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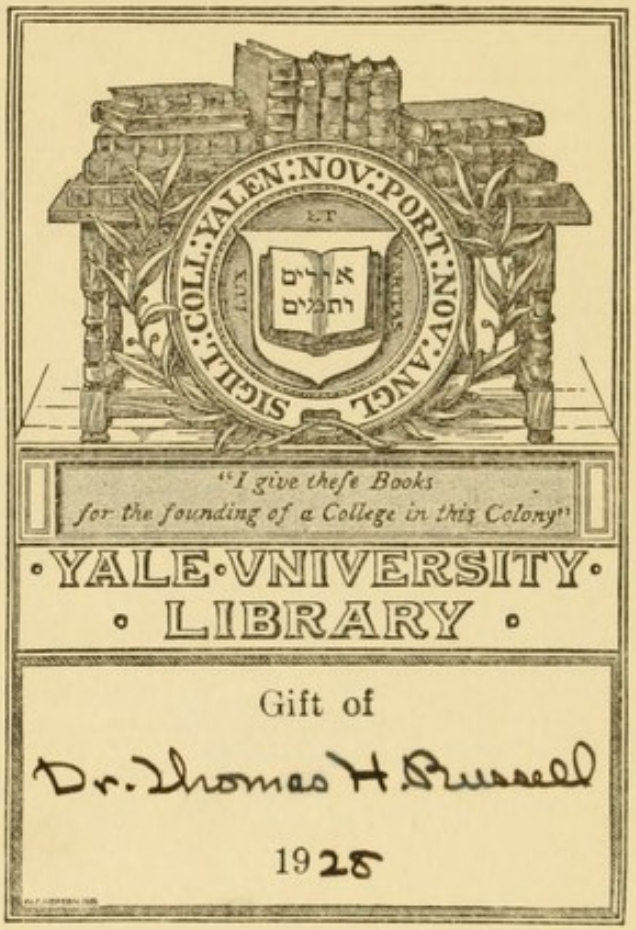

TRANSFERRED TO
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A TREATISE

ON

GYNÆCOLOGY

MEDICAL AND SURGICAL

BY

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Second American Edition

TRANSLATED FROM THE THIRD FRENCH EDITION UNDER THE SUPERVISION OF

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and the New York Academy of Medicine.

WITH SIX HUNDRED ILLUSTRATIONS

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PREFACE TO THE SECOND AMERICAN EDITION.

THE treatise of which the second edition is here given to American readers undoubtedly continues to hold the pre-eminence attained on its first appearance, when it was at at once accepted as the best work of the time on gynæcology. The cosmopolitan and scientific spirit of its author, shown in his exhaustive research and judicious appreciation of the work of other nations, together with his keen and mature judgment in utilizing the material from his own rich clinical fields, make it a clear and reliable guide to the best practice in this specialty. It has attained a phenomenal fame throughout the world. It has been translated into the German, English, Spanish, Italian, and Russian languages. It has received the prize of the Institute and of the Academy of Medicine of Paris.

The third French edition, of which this is a translation, has been the object of a careful and thorough revision, and of many additions. Certain of the chapters have been completely rewritten. The most recent treatment of uterine fibroids by abdominal and vaginal hysterectomy, the indications for the latter operation in pelvic suppurations, the recent forms of intervention in cases of retro-deviation of the uterus, are all discussed. Where the author finds it difficult to present a dogmatic exposition of certain questions still in process of evolution, he gives an exact idea of the different opinions, but does not neglect clearly to formulate his own. He believes that in a work like this, essentially didactic, it would be wrong to withhold from the reader the possibility of forming a personal conviction, but that it is also necessary that the author should never hesitate to express his own opinion.

The pathological anatomy has been subjected to many changes. The numerous histological figures, borrowed in the first edition from other works, have been replaced by new drawings, skilfully executed from specimens from the author's service by his chief of laboratory, Dr. Latteux.

In preparing this second American edition the author has been followed as closely as possible. Certain editorial notes have been added. They refer mainly to minor points, and have been enclosed in brackets. I am indebted to Drs. Aimée Raymond Schroeder and Hughes Dayton for assistance in the translation.

B. H. W.

71 WEST 45TH STREET, NEW YORK, October 1st, 1897.

AUTHOR'S PREFACE TO FIRST FRENCH EDITION.

THIS work is the result of several years of practical experience as chief of a hospital service at Lourcine, devoted especially to the diseases of women. The materials for the works published by Huguier, Bernutz and Goupil, Alph. Guérin, De Martineau, and their pupils were gathered from the same field. Thanks to the increased facilities offered in gynæcological surgery by the addition of the Pascal Annex, I have for six years been able to give regular gynæcological instruction. Moreover, the kindness of the dean, M. Brouardel, has permitted me to conduct a free supplementary course of gynæcology at the Faculté de Médecine. The lessons there given have served as an outline in the compilation of this book. Furthermore, I have, in the course of several journeys abroad, studied the methods of the principal gynæcologists of England, Germany, and Austria, and compared their instructions with those of the Faculté of Paris, where my own studies were pursued.

It is impossible to ignore the great prominence which gynæcology has everywhere assumed. The origin of its rapid progress is easy to trace. By the introduction of antisepsis a new era was opened to gynæcology as well as to general surgery. Active intervention has become almost free from danger in many diseases which used to be abandoned to palliative or disguised expectant treatment. Thanks to antisepsis, new operations have been invented and old ones restored to favor. Some of the latter had been boldly conceived and brilliantly performed by our predecessors, but the terrific mortality due to surgical uncleanliness had caused their abandonment. Such was the case with ovariotomy, vaginal hysterectomy, curetting, and even shortening the round ligaments; their present use is merely a revival.

Previous to Pasteur's great discovery, rendered fruitful by Lister, boldness in operative medicine was sheer temerity. If an occasional success raised hopes, they were at once destroyed by a series of mishaps. In 1822 Sauter (of Constance) obtained the first successful result in vaginal hysterectomy for the cure of cancer. After this one isolated cure, eleven consecutive deaths followed the first eleven operations performed in imitation of

his, and in all probability a complete list of the victims has never been published. Scarcely twenty years ago, surgery had fallen into discouragement and had renounced all active measures in a great part of the gynæcological field. Accidents during labor or the *consequences of labor* were left in the hands of *accoucheurs*, and the numerous forms of metritis, nearly all displacements, and reflex nervous disorders, perimetritic inflammations, etc., to the general practitioner. Thus dismembered and parcelled out among surgeons, general physicians, and obstetricians, gynæcology was far from forming the definite and distinct branch of the healing art that it does at the present day. Not so very long ago a good operator was a good surgeon, the two terms being almost synonymous. This is no longer the case. It has become of even more importance to avoid infection of the wound than to operate brilliantly.

Antisepsis has now triumphantly overcome all oppositions; all our instructors teach it, and the younger generation practise it with the fervor inspired by new religions. We are as well armed for the strife as our neighbors. Let us profit by their experience, and avoid the operative excesses into which they have too often fallen.

In view of these tendencies, which, it is to be feared, have sometimes caused the sacrifice of a careful clinical study of the disease, and a patient and exact determination of the diagnosis and prognosis to the *éclat* of immediate results, it seems to me that a definite rôle falls naturally to the lot of French gynæcology. Let it accept without qualification the bold and useful inventions of foreign origin, but let it exercise a more solicitous surveillance over what is in reality the highest part of our art, an exact interpretation of indications. There will then be no missing link in the chain of its records, and its future will be worthy of its glorious past.

This past is too little remembered at the present day. We ourselves are not proud enough of our long scientific lineage, which made us the teachers of other nations, in gynæcology as well as in all the other branches of the healing art. This is an opportune moment to recall it to the memory of those among us who choose to neglect our works, and who were quick to announce our decline at a time our activity were temporarily retarded. Are not modern methods of exploration, operations in use at the present day, new departures in gynæcological nosology largely of French origin? Bimanual exploration, which has been said to be a more valuable aid to investigation than even the speculum, was introduced in France by Puzos in 1753, and adopted by Levret and Baudelocque long before Kiwisch, Veit, and Schultze revived its use. The speculum, forgotten since the days of antiquity, of

Soranus and Paul of Æginus, first reappears in the works of Ambroise Paré, the illustrious Father of French Surgery, then in the surgical armamentarium published by Cullet, and finally assumes definite importance in the hands of Récamier, physician of l'Hôtel-Dieu, who introduced it into general use. Neither Lair nor Simpson nor Kiwisch were the ones to discover the diagnostic value of measuring the uterus with the uterine sound; the great French obstetrician Levret, in 1771, was the discoverer, and Huguier, the eminent surgeon of Lourcine, was the one who, after rescuing hysterometry from the discredit into which it had fallen, formulated the indications for its use.

Shall I speak of operations? Curetting was invented by a Frenchman, Récamier; the operation for vesico-vaginal fistula was first scientifically established and successfully used, in a hitherto unknown degree, by a Frenchman, Jobert de Lamballe. The surgeons who first attacked polypi, either by ligature (Levret) or boldly with a cutting instrument (Dupuytren) were French. The one who first had the daring to enucleate fibromata in the uterine tissue (Amussat) was French. In France, Récamier performed, if not the first, at least the second, successful vaginal hysterectomy for cancer. It was in France (in Strasburg), that our eminent compatriot Koeberlé was one of the first who of deliberate purpose (and not accidentally, like the greater number or his predecessors) opened the abdomen to remove an interstitial uterine fibroid. It was in Paris that Péan established a plan of technique for abdominal hysterectomy which was classical for many years.

If we pass to nosology, to the anatomico-pathological and clinical study of diseases, here again we meet a crowd of French leaders, and we have only an *embarras de choix:* Huguier for diseases of the external genitals and supravaginal hypertrophic elongation of the cervix; Nélaton for retro-uterine hæmatocele; Valleix, Aran, Bernutz and Goupil, Gallard, Alphonse Guérin, for peri- and parametric inflammations; Malassez and De Sinéty, Cornil for the pathological anatomy of ovarian cysts, endometritis, etc.

I will pause here lest this legitimate reclamation become a panegyric. I merely wished to show that our patriotism has every cause to be at ease on questions of bibliography, and that when we quote from a foreign author we often do no more than to take back our own capital with the accumulated interest thereon.

I have largely consulted foreign publications, and have quoted as many English, American, and German, as French names. It is possible that I may be criticised for so doing, but "For whoever thinks, there is neither French nor English," said Voltaire.

My endeavor has been as far as possible to present an exact statement of the present condition of science in all countries, without giving a cumbersome mass of detail. For that reason I have abstained from dwelling at any length upon historical data preceding the antiseptic period, although I have not neglected any occasion to assert any just claims of priority upon the part of operators, without regard to nationality.

In respect to bibliography, I have thought it best not to make exhaustive extracts from the enormous mass of documents which I could easily have reached through special indexes—*Revue des Sciences Médicales*, *Index Catalogue*, *Index Medicus*, *Centralblatt*, etc. This cheap form of erudition seems to me of more ostentatious value to the compiler than of real use to the reader. Those desirous of pursuing the subject farther can have ready access to these publications. There was a time(not so very remote) when a complete bibliography was essential to the compiling of any book. That time is past. At the present day we are obliged to be incomplete, in view of the enormous and constant accumulation of literary matter upon medical topics. It is better frankly to acknowledge this inevitable necessity, and make a choice of what we consider worthy of quotation. For my part, I have limited myself to advising a consultation, upon each subject, of the most recent and best works that I had been able to find. I have given the fullest list of references in regard to the questions which excite the most interest at the day present day, or about which there is the most dispute (Battey's operation, hysteropexy, etc.). I have made very few quotations at second hand, and those I have been careful to verify.

In a book designed for instruction, the author is always placed between two horns of a dilemma. Either he is in danger of sacrificing everything to perspicuity, dwelling upon outlines and leaving in the shade many details which might interfere with the schematic clearness of his sketch, in which case he is in danger of being incomplete and sometimes artificial; or else he tries to omit nothing from his picture, even though the addition of details and matter of secondary importance takes something from the prominence of the chief topics; he runs the risk in this case of being heavy and diffuse.

I have constantly endeavored to steer clear of this double danger, and, although I cannot claim entire success, yet I can claim to have done my best to that end. I deemed it essential to dwell at length upon the more recent gynæcological operations, which were often incompletely reported by my French predecessors, and somewhat obscurely described in the many existing translations of foreign works. On the other hand, it seemed unnecessary to give a detailed anatomical description of the female genital organs; I con-

tented myself with a few indispensable general indications quite sufficient for a work on pathology. The only details entered into are in reference to the external organs of generation, where certain views had to be stated in regard to their development and homology, which seemed to me to throw light upon the origin of some interesting malformations.

Many of my illustrations are original; they were drawn under my direction by M. Nicolet, who is both skilful and intelligent. I have also borrowed largely from various treatises and monographs. In every case in which these illustrations had any originality, I acknowledged their source, omitting this formality only in the case of those which came from classical works known by every one, and which have been so often reproduced as to be almost public property.

Professor Cornil kindly gave me permission to reproduce the remarkable histological illustrations of his lessons on endometritis, cancer, salpingitis, and genital tuberculosis. Professor Wyder was good enough to allow me to make reduced copies of the valuable plates in his atlas. M. Toupet, with his well-known ability and courtesy, made several anatomical examinations for me relative to salpingitis and follicular ovarian cysts. A few illustrations were kindly lent by MM. L. le Fort, Tarnier, Doléris, Dumoret, Marcel Baudouin, Poirier, Laroyenne, Collin, Mathieu, Aubry, Raynal, Dupont.

My good friend Professor Testut and my brother, Dr. Adrien Pozzi (of Rheims), deserve my gratitude, the one for making out the indexes, the other for correcting the proofs.

Finally, I wish to thank the publisher, my friend M. Georges Masson, whose faithful co-operation has greatly facilitated the execution of my laborious undertaking.

PARIS, July 22d, 1890.

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CLINICAL AND OPERATIVE GYNÆCOLOGY.

CHAPTER I.

ANTISEPSIS IN GYNÆCOLOGY.

THE general laws of surgical antisepsis are applicable in the main to gynæcology, but there are certain surgical details and technical processes which it is necessary to emphasize and describe at length. These details fall naturally into two divisions: the first relating to operations through the natural passages upon the vagina, cervix uteri, and uterine cavity; the second to operations through artificial openings involving the peritoneum.

ANTISEPSIS OF OPERATIONS THROUGH NATURAL OPENINGS.

A. Of the Operator.—Absolute cleanliness of the hands is of great importance in general surgery, but is pre-eminently a matter of necessity where there is to be manipulation of the vaginal or uterine cavities; for in these situations pathogenic germs find a culture medium essentially favorable to their development, and infection is rapidly initiated. The nails must be carefully cleaned with a smooth-pointed cleaner; the hands and arms to the elbow should be scrubbed for six minutes with soap and a stiff brush in hot water. The towels used should have been rendered aseptic in a sterilizing oven.

From researches carried on by von Eiselsberg in Billroth's clinic, upon the various substances used in the hospitals for cleansing the hands, it would seem that all soaps are good, except the ordinary hard (resin) soap; in this Eiselsberg has found many pathogenic spores, whose presence is quite accounted for by the processes of manufacture—the use of impure fats and the low temperature of saponification. The scrubbing with soap and water should be followed by washing in a bichloride solution of 1 : 1,000. All assistants and nurses should likewise cleanse hands and arms to the elbow in the same thorough manner. Many operators consider this method of cleansing insufficient, and prefer to immerse hands and arms in a saturated solution of potassium permanganate, which stains the skin a violet-brown, then removing the color by a concentrated solution of oxalic acid, and finally washing in sterilized water. I believe that this method may be reserved for the exceptional cases where there has been contact with material which is septic

or suspected of being so. Fürbringer advocates the use of alcohol at 90° as a wash for the hands, in addition to the soap and bichloride.

Where one is obliged to handle fetid substances, as in uterine cancer, etc., the use of deodorizers may well supplement but not replace antiseptics. Without them, the hands become impregnated with a disagreeable odor which clings in spite of thorough washings. Foulis, of Edinburgh, finds that anointing them before the operation with spirits of turpentine is a sufficient protection.

A vessel containing a 1 : 2,000 bichloride solution should be placed at the side of the operator, so that he may from time to time dip his hands in it.

The operator and his assistants should wear over their ordinary garments a blouse or linen frock, which must be changed, washed, and sterilized daily. For operations where constant irrigation is used, the surgeon should further be protected by a large apron of waterproof material.

B. Instruments.—As far as practicable, the instruments used should be of the simplest possible construction, easily taken apart if composed of several pieces, without cavities or grooves from which impurities are removed with difficulty. For this reason we should exclude slides on uterine sounds, canulated suture needles, needle-holders with springs, and, in spite of their convenience, the ingenious invention of Jacques Reverdin, needles with split eyes. Instruments in one piece are the best.

The instruments, which immediately after a previous operation should have been immersed for five minutes in boiling water containing a teaspoonful of carbonate of soda to the quart and carefully wiped, must again be boiled just before the next operation. Five minutes' immersion in boiling water is sufficient to destroy all germs. The bichloride solution cannot be used on account of its destructive action upon metals. Should the instruments have been previously used upon septic material (fetid pus, sanious or gangrenous matter, etc.), these precautions will be insufficient. They must then be immersed for a half-hour in a strong (five-per-cent) carbolic solution held at the boiling point, or kept for an hour in a sterilizing oven at 284° F., or soaked for twelve hours in a strong cold carbolic solution. These processes have a deleterious effect upon the instruments, especially the bistouries, but they are nevertheless indispensable.

C. Surroundings. Operating Room. Furniture.—It is important that the room used be perfectly clean, and free from curtains, hangings, mats, carpets, etc., which might retain dust. In a private house, whatever room is used for any important gynæcological operation should be emptied of its furniture and thoroughly cleaned; in a hospital it is essential that the floor, walls, and ceiling of the operating room should be so constructed that they may be washed daily with the hose. Moreover, it is well to have sterilized water and antiseptic solutions in jars with long tubes that may be easily reached. It is advantageous to have, in addition to a high and wide window at the side, free ingress of light from above. The furniture should be as

scanty as practicable, and exclusively of glass or metal, easily movable and easily cleaned.

D. The Patient. Antisepsis of the External Genitals.—The patient should have had a complete bath with hot water and soap the evening before or the morning of the operation. The rectum, however small a share it has in the operation, should have been carefully emptied by an enema and afterward washed with a saturated solution of boric acid. The catheter should be used by the surgeon or an assistant previous to the disinfection of his hands. In all operations upon the vulva the pubic hairs must be shaved, to add to the ease of the operation, as well as to remove a possible lodging-place for septic material.

The external genitals and vagina should be cleansed first with hot water, soap, and a brush, then washed with a 1 : 1,000 bichloride solution.

In my opinion, there is no objection to the 1 : 1,000 bichloride solution as a vaginal injection, providing that it is administered under the conditions and according to the directions to be given. The biniodide of mercury has been recommended, but it does not seem to offer any great advantages. Pinard and Bernardy use a solution of biniodide 1 : 4,000 instead of a sublimate solution 1 : 1,000. The use of bichloride in gynæcology and especially in obstetrics has been much decried of late. Certainly at first it was used in too strong solutions and with too little care, but the reaction has reached the other extreme. The papers published upon this subject have not always taken into account the radical difference between injections given immediately after labor, and those administered under other conditions. In the woman recently delivered, the vaginal and uterine cavities communicate through a more or less gaping and softened cervix. Fluid injected into the vagina, especially if one be not careful to separate its walls with the fingers, flows readily into the uterus, accumulates and remains there, and is perhaps absorbed by the relaxed mucosa, or its desquamated surface. Hence the accidents noted after simple vaginal injections, which have been observed not only after the use of bichloride, but after carbolic solutions. I would here point out a danger attending the use of aqueous solutions prepared upon the spot by diluting concentrated solutions of carbolic acid; more especially if the preparation be impure, small oily drops may form which dissolve with difficulty, and, as a consequence, the injection, instead of being a perfect solution, is in reality a toxic mixture. This is the explanation of cases observed by Briggs, serious accidents resulting from the administration of an injection of a teaspoonful of the alcoholic solution of carbolic acid in a pint of water, to women recently delivered. It is equally certain that the intra-uterine injection of a too powerful bichloride solution (1 : 1,000) may be dangerous even in non-puerperal patients, as in the case quoted by Mijalieff, where such an injection, given daily for twenty-six days for simple metritis, resulted in a mercurial nephritis with hæmaturia. I purposely omit allusion to the experiments upon the vaginæ of female rabbits and

guinea-pigs, which do not seem to me conclusive. Moreover, one should keep in mind the fact that the bichloride solutions commonly employed are very rapidly neutralized by contact with abundant secretions, leucorrhœa, cancerous ichor, etc., and lose both their toxic and disinfecting power. Ernest Laplace has recently shown the instability of this antiseptic, and has investigated the cause and its remedies. The mercurial salt is precipitated by albuminoid matter, forming albuminates, whence the rapid loss of antiseptic power. The following are a few of his experiments: To an open tube containing a little less than an ounce (25 c.c.) of natural serum is added about a drachm (5 c.c.) of sublimate solution 1 : 1,000; the development of germs is not prevented; with seven minims of serum bacteria are present. In a tube containing a drachm of sublimate solution 1 : 1,000, with about twelve minims of putrefied human blood containing bacteria, the microbes multiply; if a few drops of this mixture are cultivated on gelatin according to Esmarch's method, at the end of five days we shall find large colonies of the staphylococcus aureus. Laplace has found that the addition of 5 : 1,000 of tartaric acid to the solution is sufficient to prevent the formation of the albuminates of mercury, without impairing its power to destroy every germ present. This discovery, most valuable for general surgery, may also be utilized in gynæcology. From my own experiments I have nothing but praise to award it.

Creolin has been experimented with in gynæcology and obstetrics by Baumm and Born in the Maternity and Obstetrical Clinic of Breslau. As a result of their researches it would seem that creolin possesses certain decided advantages, but also certain drawbacks which tend greatly to limit its usefulness. It is extremely difficult to obtain a fixed product, its exact chemical composition not having as yet been determined. It is used in solution of 1 : 200 in treating ruptured perineum, fissured nipples, etc. If more concentrated, it may produce erythema or eschars, so that as an antiseptic it would seem to be inferior to a 1 : 8,000 bichloride solution (Baumm). For intra-uterine injections Born has used a 1 : 100 solution, for vaginal irrigations 2 : 100, with no resulting accident due to absorption. Besides its undoubted antiseptic power, creolin possesses the great advantage of leaving the vagina soft and flexible, and even of imparting to it a degree of oiliness which is of decided advantage in obstetrical operations, and in certain gynæcological manipulations when several fingers have to be introduced into the vagina, or where a large tumor is to be extracted through it (enucleation of fibroid bodies, vaginal hysterectomy). We know that solutions of the bichloride of mercury and even those of carbolic acid have the opposite effect of stiffening and roughening the vaginal mucosa, leading often to serious inconvenience. This is, I believe, the only useful application of creolin. The opacity of the solution renders it unfit for the immersion of instruments.

β Naphthol, used by Bouchard for intestinal antisepsis, has been recently extolled for surgical dressings, either in solution or as a saturated gauze.

It has the advantage of being very slightly poisonous, and seems destined to render real service. The aqueous solution contains only two parts in a thousand.

Vaginal injections, to be truly cleansing, should be given according to certain definite rules. A portable cylindrical can, to which is attached a long tube ending in the nozzle (Figs. 1 and 2), should be fixed at a slight height above the operator, or held up by an assistant. The person who gives the injection places the canula in the vagina, introducing by its side the index and middle fingers, which are gently pushed up to the cul-de-sac, then

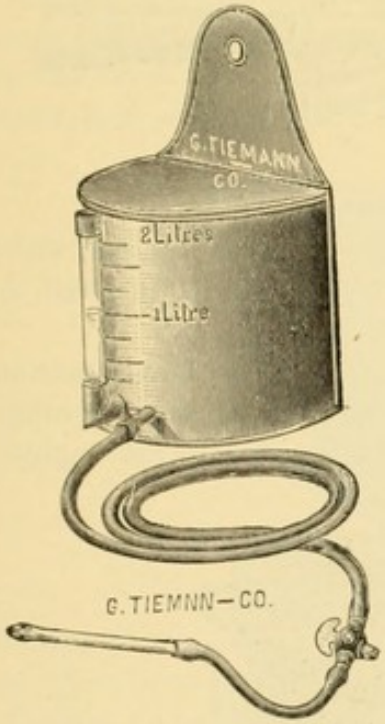


FIG. 1.—VAGINAL IRRIGATOR FOR SUSPENSION.

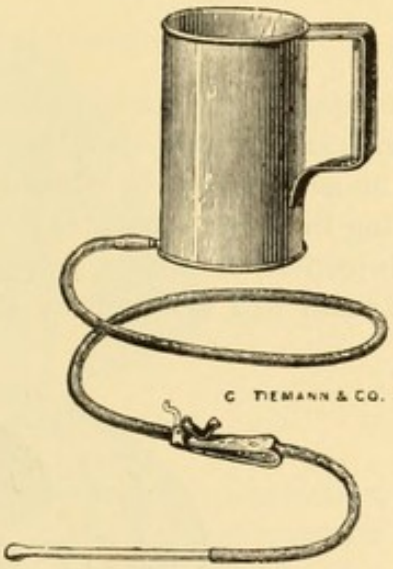


FIG. 2.—PORTABLE VAGINAL IRRIGATOR.

firmly rubbed about in every direction to open out the folds of the vagina and insure their thorough cleansing. If this procedure be neglected, some cause of infection will surely remain. The surgeon or his assistant should himself give such an injection before an operation; it is what I call rinsing the vagina.

All canulæ to be used by the surgeon should be of strong glass with one terminal orifice, for the water should be directed toward the cul-de-sac and the cervix, cleaning the vagina upon its return only. For injections to be administered by the patient herself it is best, to avoid all possibility of introducing the tube into the os uteri, to have a canula with several openings on the side of a terminal enlargement. It is also a convenience to use a wire speculum, which accurately fits the canula, and which opens out the vagina and permits of thorough irrigation (Fig. 3). The patient should lie upon a pan, a Kelly pad, or a rubber sheet arranged to carry the fluids into a pail (Figs. 4, 5, and 58).

The accidents liable to occur from vaginal injections and the danger of wounding the cervix or allowing liquid to enter through it, have been greatly exaggerated. Some physicians have even gone so far as to forbid the use of the canula. This is, I think, a grave error. You should simply instruct the patient to insert the instrument to a depth of six to eight centimetres

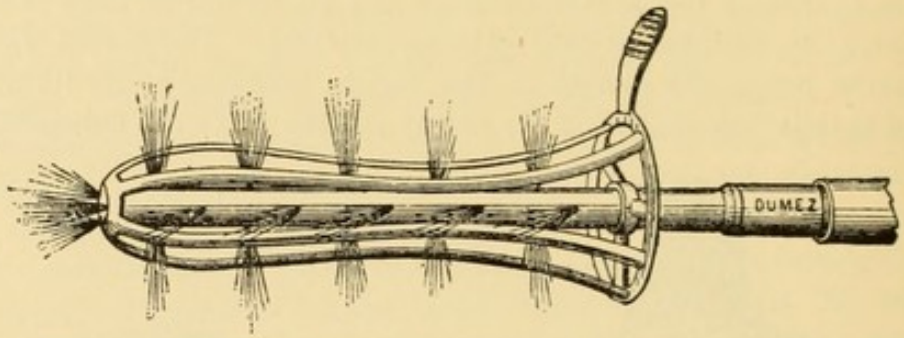


Fig. 3.—Fenestrated Speculum for Vaginal Irrigation.

(three inches) only, or about a finger's length. Rubber canulæ, which are not easily cleaned and disinfected, should be discarded. Curved canulæ possess no advantage over straight ones.

During the week preceding the operation, the patient should take an antiseptic injection (sublimate solution, 1 : 2,000) morning and evening, after which a small pad of iodoform gauze is to be inserted in the vagina. On

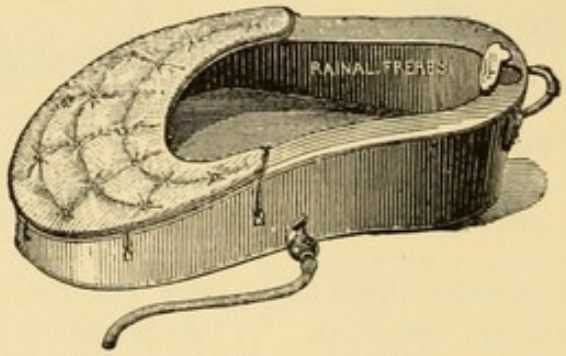


Fig. 4.—French Bed-pan with Exit-tube.

the day of the operation three injections are to be given, the first two at intervals of an hour, the third at the very moment of the operation; I will point out later the reason for this method of procedure.

After a vaginal injection, especially of corrosive sublimate, one should be careful to press down upon the fourchette in such a manner as to insure the escape of all the fluid. In many women the terminal portions of the vagina and the vulva are of so firm a quality that much fluid may remain imprisoned in the upper part of the canal, and give rise to the various accidents due to absorption. I have myself witnessed several minor casualties due to this cause.

There is a widespread opinion that an antiseptic injection should follow

and not precede minor gynæcological procedures—as examination, catheterization, dilatation, etc. This is a grave error. Antisepsis is most needed before any such manipulation. The observations of Kaltenbach upon the auto-infection of parturient women might have caused a suspicion of the existence of a condition of latent infection, so to speak, of the female genital organs, especially during the puerperal period. The researches of Winter have recently placed this fact beyond dispute. The genital tract, vagina, and cervix uteri of a healthy woman contain pathogenic germs; the staphylococcus pyogenes aureus, citreus, albus, and streptococci of three varieties have been recognized by their several distinct characterisitcs and methods of culture. But, and most important, their virulence seems to be attenuated and latent, since the inoculation of animals with these germs and their cultures has been without result. Notwithstanding this, they are a perpetual

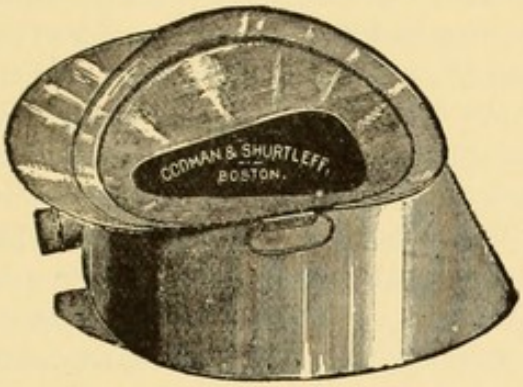


Fig. 5.– Hospital Bed-pan (or Baker's Bed-pan).

menace, for these inert organisms may, at the slightest septic impulse from without, germinate and fructify with the most terrible consequences. Moreover, there is no proof that these germs, innocuous so long as they remain in their ordinary habitat below the orifice of the internal os uteri, may not reacquire virulent properties if they are suddenly carried beyond this boundary. That germs may be carried into the uterus by the use of the sound and by manual touch has been proved beyond a doubt by Winter's examinations of specimens removed by hysterectomy shortly after these operations. The consequences of these remarkable experiments are important. As regards the disinfection of the vagina prior to operation, they make its necessity apparent. Is it possible, by means of the most carefully administered injection, to get entirely rid of the micro-organisms quartered in the cervix? Steffeck has made a particular study of this subject, from which he draws the following instructive conclusions:

1. After a vaginal injection of one litre of a 1 : 3,000 sublimate solution, as many germs as before are found in the cervix; only the vagina has been cleansed.

2. After the same injection, in which the vaginal washing has been done with the aid of one finger as described above, if some of the vaginal mucus

be inoculated upon agar-agar, a number of colonies will develop, less numerous, however, than in the first case.

3. After the same performance aided by two fingers, two of every three cultures will remain sterile.

4. As a final experiment the injection of the vagina and the cleansing of the cervix are accomplished in the following manner: One finger is pushed as deeply as possible into the cervix; another finger opens and permits a thorough washing of the anterior cul-de-sac—then the two fingers are rubbed about in such a way as to cleanse the posterior cul-de-sac; finally the stream of water is sent directly into the os externum. After so thorough a washing as this, all culture experiments have been without result, while before this disinfection the tube cultures showed from fifty to one hundred colonies. As might be expected, this disinfection is of short duration, as more germs come from the supravaginal portion of the cervix through the os uteri, and at the end of an hour may be found in the lower portion of the cervix. By repeating the injection for a second and then a third time at intervals of an hour, the germs may be destroyed for a longer time, Steffeck having found that in such a case the mucus was free from germs for five days.

This process of successive sterilizations is somewhat tedious, but it reduces to a minimum the chances of auto-infection. This is the reason why I recommend the administration of three consecutive injections at intervals of an hour, previous to every operation. No sound or dilator should ever be introduced into the uterus without this thrice-repeated disinfection of the vagina and cervix.

To the omission of this precaution may be traced the numerous accidents following these operations even when they are apparently done under strict antisepsis. If we have to do with a disease causing a foul odor, as cancer, sloughing fibroid, etc., the antiseptic should be preceded by a deodorizing injection (which is at the same time in itself slightly antiseptic) of a quart of hot water to which are added two or three teaspoonfuls of Labarraque's solution of chlorinated lime or Pennès' vinegar. To wash the rectum and the bladder, use either a solution of boric acid (30 : 1,000) or boiled water.

For dressings, iodoform gauze should be used almost exclusively. That which we ordinarily obtain as an article of commerce is supposed to contain from five to ten per cent of iodoform. When large amounts are needed, it is more economical and better to have it prepared by some one trustworthy person. Ten yards of plain gauze sterilized by boiling are cut into pieces of a yard each, soaked in a solution of iodoform (50), glycerin (100), and ether (700), passed through a wringer, hung up in an isolated chamber which is darkened and heated to 85° F., and dried, after which it is placed in tightly closed tin boxes. I employ also for the first dressing strong iodoform gauze which is prepared by rolling sterilized gauze or ten-per-cent iodoform gauze in iodoform powder, shaking it lightly, and cutting it into small squares.

Some curious experiments made by von Eiselsberg in Billroth's clinic,

upon supposedly carefully prepared gauze, demonstrated the fact that it often (eleven times out of thirty) contained germs whose presence was readily shown by means of culture. If the gauze, before the addition of the iodoform, was subjected to a temperature of 212° F. (easily done by boiling it), the cultures remained sterile in the proportion of eighteen out of twenty. This preliminary precaution of sterilizing should never be omitted.

It would be still better to heat the gauze to 250° F. in a steam sterilizer in order to destroy both germs and spores. But this apparatus is not everywhere obtainable, and sterilization by means of boiling water, if not theoretically perfect, certainly seems to produce sufficiently excellent practical results.

It may seem surprising that iodoform alone does not suffice to destroy all germs. As regards this point, we must refer to the researches of Heyn and Rosving. They have proved that iodoform in itself is not a germicide, is not even an obstacle to the development of germs. De Ruyter (of Berlin) and Lübbert (of Wurzburg) have come to the same conclusions, which have been further confirmed by the recent experiments of C. B. Tilanus. Shall we conclude that iodoform *in vivo* is not an antiseptic in the presence of pathogenic ferments? Certainly not. The researches of Behring (of Bonn) will give the solution to this seeming contradiction. According to this authority, iodoform acts upon and destroys leucomain sand ptomains as fast as they are formed. It may be considered as an established fact that it is not possible to have any dressings which will be absolutely aseptic. You may keep them from all contact with the air in tightly closed metal boxes; but whenever the box is opened the germs may enter. It is better, therefore, to use antiseptic gauze (iodoform) rather than aseptic gauze which has simply been sterilized in a moist chamber. Nevertheless, if sterilization were applicable on a large scale, not only to the dressings but to all the bedding as well, it would no doubt be all-sufficient. In Bergmann's clinic, where everything is thus carefully purified, the effort is, as far as possible, to replace antisepsis by asepsis, and for this reason gauze which has simply been sterilized is used in many cases as a dressing.

If symptoms of absorption render necessary the substitution of some other substance for iodoform, sterilized and sublimated gauze should be used. This may be easily obtained by first boiling the gauze for an hour in a solution of sodium carbonate, 20 : 1,000, to remove all stiffening, then for an hour in a 1 : 1,000 solution of bichloride. It is then dried in a sterilizing oven and preserved in tightly closed boxes or jars.

I have used salol and iodol, and have found them very inferior to iodoform and sublimate. As to carbolized gauze, it so quickly loses its antiseptic properties that it is not to be depended on; moreover, it is slightly irritating.

A number of antiseptic substances have been recently extolled in gynæcology. Ichthyol, introduced into gynæcological practice by H. W. Freund,

has been the subject of many articles. These show that ichthyol, employed with success in local applications for ulceration of the cervix and genital pruritus, acts rather as an antiphlogistic and local analgesic than as an antiseptic. It has been used internally in diseases of the genital organs depending upon the arthritic diathesis (chronic metritis, oöphoritis). A resolvent action upon exudates has been attributed to it, but this property has been contested. Eschen has reported three cases of general erythema following the use of ichthyol.

The aniline dyes have been recently recommended as powerful antiseptics by J. Stilling, who uses a solution of from 1 : 1,000 to 5 : 1,000. Warmann has employed with great success a 1 : 1,000 solution of pyoktanin or methyl violet in cases of endometritis and of vaginitis and in gynæcological operations. He extols its antiphlogistic, analgesic, and antiseptic action.

Lysol, introduced into surgical and gynæcological practice by Cramer and Wehmer, has a germicidal power at least equal to that of phenol. It is much less toxic and its price is very moderate. It is said to lubricate the hands of the surgeon and the instruments, a serious inconvenience during operations, especially as regards hæmostasis, but advantageous in gynæcological examinations. Michelsen strongly urges its employment.

Dermatol has been presented as a substitute for iodoform. The observations of Sackur and Weissmuller show that while it is an excellent antiseptic with a considerable drying power, it cannot supplant iodoform. According to Gloeser and Asch it renders great service in cases in which it is desired to prevent an abundant secretion from a wound, or in which primary union is desired in a place where an occlusive dressing is difficult to apply; as the pedicles after hysterectomy, vesico-vaginal fistulæ, operations upon the cervix, perineorrhaphies, etc.

Among other antiseptics are aristol, whose good effects upon endometritis, erosions of the cervix, perimetritis, and vulvar eczema have been appreciated by von Swiecicki; thiol, whose indications and antiseptic properties are like those of ichthyol, of which it has not the disagreeable odor, though its cost has prevented its general use; thiophane, employed in the form of the biniodide either in powder or in gauze impregnated with a ten-per-cent emulsion, and which may advantageously replace iodoform in many gynæcological operations; alumnol, which according to Heintz and Liebrecht is of great service in gynæcology, either as an antiseptic for irrigating irregular wounds or as a mild caustic in the form of from two to five per cent in cases of endometritis. Chotzen has used successfully in uterine irrigation diaphtherin, or oxydinaseptol, recently discovered by Emmerich, and which, according to Konrad, is one of the best antiseptics known, and di-iodoform, whose content of iodine is perhaps equal to that of iodoform and whose therapeutic properties are analogous.

Antisepsis of the Cervix and Uterine Cavity.—After operations upon the uterus or the cervix, it is well to leave some antiseptic in contact with the

cervical canal. I have used small crayons made according to this formula of von Häcker:

℞ Iodoformi pulv., ... 20.00 gm. ʒ v.
Gummi acaciæ,
Glycerini,
Amyli, ... āā 2.00 gm. gr. xxx.
M. S. To be made into sticks of the same calibre as the ordinary sticks of nitrate of silver.

These crayons have the advantage of being very manageable, and they can be inserted to quite a depth into the uterus; but sometimes they dissolve incompletely, and their presence gives rise to colicky pains. I have therefore abandoned their use, and content myself with dusting iodoform upon the cervix or blowing it into the cavity, leaving besides in contact with the cervix a tampon of iodoform gauze.

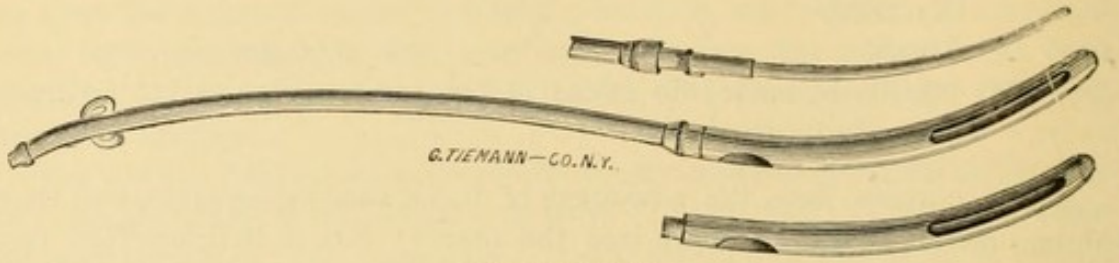
The disinfection of the apparatus used in dilating the cervix is one of the most important points for our consideration. I do not use tupelo tents, regarding them as much inferior to the laminaria. This even may be a source of infection if we neglect certain precautionary measures.

It should be kept, for several weeks before using, in a saturated solution of iodoform in ether, to which it is well to add one part of alcohol in ten. In this way toxic effects, such as have been recently recorded after the use of laminaria tents kept in a bichloride solution, are avoided. Konrad has observed symptoms of poisoning by bichloride (tenesmus, severe pains, bloody stools, metallic taste, etc.) five hours after the introduction of a laminaria tent which had been kept in a 1 : 1,000 solution of mercuric chloride, the symptoms disappearing rapidly after appropriate treatment. The anterior and posterior vaginal walls showed small ulcerations produced by cauterization. These as well as the toxic symptoms are believed by Konrad to have been caused by small crystals of bichloride which had been deposited upon the tent.

Intra-uterine injections in gynæcology are far from possessing the same danger that they do in obstetrics, excepting where the uterine cavity is much dilated and offers, after an operation, a large denuded surface (enucleation of fibromata, curetting a cancer in the fundus, etc.). In a case like this, the conditions are very similar to those of a uterus after delivery, so far as the absorptive area is concerned.

When the uterine cavity is not specially dilated (as after curetting for catarrhal or hemorrhagic endometritis), there is no objection to using a bichloride solution 1 : 2,000, if one has a double-current catheter of hard rubber, glass, or celluloid. But as most instruments are of metal, which is attacked by the mercurial solution, it is better to use a one-per-cent carbolic solution. This must be tepid and one may use a pint or more until from the appearance of the fluid as it comes from the uterus it can be seen that

the cleansing has been thoroughly accomplished. The number of tubes for intra-uterine injections has greatly increased of late. When the uterine cavity is not enlarged, I use the Bozemann-Fritsch instrument (Fig. 6), after dilating the cervix, if that be necessary. If the uterus is much enlarged, no



1. Bozeman-Fritsch's.



2. Oliver's.

Fig. 6.—Recurrent Catheters for Intra-uterine Injections.

danger attends an injection given with an ordinary sound or canula, providing that the pressure of water be not too great, as the liquid can easily return around the canula.

Should the cavity of the uterus need powerful disinfection (as in certain cases of gangrenous fibromata, intra-uterine cancer with putrid fungosities,

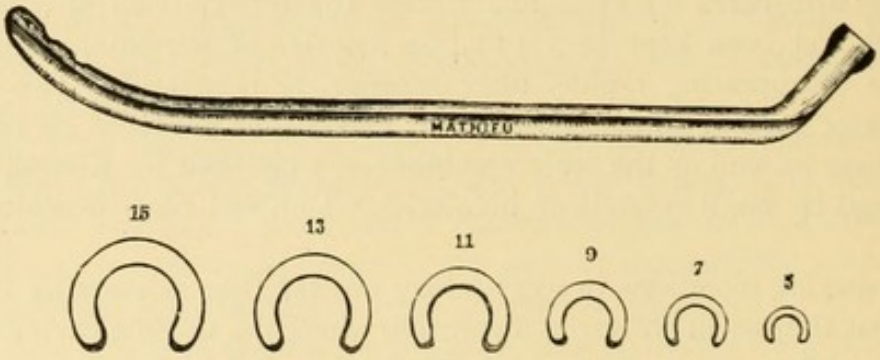


Fig. 7.—Budin's Horse-shoe Recurrent Catheter for Intra-uterine Irrigation.

etc.), it would be well to use bichloride 1 : 2,000; after its prolonged application, it must be followed by a second intra-uterine injection, simply to wash away any of the poisonous antiseptic which might remain. For this purpose I would recommend sterilized water, to which I would add 6 : 1,000 of sea salt; this modifies its irritating and absorptive powers by causing its composition to approach more nearly that of the serum of the blood. I make frequent use of this fluid for injections that are to be purely aseptic, whenever, for any reason, the use of antiseptics is contraindicated.

Before leaving the subject of the antisepsis of the external genitals, the

vagina and the cervix, I would say a word in reference to a procedure which is at the same time an adjuvant in an operation and a method of disinfection. I refer to continuous irrigation. It may be accomplished by means of a special speculum (Fig. 8), or more simply by the help of a long canula which one of the assistants must grasp in his hand, supporting his wrist upon the pubis, while in the same hand he holds another instrument (a retractor or

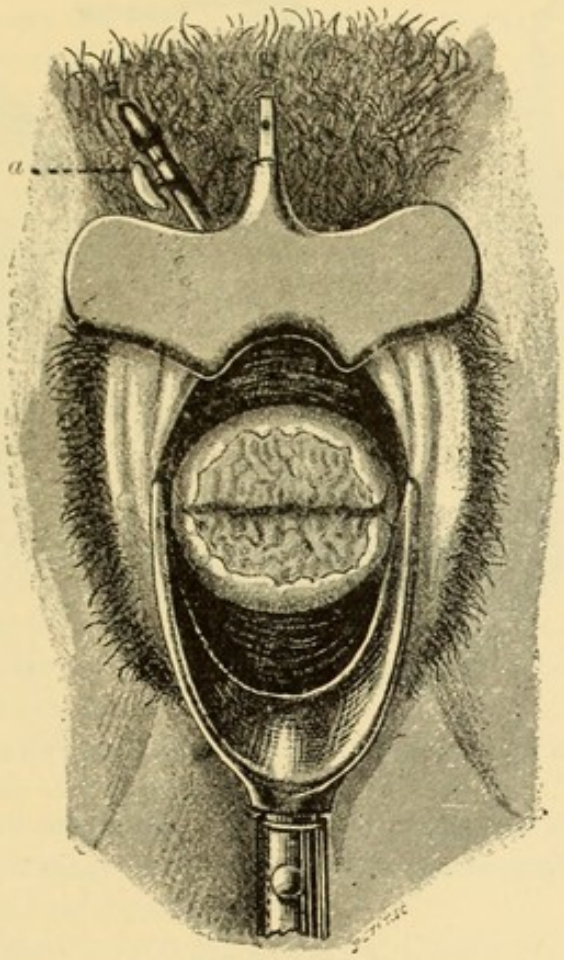


Fig. 8.—Showing how Continuous Irrigation during Operation may be Maintained by Fritsch's Device. *a*, End of irrigating canula to which rubber tube is to be attached.

a tenaculum, Fig. 9). I use for this irrigation carbolized water (10 : 1,000), at 95° to 115° F. Its strength must be diminished to 5 : 1,000 if the irrigation lasts for any length of time, otherwise painful excoriations will be the result. [The sterile normal salt solution is much to be preferred for this purpose.] The slender stream of water which constantly flows upon the operating field, and can be increased or diminished at will, has a two-fold advantage: it washes away the blood, thus dispensing with the necessity of sponges or their substitutes, and it keeps the wound bathed in an antiseptic fluid which is a far better protection against the germs in the atmosphere than even the spray. In all operations upon the vulva, vagina,

and cervix, the use of continuous irrigation is to me a matter of routine practice; I can scarcely praise it too highly.

I never use sponges except in vaginal hysterectomies, as I consider pledgets of absorbent cotton, either dry or soaked in a solution of bichloride and then wrung out thoroughly, to be superior in all other cases. When

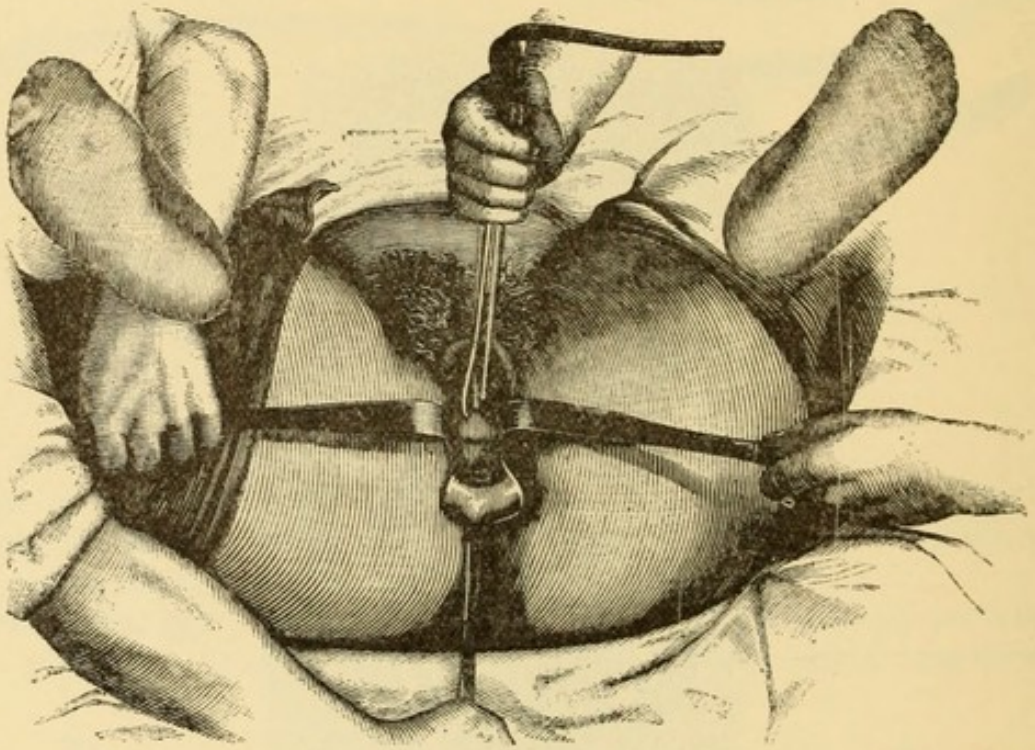


Fig. 9.—Continuous Irrigation with a Long Nozzle; also Shows Position of Assistants.

these are used dry, it is well to wrap each in gauze in order to avoid the detachment of portions which adhere to moist surfaces.

Laparatomy.

I will now take up the special antiseptic precautions which are to be used in a laparatomy.

A serious preliminary point arises: How does it happen that operators of great authority, as Lawson Tait and Bantock for example, disapprove of antisepsis, regarding it as useless and even dangerous, and, in spite of this opinion, obtain the most superb results? Does not this fact greatly impair the value of the minute precautions which we are about to advise?

The contradiction is more apparent that real, and to convince yourself of this it is only necessary to follow in detail the methods of procedure adopted by these operators whom I have quoted. This will show that if they are not antiseptic they are eminently aseptic, that is to say, they replace chemical by physical antisepsis (the use of heat) and by the maintenance of strict

cleanliness. Now for a laparatomy and all intraperitoneal operations, asepsis is not only equal but far superior to antisepsis. In fact, considering the delicacy of the endothelium lining serous cavities, an antiseptic solution strong enough to exert any action would injure this tissue and perhaps be followed by results which would endanger the success of the operation. Rigid asepsis, then, should be the rule for the interior of the abdomen, antisepsis being reserved for the exterior. If, moreover, you will note the fact that after a laparatomy and the accurate fitting together and suture of the abdominal walls, there is, so to speak, no longer any wound, you can understand why the omission of antiseptics in the dressings may be unattended by untoward results. Notwithstanding all this, I consider such omission to be an error.

A. The operator and his assistants must be absolutely clean. For forty-eight hours previous to the operation, none of them should have been in a dissecting room, nor present at an autopsy, nor have handled an anatomical specimen or septic wound.

On the other hand, they should have taken a full bath, using hot water and soap over the whole body.

A long and perfectly clean sterilized linen garment should cover their ordinary clothes. [It is better to remove the outer garments before putting on the operating-room suit.] The hands and arms should be disinfected according to directions given above. After these ablutions they must be careful to touch nothing which has not been disinfected, nor to shake the hand of any friend. If necessary, one may wear sterilized rubber gloves until the very moment of the operation.

The number of assistants should be as restricted as possible in order to diminish the chances of infection. One is usually sufficient for the operation itself; a second to prepare and hand sutures and ligatures. The surgeon himself will take his instruments from the receptacles where they are lying in an antiseptic solution.

No one should operate upon the abdomen if there be the smallest sore or suppurating scratch upon the hands, for no rubber finger shield can fully protect the peritoneum from possible infection.

B. The patient has on the previous evening been given a soap and sublimate bath. For several days she has had, night and morning, a vaginal injection of bichloride 1 : 2,000, after which a pad of iodoform gauze has been placed in the vagina. The bowels have been emptied by a purge the day before, and by an injection in the morning. An assistant uses the catheter, and immediately disinfects his hands. The hairs are shaved, the abdomen is scrubbed with soap and hot water with a brush, then with ether, and finally with bichloride 1 :1,000, taking especial care to clean the cutaneous folds of the umbilicus. The abdomen is then covered with compresses saturated with sublimate solution, and these remain in place for the time, however short, which elapses between the cleansing and the operation.

Kelly advises covering the abdomen, for two hours before the final cleansing, with a poultice of soft potash soap in order to remove the epithelium.

C. In a hospital, a special room is reserved for laparatomies. It is as far as possible from the wards in which are patients with suppurating or septic wounds, from the water-closets, and, in short, from all sources of infection. The corners should be rounded off; there must be no recesses or places not easily accessible for cleansing purposes. All the furniture should be movable; seats, tables, stands, should all be of metal, enamelled or var-

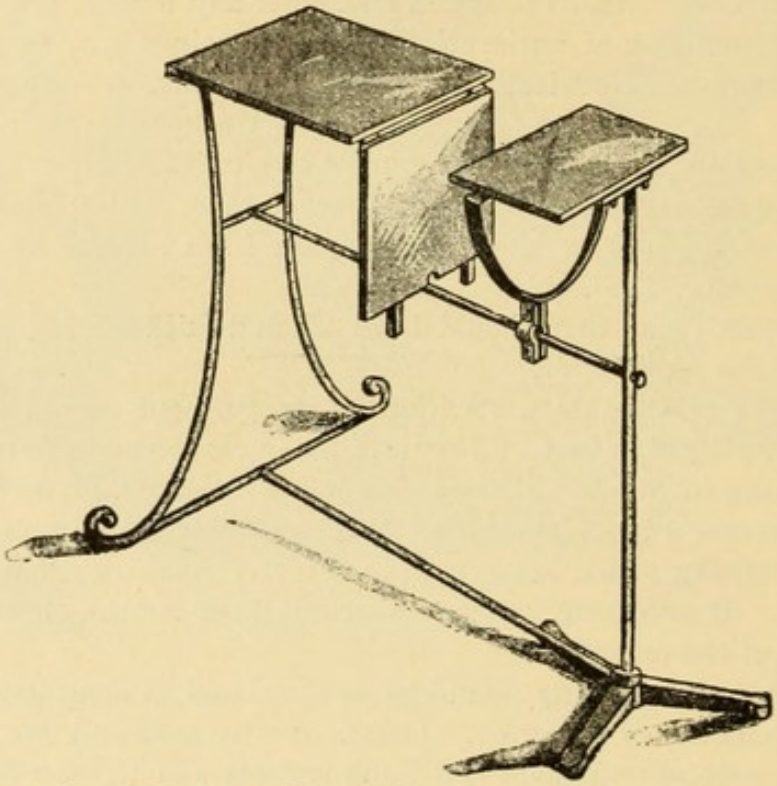


Fig. 10.—Laparatomy Table of Mme. Horn, Employed by Martin.

nished, or of glass. After each operation, the wall should be washed with a hose attached to a pump, or to a faucet which admits the water with sufficient force to send it to the most remote corners.

Should the operation not be performed in a hospital, the room chosen should be carefully prepared at least two days in advance. The furniture must be removed; if the walls have not been newly whitewashed, they must be carefully cleaned, as well as the ceiling, floor, and woodwork, with cloths soaked in a carbolic solution 50 : 1,000. If the house be old, or the room under suspicion, this cleansing should be supplemented by a disinfection with sulphurous acid—placing some sulphur (two pounds to each one thousand feet) upon a dish in the middle of the room, setting fire to it, and hermetically sealing the openings to the chamber during twenty-four hours.

During the whole of the operation the temperature of the room should be high, in order to avoid all chilling of the patient *intus et extra*. From 77° F. at least, to 86° F. at most, is necessary.

Instruments.—These should have been thoroughly cleaned and immersed in boiling water for five or ten minutes after the preceding operation. On the day appointed for the laparatomy they are to be placed for an hour in a hot-air oven at 250° to 290° F., then plunged into the two-per-cent carbolic solution. A sterilization less perfect, but sufficient for ordinary practice, may be obtained by boiling (Figs. 11 and 12) the instruments for a quarter

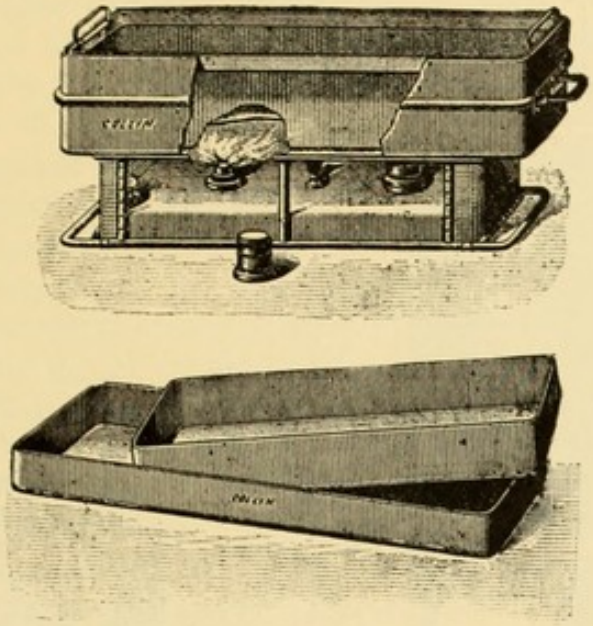


FIG. 11.— PORTABLE STERILIZER. The cover serves as a second tray.

of an hour in a one-per-cent solution of carbonate of soda (Bergmann). This solution possesses the advantage over pure water that it avoids oxidation. Dressings must be sterilized, by means of steam under pressure, in autoclaves. Of these I mention particularly those of Redard, Geneste-Herscher,

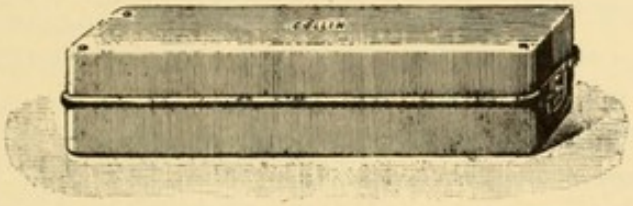


FIG. 12.—THE SAME, CLOSED.

Wiesnegg (Fig. 17), Chamberland, Vaillard, and Besson. Chamberland's autoclave is the type of apparatus intended for the sterilization of instruments and dressings by steam under pressure, so a brief description of it, borrowed almost verbatim from Terrier, follows:

This autoclave may be used also without pressure and at 212° F., but it is when under pressure that moist heat is most effective in surgical sterilization. In fact this pressure, which may be raised to two, three, or four atmospheres, causes a rise of temperature to 248°, 273°, and 291° F. respectively.

This autoclave is formed of a cylinder of red copper, soldered, and surrounded by a covering of sheet iron. The upper opening is closed by a bronze cover which is fixed at its periphery by strong thumb-screws and bolts. This cover presents three orifices: a safety-valve, a cock, and a manometric tube. The manometer is graduated from 0 to 3 atmospheres and gives at the same time, approximately, the tension of the steam contained in

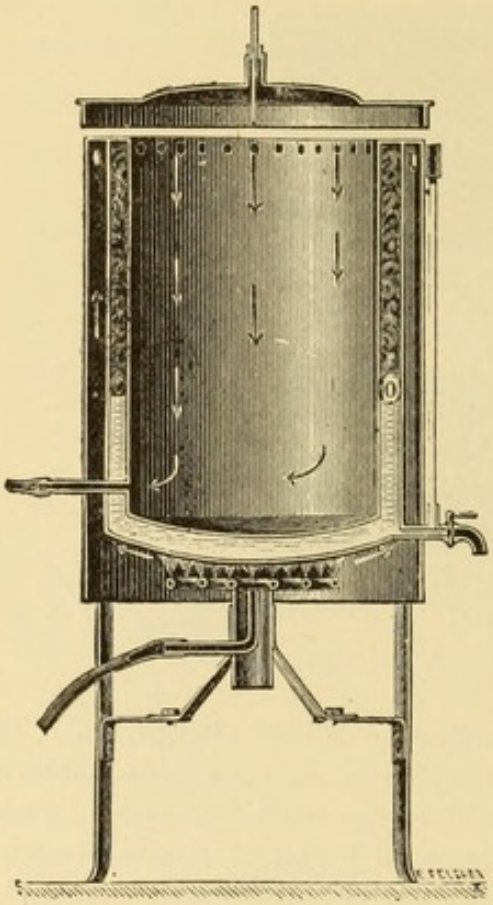


Fig. 13.—Schimmelbusch's Sterilizer.



Fig. 14.—Box for Sterilizing Dressings in Schimmelbusch's Apparatus. The openings are closed after sterilization by a sliding band.

the apparatus and its temperature. It should be remembered that the pressure at zero is one atmosphere, so that at three four must be read.

Below the boiler, surrounded and supported by a chamber encased in sheet iron, is the gas-burner, which has two concentric circles of jets independent of each other and capable of being lighted together or separately. In the interior of the boiler is a basket of ordinary copper or brass wire gauze, separated by an empty space from the lower part of the boiler. For this basket are substituted metallic boxes, nickel plated or of pure nickel, when compresses or gauze sponges are to be sterilized. These boxes are closed with a bayonet catch, and possess at their upper ends holes which permit the entrance of steam to the interior of the boxes when the catch is not entirely shut.

In using the sterilizer one to two litres of water, previously boiled, are poured into the boiler, the metallic basket or boxes put in place, the cover shut down, and the bolts raised and fixed by the thumb-screws. The cock in the cover must be left open in order to allow the egress of the air within the apparatus as it is displaced by the steam. When the water boils, a jet of steam issues from the cock and the temperature is about 212° F. In order to obtain a higher temperature the cock is closed when it gives out a full jet of steam and the screws of the bolts of the lid are tightened. The pressure, indicated by the manometer, may rise to four atmospheres with a temperature of 290° F.

It is well to regulate the gas and arrange the safety-valve so as to obtain and maintain the desired pressure and temperature for some time. At the beginning of the sterilization steam should be allowed to blow off once or twice in order to remove the last portions of air which the apparatus contains. When the temperature and pressure sought have been maintained for the time wished, the gas is extinguished, and when the needle of the manometer has returned to zero, the cock is opened and air allowed to enter. The lid is then raised and the objects sterilized or the boxes which contain them are lifted out. Complete cooling must be waited for, or else the rubber washer placed between the cover and the boiler may become adherent and be easily torn.

The apparatus which I have long used, and which offers the advantage of being light and portable in spite of its great size, is that which Lautenschläger has constructed according to the indications of Schimmelbusch (Fig. 13). It is formed of two copper cylinders placed one within the other and solidly united. Being of unequal size these have between them a space which is partially filled with a one-per-cent solution of carbonate of soda (up to the point O). The dressings, enclosed in a metallic box pierced with holes (Fig. 14), are placed in the internal cylinder, and the cover of the apparatus firmly closed by screw nuts, a rubber washer being placed beneath the lid to assure perfect adhesion. A gas burner or several alcohol lamps may be used for heating the apparatus. The steam formed by boiling the water between the two cylinders can escape only into the internal cylinder through a line of openings near its upper border. Entering here it passes through the dressings, condenses at the bottom of the internal cylinder, and passes out of the apparatus by a cock. In half an hour from the time when steam begins to be formed the sterilization is sufficient.

This apparatus, though very convenient, does not give, theoretically, an absolute sterilization, as the temperature does not rise sensibly above 212° F.; spores must resist its action; it is rather a pasteurization which takes place. It seems sufficient in practice, and I have used it for several years in my service with excellent results. It is for this reason that many American hospitals limit themselves to sterilizing dressings in simple and portable apparatuses which are used for the pretended sterilization (pasteurization) of

milk (Fig. 15). One may be easily improvised with any kind of vessel (Fig. 16).

Cutting instruments and needles may also be sterilized in the direct flame of an alcohol lamp or Bunsen burner. For bistouries and scissors this method should be employed only when absolutely necessary, as it is uncertain and injures the instruments. For needles it is very convenient and more reliable on account of their small size, but in order to avoid ruining their temper they should be plunged immediately after being heated into a cold antiseptic or aseptic solution.

I recommend the operator to use no instruments but his own and to sterilize these himself, rather than rely upon the assistance of others. One can

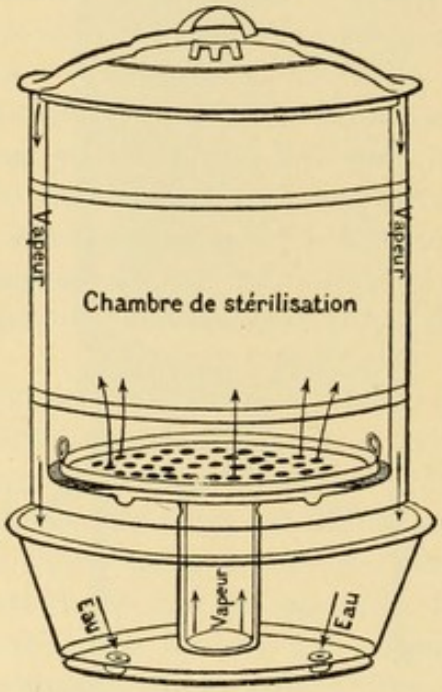


Fig. 15.—Arnold's Sterilizer.

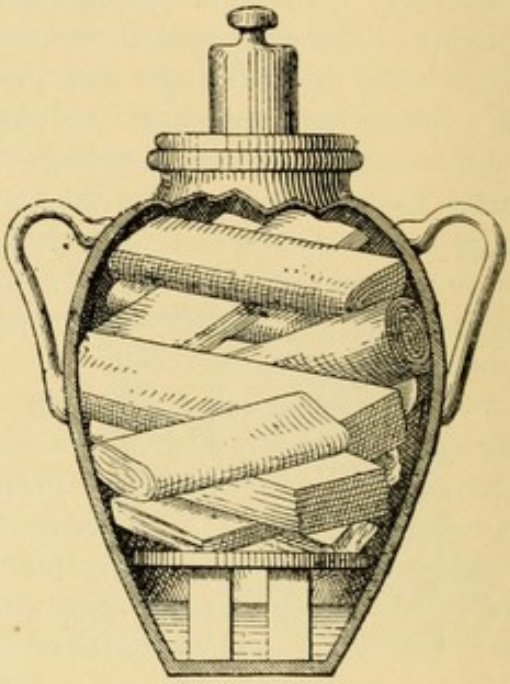


Fig. 16.—Extemporized Sterilizer.

never be sure, from an antiseptic point of view, of borrowed instruments. Better a disinfected bistoury that is dull than a sharp bistoury capable of infecting the patient.

I have completely given up sponges for the same reason. It is not always easy to obtain them new and perfectly purified, and this does not seem strange when we consider the number of processes to which they must be submitted before they can be called clean. Schimmelbusch, though favoring gauze sponges for ordinary operations, employs marine sponges for certain special operations, especially for making the toilet of the peritoneum. The following method is recommended by him as furnishing a sufficient guaranty of sterility of the sponges. They are first washed thoroughly in cold water, then in hot, and next wrung out with great care in a cloth or preferably in a bag. They are then plunged, still contained in the bag, into a one-per-cent solution of sodium carbonate, the solution having been

brought to a boil and being withdrawn from the fire just as the sponges are put in, as the latter are injured by boiling. They are left in this solution half an hour, then wrung out, washed in boiled water to remove the sodium carbonate, and kept in a 1 : 2,000 solution of bichloride. Sponges which have already been used require a still more scrupulous cleansing and are always less reliable on account of the septic character of the fluids which may have come into contact with them. They are both unreliable and ex-

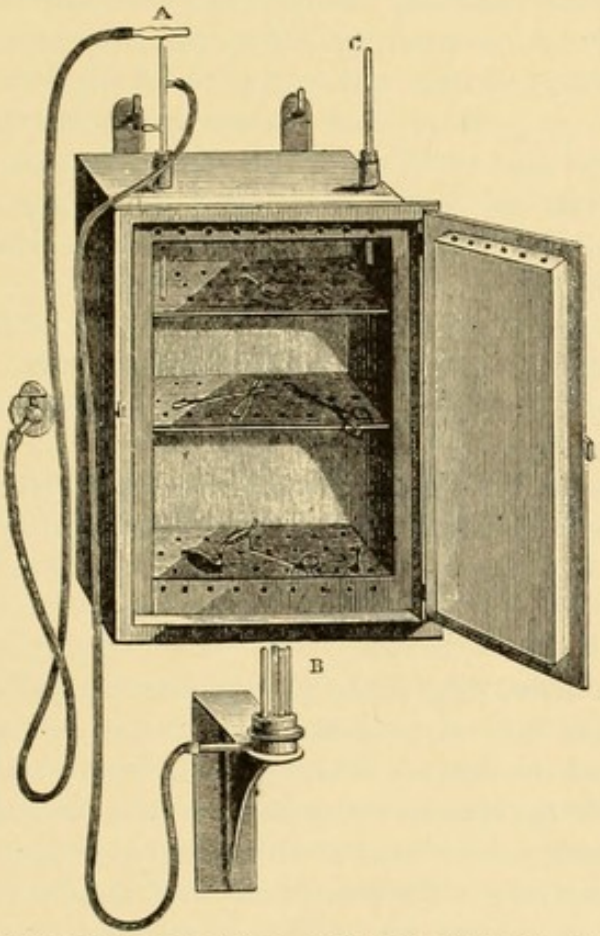


FIG. 17.—WIESNEGG'S STERILIZING OVEN. *A*, Regulator; *B*, burners; *C*, thermometer.

pensive. One may be astonished that I mention the latter consideration, but it should not be overlooked in a hospital. It also frequently happens, especially in places distant from the great centres, that one can obtain only sponges which are too hard or too easily torn, or of inconvenient size or shape, and quite unmanageable. Having witnessed in Billroth's service in Vienna the advantages which aseptic gauze sponges offer in laparatomies, I use them exclusively. My method of preparing them is as follows: a piece of gauze, a fine muslin known commercially as cheese-cloth, is folded several times so as to make pads twelve inches square and consisting of eight thicknesses of gauze. These compresses are carefully hemmed at the edges with long stitches. They are then sterilized in the autoclave. If this is not obtainable, they may be boiled for two hours at least in a one-per-

cent solution of sodium carbonate. They are kept in a weak solution of bichloride, and at the time of using are washed carefully in hot water which has been sterilized by filtration and boiling, and wrung out.

These gauze sponges are a very efficient and convenient absorbent agent, which can be rapidly given any form or dimensions, can be introduced upon the finger into cavities and interstices, and can be spread upon the intestines; they offer in fact many advantages over sponges. During an operation the same compress may, if necessary, be used several times after being washed; but those which have been soiled by septic fluids are immediately thrown away, and after each operation all which have been used are destroyed. Their insignificant cost justifies this sacrifice which often seems extravagance in the case of sponges. In 1886 I first introduced in my hospital service in Paris the exclusive use of gauze sponges for laparatomies, and detailed their advantages in a report to the Société de Chirurgie on October 19th, 1887.

I shall confine myself to a simple enumeration of the antiseptic processes which form part of the operation itself, and return to the subject under the head of individual operations. I shall mention here only those which are of especial importance.

The antiseptic spray, which has long been employed over the field of operation, is more harmful than useful; it chills and irritates the peritoneum beyond measure.

Care of the Peritoneum.

Laparatomists have long pushed to an extreme the care taken to clear away all discharges and clots of blood from the peritoneum. They have greatly exaggerated the noxious action of these residua, which are very likely to be reabsorbed if the absorptive powers of the serous membrane are not destroyed by irritating solutions and unnecessary rubbings. One should be very cautious in the care of the peritoneum and try to avoid the necessity for much dressing by preventing the overflow of the contents of tumors. Where this is not possible, the cleansing should be rapidly accomplished by means of the gauze sponge. It has been demonstrated that some fluids which have the reputation of being very infectious, as the contents of cysts and the pus from a pyosalpinx of long standing, are really less dangerous than has been supposed.

Flushing the peritoneum with warm sterilized salt solution was first extolled by Lawson Tait, and is chiefly of use where an irritating or infectious fluid has come in contact with the serous membrane during the operation; but it should not be used to wash away the blood, as this can be accomplished perfectly well by means of the gauze sponges. Although it is certainly a serious matter to leave the least drop of pus or the smallest septic particle in the peritoneal cavity, the case is not the same with small clots which are easily absorbed. There is another indication for these hot-water

flushings to which I will make only a passing allusion. They have been much praised for the counteraction of shock following an operation. Polaillon has recently pointed out the danger attending the administration of washings of too high a temperature upon the supra-umbilical portion of the peritoneum in the vicinity of the solar plexus; they may cause an arrest of respiration and syncope. As for pelvic washings, they are not harmful when performed rapidly and with some harmless fluid which can be absorbed without danger. However, the experiments of Delbet have proved that these washings temporarily impair the absorbing powers of the peritoneum—a fact which should be kept in mind if there is any fear of secondary oozing, as it may render drainage necessary.

Water filtered through the Chamberland filter may still contain microbes, as Tripier has shown, and we know that simply boiling it kills the germs but not the spores. Certainly water which has been filtered and boiled is fairly pure and may be used without much fear. But to insure absolute security the temperature must have been raised to 250° F.

[Sterile normal salt solution is best prepared by adding one and a half drachms of sodium chloride to the quart of water, filtering into clean flasks, whose necks are then stopped with plugs of ordinary cotton batting, *not* absorbent cotton, and disinfected by heating to the boiling point on three successive days.] The cauterization of wounded surfaces, pedicles, and adhesions has been done by means of antiseptics such as a concentrated solution of carbolic acid, the tincture of iodine, iodoform, or with the actual cautery. The last-named process was introduced by Baker Brown, and is much in vogue in England and America. For my part, I often use it where a cut surface has a suspicious appearance (as in some salpingotomies) or is merely thick and moist. Be it understood, I speak in this connection only of the antiseptic powers of cauterization, which it is important to keep separate from its hæmostatic properties, so valuable in parenchymatous oozing. Paquelin's thermo-cautery has taken the place of the red-hot iron. A strip of sterile gauze should be wrapped about the handle of the instrument in order to prevent the hands from becoming soiled by contact with it.

Preparation and Preservation of Materials Used for Ligation and Suture.

The subject of antisepsis in gynæcology would be incomplete without a section relating to the preparation and preservation of the various materials used for ligatures and sutures.

Silk.—The strongest with the least bulk is the flat-braided silk, of which twelve different numbers are made. It should be sterilized in the steam chest or autoclave after being rolled in small quantities upon glass bobbins. If one does not possess such an outfit the silk may be rolled in very loose skeins (a precaution extremely important for securing equal and perfect ster-

ilization), and then boiled for one hour in a five-per-cent solution of carbolic acid. It is then to be rolled again upon glass reels and placed in a fresh carbolic solution of the same strength, which should be changed every eight days. It may also be kept dry, in small quantities superimposed and separated by wool tampons, in a large sterilized glass tube. This method allows the successive use of small quantities of silk without touching the whole supply.

Schimmelbusch has had made a small box in which silk is sterilized and kept. This box has a hinged cover and a side wall which can be drawn out. The silk is rolled on small metallic drums, each formed of four parallel rods united at their extremities by two metallic discs into which they are inserted. In this way the steam is enabled to exert its sterilizing action upon all of the silk. Each drum is movable around rods soldered to the box. A fixed plate, pierced to allow the passage of the silk, protects it from all infection. For purposes of sterilization the box is opened and placed in the steam sterilizer. A similar box has been constructed by Forgues.

Catgut.—Four numbers of catgut are manufactured. The method of preparation which yields the best results is that by means of oil of juniper wood (oleum ligni juniperi), which must not be confounded with oil of juniper berries (oleum juniperi). The oil of juniper wood was first recommended by Thiersch and later adopted by Küster, Schröder, Martin, Hofmeier, etc. Kocher determined experimentally that this oil sterilizes violin string in twenty-four hours (Troisfontaines: "Manuel d'Antisepsie Chirurg., p. 100). The same surgeon has, however, recently attacked catgut, which he holds responsible for several septic cases which have occurred in his service, and of which he has therefore given up the use. It seems probable that Kocher had the misfortune to be supplied with a bad quality of catgut. His opinion has been strongly combated by Zweifel and J. L. Championnière. In my service the catgut is first carefully treated with ether to remove fat, then sterilized in the hot-air oven at 230° F. for one hour. It is next soaked in a 1 : 1,000 bichloride solution, then kept in the oil of juniper for several weeks, and finally taken out of this and kept in rectified spirits to which is added a tenth part of oil of juniper. Martin employs a slightly different process. The catgut is rolled on glass reels, immersed for six hours in a 1 : 1,000 solution of bichloride, withdrawn, dried by pressing in a towel, and placed in a mixture of two parts of alcohol and one of oil of juniper. This may be used after six days. During the operation the amount to be used is kept in a basin in some kind of antiseptic fluid. In the Frauenklinik in Berlin, the catgut is left twenty-four hours in oil of juniper, then for the same length of time in glycerin, after which it is placed in absolute alcohol to which has been added a small quantity of oil of juniper.

The advantages possessed by catgut prepared in juniper oil are many: it is far superior to that more commonly used which is disinfected in carbolized oil; it possesses remarkable tenacity and flexibility; it may be used for

buried sutures, as it is dissolved and absorbed in a length of time proportionate to its bulk, which, by the way, should be carefully noted by the operator. It is because of these qualities possessed by catgut that buried sutures and sutures in layers have been undertaken with such success and have given such excellent results.

Benckiser, who has adopted the method of disinfection by heat, places his rolls of catgut in envelopes, before putting them in the sterilizer—opening the envelope only at the very moment of using the catgut.

Mikulicz has indicated a method of preparation which transforms the catgut into a remarkably resistant and tenacious material for sutures, which Leopold has adopted for Cæsarean sections. The catgut is first put for forty-eight hours in carbolized glycerin, 10 parts to 100, then for five hours in a solution of chromic acid 1 : 200, and finally preserved in absolute alcohol.

Döderlein recommends a slightly different method of preparation. He plunges the catgut into a 1 : 1,000 chromic-acid solution for ten minutes, dries it, and sterilizes it for two hours in an oven at 266° F.

We might mention also the methods of Braatz, Bunner, Partridge, Clinton Cushing, and others, which are all processes of chemical disinfection. Repin sterilizes catgut in the vapor of absolute alcohol at 250° F. for one hour, and keeps it in tubes sealed in the flame, containing several cubic centimetres of sterilized bouillon. This method of preservation serves as a control, as unless the sterilization of the catgut is complete, the bouillon quickly becomes cloudy.

[Probably the most certain method of sterilizing catgut is first to remove all oil by soaking in ether and then to boil in ninety-five-per-cent alcohol, the boiling being repeated on three successive days. This may be accomplished by using a still, as is done at some of the larger hospitals, or by putting the gut into screw-topped bottles and heating in a water-bath, the covers being left loose at first and screwed down when the bottle is taken from the bath.]

Silver Wire, Silkworm Gut.—After heating to 250° F. for one hour in a sterilizer, these may be preserved in rectified spirit.

[Silkworm gut can be obtained in two sizes, coarse and fine. It may be sterilized in tubes in the same manner as silk, or simply boiled in the soda solution with the instruments. It should be soaked for twenty minutes before using to render it more pliable and less liable to break. Silver wire can be sterilized by moist or dry heat, and the metal itself is said to possess definite antiseptic properties, so that by its use stitch-hole abscesses may be avoided.]

Elastic Ligatures. Drainage Tubes.—These may be made relatively pure by boiling them for twenty minutes in a 1 : 1,000 bichloride solution; they are then kept in a strong solution of carbolic acid or in 1 : 1,000 bichloride contained in bottles with tightly fitting corks. It is, how-

ever, preferable to sterilize them in an autoclave or oven for one hour, at 230° F. Rubber objects should be carefully isolated from each other by gauze compresses, in order to avoid their agglutination. M. Baudouin recommends the use of a 1 : 100 bichloride solution and several successive boilings.

CHAPTER II.

ANÆSTHESIA IN GYNÆCOLOGY.

Local anæsthesia may often be employed with good results, the method differing according to whether the operation be upon the skin or mucous membrane. For an incision, or a rapid dissection, we may freeze the part by means of a mixture of cracked ice and salt, operating the very moment the skin becomes white, for an undue prolongation of the action of the cold might result in a blister or even a slough. Richardson's ether spray is exceedingly convenient and too well known to need description. It possesses the drawback of slow action and of preventing the use of the thermo-cautery; some foreign authorities, and Terrillon in France, have proposed replacing it with a spray of bromide of ethyl, which is non-inflammable; but this in its turn possesses disadvantages which have interfered with its widespread use.

Recently Redard has praised the effects of ethyl chloride employed as a spray. This liquid, which vaporizes at 50° F., is convenient for use in practice. It is kept in small sealed glass bulbs with slender tips and containing ten grams (two and one-half drachms) of ethyl chloride. In using it the tip of the bulb is broken, and the heat of the hand is sufficient to vaporize the ethyl chloride, which escapes in a fine jet.

Cocaine chlorhydrate can be used for anæsthesia of the skin.

Wölfler has demonstrated that if you inject hypodermatically, or preferably endermatically, fifteen minims of a five-per-cent solution, at the end of one or two minutes a local anæsthesia will be produced which will last from twenty to twenty-five minutes. The zone of anæsthesia will extend about two to three centimetres around the point of entrance, and a second area of semi-anæsthesia of the same extent surrounds the first—which gives us from four to six square centimetres upon which we may operate painlessly for from twenty to twenty-five minutes. This is more time than is needed to open an abscess or remove a small tumor. If the operation is to be upon a mucous surface, all that is required is to paint it over with a ten-per-cent solution of the cocaine. This will produce an anæsthesia which may easily be prolonged by repeated applications, so that, as I can bear testimony from my own experience, an Emmet's amputation of the cervix may be done by this means. The anæsthetized mucous surface seems, to use the patient's own expression, to be "made of wood."

I am convinced that the field of local anæsthesia in gynæcology would be greatly increased, could we but overcome the timidity of those patients

whose fears yield more readily to general anæsthesia. Daniel Lewis, of New York, after the injection of cocaine, performed a painless amputation of the breast upon a woman of sixty years, who, on account of a cardiac murmur, was in dread of general anæsthesia. In the same way I amputated the finger of a young woman who absolutely refused to be made unconscious.

Some surgeons, including Schleich, who uses a spray of cocaine in ether 1 : 100, Roux of Lausanne, and Reclus, have been able to perform laparatomies without employing general anæsthesia. They claim to have obtained a sufficient insensibility by the simple injection of cocaine into the skin and subcutaneous cellular tissue. I do not believe that their example should be imitated. Largeau, of Niort, has gone still farther, having performed three ovariotomies and one hysterectomy with absolutely no anæsthesia of any sort.

We must not omit to mention and inquire into the statement made by Hanks, namely, that applications of cocaine have an injurious effect upon the union of wounds after plastic operations. In the cases quoted by the American surgeon, may this result not be due to the use of a non-sterilized cocaine solution? The water for these solutions should be distilled and then boiled, and it is well to add a few drops of Van Swieten's fluid. Neverthless, we should bear in mind that accidents have sometimes occurred as a result of these injections, and use them with moderation. Bousquet, of Clermont-Ferrand, also claims to have seen two cases in which, in spite of all antiseptic precautions, primary union entirely failed to take place. He attributes this result to local trophic disturbances due to the cocaine. Dudley reports to the Obstetrical Society of New York three cases in which the hypodermatic injection of cocaine was followed by most alarming symptoms. In two of the cases he had injected a solution into the cervix before curetting the uterus; in the third, at the margin of the anus before removing a syphilitic growth. He used a ten-per-cent solution, of which he injected about fifteen minims. One of the patients swooned; all were greatly depressed. Emmet has noted similar untoward results. A loss of consciousness has been observed after the hypodermatic injection of six drops of a twenty-per-cent solution of the chlorhydrate of cocaine, which is equivalent to six centigrams of the active principle. Very serious symptoms, such as vomiting, extreme weakness, slowing of the respiration, and enormous increase in the pulse rate, resulted from the hypodermatic injection of one grain (sixty-five milligrams) with which Dr. B. J. Howel experimented upon himself.

Lorenz has observed accidents with still smaller doses. Two, one, and even three-quarters centigrams of cocaine injected into the cervix have caused symptoms which, though not alarming, showed an evident intoxication. It would seem unsafe to use a larger dose than five centigrams or twenty drops (about one gram) of a five-per-cent solution of cocaine. Reclus, who formerly employed as much as twenty centigrams, now never ex-

ceeds ten to fifteen, and recommends the use in all cases of a very diluted solution (1 : 100). Roux opposes large doses, and insists upon the particular susceptibility of certain persons; he has seen tetanoid symptoms develop after the injection of five and one-half centigrams. Mannheim has collected two hundred cases of accidents caused by cocaine. The largest dose which was tolerated was one and one-fourth grams; the smallest which caused death, one-quarter of a gram. He advises the use of two centigrams as an average dose.

It is difficult not to consider the accidents imputed to extremely weak injections as exceptions resulting either from errors in dosage or to idiosyncrasy. Thus Hallopeau has published a case of acute cocaine poisoning of prolonged duration following the intragingival injection of about eight milligrams. The acute symptoms were succeeded by functional disorders, which reached their maximum intensity a month after the injection and did not disappear until the expiration of two and a half months. Hallopeau has gathered two other analogous cases.

Such facts should not be sufficient to lead us to dread or reject an excellent means of securing local anæsthesia, but should simply teach prudence in its use.

Continuous irrigation, which is so useful from the point of view of convenience and antisepsis, has also a remarkable power of diminishing pain, especially when even a weak solution of carbolic acid is used (10 : 1,000).

Finally, in extremely nervous or hysterical women, we may obtain sufficient anæsthesia by means of hypnotic suggestion. I call attention to this as something of a pathological curiosity; nevertheless, at Lourcine-Pascal I have several times been enabled to curette a patient without causing pain, by simply suggesting that she was not suffering, and this without having to put her to sleep. Very recently Geyl, of Dordrecht, was able to excise a prolapsed rectum and amputate a cervix by complete anæsthesia from hypnotic influence alone, lasting two hours in the first case, one hour in the second. Mesnet reports to the Academy of Medicine a case of vaginal cystocele painlessly operated upon under the same conditions.

General anæsthesia is indispensable in major operations; it may even be used in slight ones if administered with the proper precautions. I usually employ it when curetting a uterus.

Finally, when an examination of the abdominal organs presents much difficulty, anæsthesia is a necessity. The exploration is greatly facilitated by the resulting flaccidity of the abdominal walls and the absence of reflex movements caused by pain. This exploratory anæsthesia should be the rule in many procedures, as without its help it is often impossible to obtain an exact knowledge of the condition of the uterine appendages where these are inflamed. Such exploration should preferably be made just before operation.

Ether has been recommended by Lawson Tait, Keith, and a number of other surgeons, including Silex, who reports twenty-five hundred cases in which it had been employed without a single death, and in France by the school of Lyons. It has recently been the subject of study in Paris. It has been claimed that ether exercises a destructive action upon the renal epithelium, which renders its use dangerous when the kidneys are more or less affected, as is often the case when abdominal tumors exist. Lee, Dudley, Freeman, Talbot, etc., have cited cases of this character. For my part I do not give up the use of chloroform, which seems to me the best of anæsthetics provided it is well administered. The two principal faults which I find with ether are that it is irritating to the bronchi, and that it cannot be used in the presence of an incandescent object [such as the actual cautery]; besides, it must always be given in such large amounts as to render its supply difficult.

Pental, or trimethylethylene, whose anæsthetic properties have recently been revealed by von Mering, has been experimented with by several surgeons. Its action is extremely rapid, and it is held to have been of great service in operations of short duration and in cases which took chloroform badly. Breuer and Philip, however, have used it successfully in operations which lasted over half an hour. No nausea or vomiting followed its administration, and accidents were extremely rare. They have nevertheless been observed.

In Italy, several surgeons, among whom are Nanzetti, Morisani, and Bianchi, extol the advantages of bichloride of methylene.

There has recently been an attempt, especially in Germany, to re-establish the use of bromide of ethyl. It has given satisfaction to those who have employed it. Anæsthesia comes on very rapidly without a period of excitement, and there are none of the after-effects which make the use of chloroform so disagreeable for the patient. Unfortunately the anæsthesia which this drug produces is of very brief duration, not exceeding five minutes, which materially limits its use in gynæcology. Its administration is very simple. The whole quantity which is to be given (ten to fifteen grams for an adult) is poured at once upon the inhaler or compress, and this is applied to the patient's face so as to prevent entirely the access of air.

In France chloroform is the anæsthetic preferred, and the rules for its administration are so well known that I do not need to dwell upon them. The purity of the drug should always be tested, especially when the anæsthesia is to be of long duration. Dubois-Reymond believed, as a result of his experiments upon animals, that impurities in chloroform are in part responsible for the accidents which it causes.

When the operation is expected to be of long duration, and with patients who are particularly nervous and excitable, I have long been in the habit, before beginning the administration of chloroform, of giving a hypodermatic

injection of one cubic centimetre (or twenty-five to thirty drops) of the following solution:

	Gm.	
Distilled water, ...	10.	℥ iiss.
Morphine hydrochlorate, . . .	.10	gr. iss.
Atropine sulphate, ...	.005	gr. $\frac{75}{1000}$

After one serious accident I gave up this method.

Kocher, Poitou-Duplessis, Terrier, and Segond recommend another method of mixed anæsthesia which offers great advantages. In this bromide of ethyl is first administered, and when insensibility is obtained it is continued by chloroform (Poitou-Duplessis, Terrier, Segond) or by ether (Kocher). Complete insensibility is thus rapidly obtained, thus saving the surgeon a considerable amount of time, avoiding the dangers of the period of excitement at the beginning of anæsthesia by chloroform, and allowing the use of small quantities of the latter drug even for the longest operations. When it is necessary to prolong chloroform anæsthesia, the toxic and dangerous dose is rapidly reached; with ether this dose is attained much more slowly. For this reason Kocher, who uses chloroform, replaces it by ether when anæsthesia must be long continued. This process of mixed anæsthesia, which we owe to Dastre and Morat, can scarcely be awarded too much praise in operations of any considerable length. It is designed to avoid the symptoms due to chloroform which the surgeon is unable to combat—laryngo-reflex syncope—especially secondary syncope. It prevents the initial excitement, diminishes the nausea, limits the amount of chloroform used, and consequently lessens the chances of chloroform poisoning in operations of long duration. My learned friend, Professor Dastre, has assured me that in his laboratory experiments, before he adopted this method, he lost one out of every four dogs anæsthetized. For ten years he used it upon hundreds of animals, and has not lost one. Safety and convenience are both gained by the process. It has been adopted by practical surgeons. Aubert, head surgeon of the Antiquaille in Lyons, uses it to the exclusion of all other methods. This method has the following advantages: 1. Safety. 2. More rapidly induced unconsciousness. 3. Absolute calm on the part of the patient. 4. An easy awakening. 5. Very little malaise or vomiting as sequelæ. Many of my colleagues in Lyons, especially Gayet and Leon Tripier, have at my instigation used this method of anæsthesia. The number of cases experimented upon amounts to several thousands, with no resulting accident. Alcohol has been combined with chloroform and with ether more especially in alcoholic cases. The patient is anæsthetized in bed, and taken to the amphitheatre in a ward-carriage, thus avoiding the disagreeable impression produced by the sight of the surgical preparations, and facilitating the first steps in the administration of the chloroform.

We must bear in mind that if anæsthesia be unduly prolonged, it may

have a serious effect upon the nervous system and upon the kidneys. The fatal results of many cases reported under the head of shock may be traced to the depressing effects upon the nerve centres of an anæsthesia prolonged to two or three hours. It is not impossible that many of the so-called reflex symptoms occurring after utero-ovarian operations may be due to the same cause; more particularly what has been termed the guttural-reflex symptom, characterized by incessant and painful expectoration. I have had the opportunity of observing this symptom after long operations other than abdominal, and I feel convinced that it is due to real chloroform-poisoning.

Further, the absorption of a large quantity of chloroform or ether, and its consequent elimination by the kidneys, may determine an intense renal congestion with or without albuminuria. Chloroform absorbed in great amount cannot fail to have an action upon the renal epithelium and thus interfere with the elimination of the constituents of the urine; this action may be the source of immediate danger when there is a pre-existing lesion of the organ. It is especially after abdominal hysterectomies that cardio-pulmonary symptoms have been observed, and we know that in these cases the kidneys are peculiarly vulnerable, since abdominal tumors in general and fibroids in particular are a predisposing cause of chronic nephritis. The renal filter is then in a defective condition, and powerless to rid the circulatory current of the toxic agent introduced by a long pulmonary absorption. Moreover, in patients with abdominal tumors, the heart, as well as the kidneys, is often affected, and it is easy to comprehend why, in these persons, a prolonged anæsthesia is followed by certain fatal symptoms whose pathogenesis has not heretofore been thoroughly understood. I have alluded to heart lesions as frequently complicating abdominal surgery. Granted that they call for especial precautions as to the duration of anæsthesia, do they absolutely contraindicate the administration of chloroform? In France the prevalent opinion is that they do, but according to the greatest English authorities on ovariotomy they do not. The latter claim that in chloroform anæsthesia fatal results are due to a reflex inhibition of the cardiac centres or of the respiratory and vasomotor centres; that this reflex inhibition is most apt to occur where there is organic disease of the heart, and that, therefore, paradoxical as it may seem, it is in reality logical to administer chloroform in just such cases, and to push it to the point of complete abolishment of reflexes. Quénu and Terrier have recently made the same statements at the Société de Chirurgie. Guérin has expressed the opinion that in chloroform anæsthesia the inhibition of the heart is due to stimulation of the nasal nerves by the drug, and that consequently death from this cause may be prevented by confining the respiration of chloroform to the mouth. Fatty degeneration of the heart, chronic renal disease, atheroma of the arteries, and extreme weakness constitute absolute contraindications to the use of chloroform.

It is quite unnecessary to give details upon the manner of administering

an anæsthetic, and methods of resuscitation in case of accident. A few words of counsel, however, may be to the point.

An important preliminary precaution is the removal of false teeth and plates. The face should be anointed with oil of some kind, to prevent the irritating effect of chloroform during prolonged anæsthesia. The chloroform itself should have been recently purified and kept away from the light; the required amount may be put, just before the operation, into a flask provided with a double tube, or else with a cork in which you can make a small opening to limit the amount used. Junker's apparatus is much used in other countries; in France we prefer to use a folded piece of linen, a simple procedure, which the English sometimes describe as the Scotch method, and which allows of a close inspection of the patient's face. It should be held a little way from the nose and mouth, and in order to prevent much loss of



FIG. 18.—TONGUE FORCEPS.

chloroform by evaporation as well as to make the compress easier to handle, it is well to cover it with a piece of oiled silk.

Wherever practicable, one assistant should devote himself to the administration of the chloroform, giving it in small but oft-repeated doses, closely watching the pulse and respiration.

To prevent accidents, note the respiration and the pupils even more carefully than the pulse; draw the tongue forward by pressing upon the lower jaw, or by seizing it with the forceps. Spring forceps are to be avoided, as they produce sloughing. I use forceps of my own devising; the spatulated blade is slipped under the tongue, and the two sharp teeth of the upper blade give a sure hold at the expense of very slight wounds.

Certain circumstances in gynæcological operations call for especial care. Respiration is embarrassed, and the difficulties of anæsthesia increased, when the patient lies upon her side or is kept in the genu-pectoral position. There are also some processes connected with laparatomies during which the dangers of anæsthesia are augmented; the withdrawal of a great amount of fluid or of a large tumor, traction upon the pedicle of a uterine tumor, or upon the broad ligament may be the cause of reflex action upon the respiratory or circulatory apparatus. Interference with respiration due to a mechanical cause, such as the accumulation of mucus in the pharynx, is a mere

incident and not an accident, easily remedied by introducing a sponge upon a holder, pressing it firmly and deeply and removing the obstruction.

If respiration becomes difficult or ceases, rhythmic tractions of the tongue may be tried, and if an immediate result is not obtained, artificial respiration should at once be practised persistently, regularly, and not too rapidly. If the pulse ceases suddenly and syncope occurs, the head should be lowered, the surface of the body flagellated, cold water dashed on the face and nape of the neck, electric stimulation applied to the phrenic and pneumogastric nerves, and artificial respiration performed. The last should be done by the assistants in turn, as I have seen a patient saved only after it had been carried on for twenty minutes. If the room is very warm or full of the fumes of carbolic acid, it should be well aired. Laborde has recommended the use of apparatus for artificial respiration in case of chloroform syncope. It consists of an ordinary bellows and a facial mask, the air from the bellows entering the mask and thence into the air passages.

I believe that the methods previously described are sufficient. The benefits of tracheotomy also seem to me very doubtful.

CHAPTER III.

METHODS OF SUTURE AND HÆMOSTASIS.

Sutures.—Union by first intention, which, with a few exceptions for special cases, has become the rule in modern surgery, is of prime importance in gynæcology; upon it depend the success of plastic and the innocuousness of other operations. I shall not dwell upon the local conditions necessary to such union; the cardinal principles are known to be these: that the wound be clean cut, its surfaces smooth, accurately approximated, and without dead spaces, that no traction be exerted, and but little pressure applied. The raw surface should be thoroughly pared and all superfluous tissue removed by

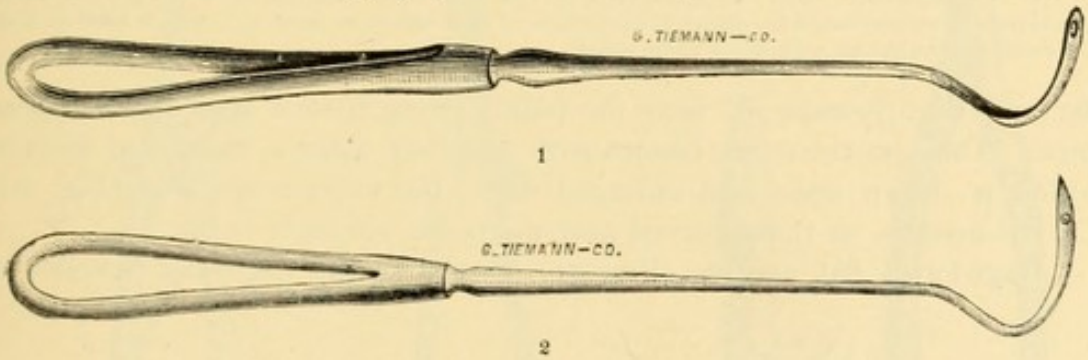


FIG. 19.—LARGE MOUNTED NEEDLES. 1, blunt Deschamp's; 2, sharp Deschamp's.

means of curved scissors; the sutures should then be so applied as best to imitate the normal condition of the tissues.

Although all gynæcologists are doubtless familiar with the ordinary rules of surgery, it will be well in this connection to repeat certain points of especial importance.

The needles may be used in one of several ways. 1st. They may be held in the fingers; this is extremely inconvenient and should be done only where absolutely necessary.

2d. Needles immovably attached to a handle are used in passing through resistant tissues or parts difficult to reach. Deschamp's sharp-pointed needle, which is of this description, may be used to advantage high up in the vagina, upon the cervix uteri, or in the cul-de-sac, but where the needle has to pass through relaxed tissues rich in blood-vessels (ovarian pedicles, round ligaments, etc.), blunt needles with a rounded edge will push aside the vascular tissues without wounding them.

I have already said that grooved needles or those with split eyes should be discarded on account of the difficulty of keeping them clean.

3d. The needles may be inserted in a holder. This is the most usual method.

Three kinds of needles are used: ordinary surgical needles, which are

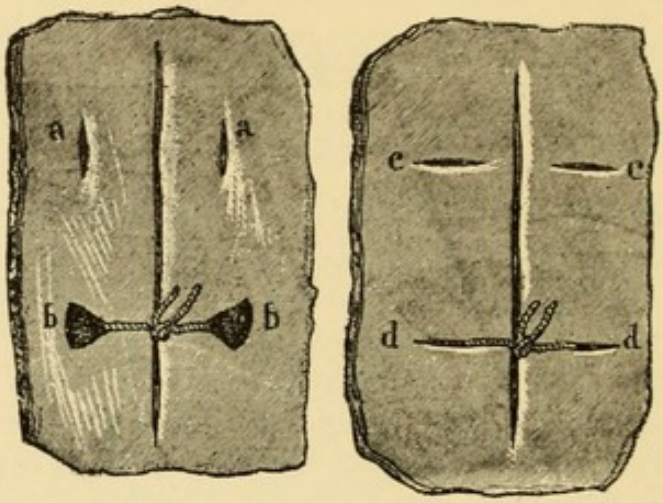


FIG. 20.—DESIGNED TO SHOW THE SUPERIORITY OF THE FLAT OVER THE ORDINARY NEEDLE. *a*, *a*, Skin wounds made by ordinary surgical needle; *b*, *b*, enlargement of these orifices by suture; *c*, *c*, wounds made by Hagedorn needle (*d*, *d*) which are not enlarged by the suture.

flat and slightly enlarged near the point, giving them a lanceolated appearance. They penetrate the tissues with ease, but make a transverse incision which is drawn upon and enlarged when the sutures are tied (Fig. 20). Curved needles, or those curved near the point, are most in use.

Hagedorn's flat needles (Fig. 21), curved on the edge and bevelled at

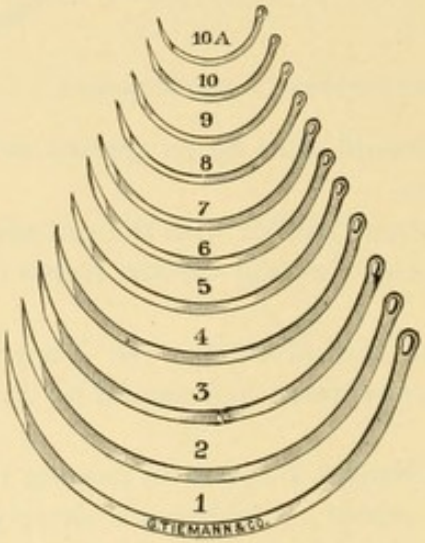


FIG. 21.—HAGEDORN NEEDLES.

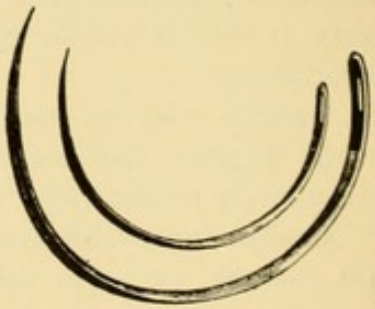
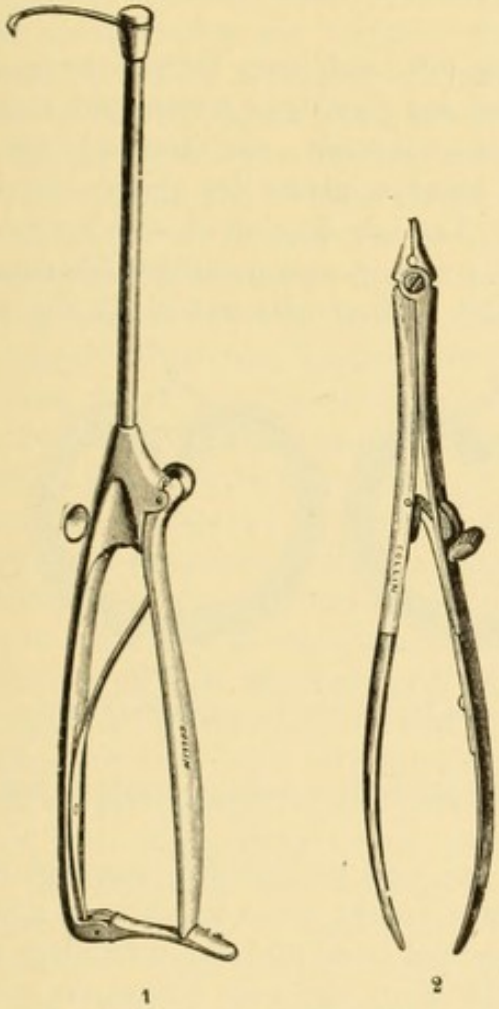


FIG. 22.—ORDINARY SURGICAL NEEDLES MADE STRONG FOR SUTURING THE ABDOMINAL WALLS AFTER LAPAROTOMY.

the point, possess a greater cutting power than the old surgical needles. They are of the greatest use in plastic operations.

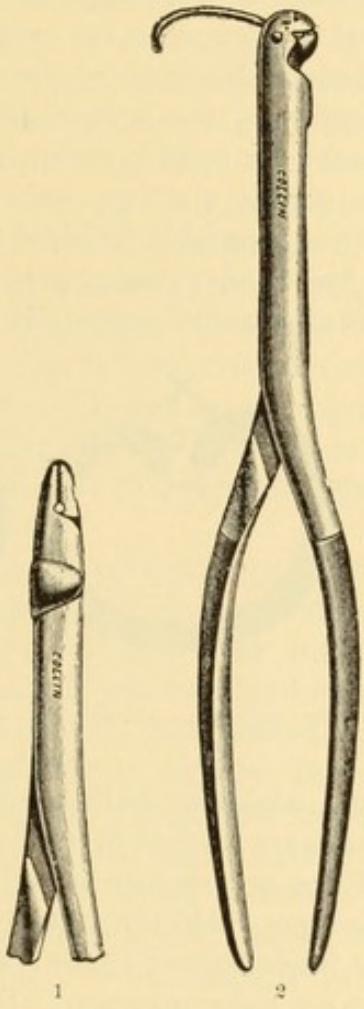
One should have on hand a supply of needles of all sizes: very fine ones are required for certain plastic operations, as in vesico-vaginal fistulæ; while

for suturing the abdominal walls after a laparatomy, it is well to have needles of more than ordinary strength (Fig. 22). The choice of a needle-holder, of which there are many varieties, depends upon whether the operation demands chiefly great accuracy or strength. If the former, it may be found more convenient to use a lock forceps, which obviates all necessity of keeping the needle in place by pressure on the handle, and allows of concentration of attention upon the movements of the needle. Collin's forceps meet



1 2

FIG. 23.—1, Pozzi's needle-holder for small flat needles. 2, Holder for small ordinary needles.



1 2

FIG. 24.—1, Holder for large round needles. 2, Holder for large flat needles (Pozzi).

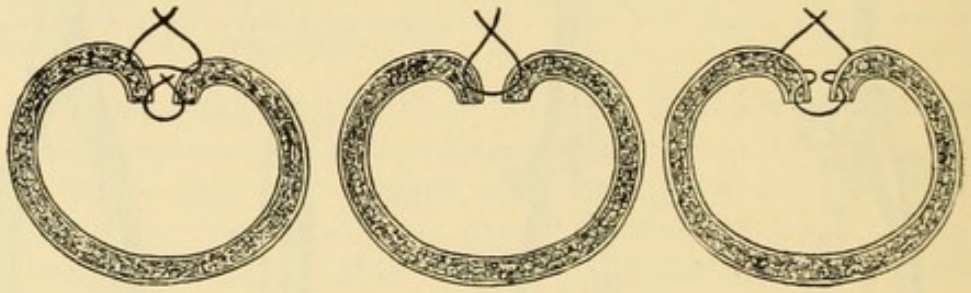
this indication, and with my modification will hold the Hagedorn needle. They can be taken apart and cleaned (Fig. 23).

If thick or resistant tissues are to be sutured, larger needles should be used, and a strong holder without a lock will give greater leverage, with less fatigue than any other. Grasp of the needle and forward pressure are made simultaneously and are equal in force. The forceps used by A. Martin is of unusual size, but I can testify from personal experience that it is not too large. Collin has made for me a needle-holder of this description for large ordinary needles (Fig. 24, 1) and one for Hagedorn's needles (Fig. 24, 2).

The latter seems to me greatly superior to the spring forceps of the German surgeon. For the intestinal sutures which may be required during a laparatomy, round sewing needles will be found to make a smaller incision than any of the foregoing. Figure 25 shows the most frequently used intestinal sutures—those of Lembert, Czerny, and Gussenbauer.

I especially recommend an exact reunion of the mucous membrane in every case. In order to avoid threading the needle for each suture it is sometimes of advantage to use a needle furnished with a loop of silk intended to draw upon the suture.

Suture Materials.—Formerly hemp, silk, and linen threads were used for suturing; the laws of antisepsis had not then been formulated, and the necessity for aseptic suture materials was unknown; the threads in use, by their porous qualities, were veritable breeding-places for germs, and suppuration invariably followed their use. The introduction of wire sutures by the American gynæcologist Sims was a step in advance whose importance at the time could scarcely be exaggerated. Silver wire was of all the most



1 2 3

FIG. 25.—INTESTINAL SUTURES. 1, Czerny's suture; 2, Lembert's suture; 3, Gussenbauer's suture.

aseptic, which no doubt accounts for the marvellous results obtained and the enthusiasm aroused by its use.

Even at this date it is in general use, and it certainly possesses some advantages. On the other hand it breaks easily; when tied around a somewhat thick mass of tissue it cuts it more than other threads; it requires more time for its application. If it is cut off short, the ends wound the vagina and the perineum; if left long, they may be pulled upon. For these reasons I have almost abandoned its use, replacing it with catgut or silk. Hegar makes use of wire in cavities like the vagina, where silk easily becomes septic. In such cases I take pains to blunt the sharp ends of the twisted wire by pressing upon them a piece of lead and cutting them off close to its level. I never leave the ends more than two or three centimetres long, so as to avoid pulling upon them. The piece of lead is of advantage also in aiding the operator to find and remove the sutures, as without this precaution they may often escape the sight and even touch, especially when they are placed deeply. I have seen Désormeaux use iron wire, while copper wire has been recommended in America. Neither has anything in its favor except its

cheapness, and they have the disadvantage of changing more rapidly than silver wire.

Silkworm gut is as impermeable and non-absorbable as silver wire; it is less easily broken, but less flexible, and applicable to all cases in which wire is used; it is given the preference by many authorities, as Bantock and Sänger. I find that the knot does not hold as well as that of catgut or silk, so that the stitches seem to me somewhat insecure. Moreover the ends become stiff as they dry, which is a matter of some importance in plastic operations on the vulva and vagina. Nevertheless it is a good material for sutures. It should be soaked in a carbolic or bichloride solution for about a quarter of an hour before using, otherwise it will be inconveniently stiff.

The best silk is the braided, and not the twisted variety; it comes in very fine strands, and when rendered antiseptic is an excellent suture material. It may even be used for buried sutures; Billroth uses it exclusively. Experimentation has shown that not only is it well borne by the tissues, but that it is even absorbed by them, yet in these two particulars it is inferior to good catgut. Therefore in cases in which there is no especial resistance to be overcome, and where the suture need not remain for any great length of time, I should use catgut, but in suturing the intestines, the stomach, or the bladder, I give silk the preference. It is also desirable to insert silk sutures at intervals to support a continuous catgut suture.

Owing to the porosity of silk, it possesses one serious drawback: that of secondary infection. Buried silk sutures in any place where suppuration is likely to occur may be the cause of fistulæ, which will not close until the septic piece of silk be eliminated. In such cases, it will be found best to use catgut for ligatures and silkworm gut for the sutures; being non-absorbent they are less liable to infection. This applies with peculiar force to operations for pyosalpinx and pelvic abscess, where the sutures come in contact with suppurating matter, and in sutures of the abdominal walls, where they are placed near drainage tubes or packing. Here silkworm gut or silver wire should be employed. There is no material used for ligature and suture, in either general surgery or gynæcology, to be compared to catgut. Its property of disappearing by absorption in from eight to fifteen days, according to its thickness and the method of its preparation, renders it invaluable for sutures buried in the abdominal cavity, and for operations on the cervix and vagina, where the removal of the stitches is attended by both difficulty and pain. Catgut prepared in chromic acid is the only kind which is not quickly absorbed. It is then even more durable than silk. I use it exclusively in my operations, occasionally reinforcing it by a suppurating suture of silk or of silver wire. Catgut loosens more readily than silk, and should be tied in three knots to avoid mishaps. The commercial article is unsatisfactory; it should always be prepared by one's self or a competent assistant.

Methods of Suture.—The tendency of the present day is toward simplic-

ity, and the reduction of the number of sutures in practical use for gynæcological operations to a few well-chosen methods, of which the following are the chief:

1. Interrupted suture.

2 and 3. Simple continued suture and continued sutures in layers (étages).

4. Mixed sutures.

5. Quilled suture.

1. *Interrupted Suture.*—Whatever the extent of the wound, its surface must all be taken in by the suture, otherwise pocketing and an accumulation of fluid may result which will distend the wound, preventing union, and may increase the chances of sepsis. To meet this requirement Hegar, fol-

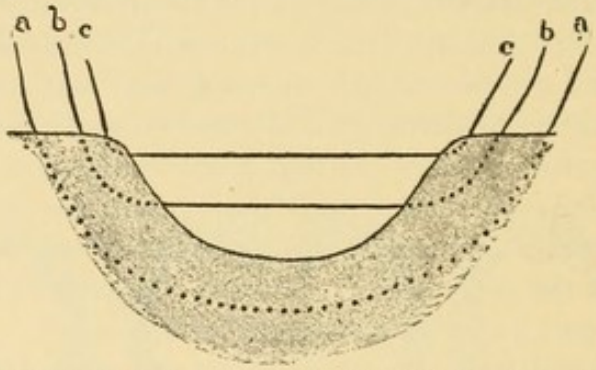


FIG. 26.—COURSE OF INTERRUPTED SUTURES. *a*, *a*, Deep suture including whole surface of wound; *b*, *b*, suture including a part only of the denuded surface; *c*, *c*, superficial suture including edges only of wound.

lowing Simon's method, directs the needle deeply under the whole surface of the wound, so that the suture is embedded in tissues. Occasionally the thread may cross the wound at about half an inch or an inch above the denuded surface (Fig. 26). The needles used in approximating surfaces (as in colpoperineorrhaphy, etc.) should be both long and strong. After uniting the deeper tissues by these concealed sutures, the lips of the wound should be drawn together by superficial stitches, placed near the margin. These, while applied last, are tied first; the deeper stitches are tied last. This method insures a more exact approximation. The deeper the wound, the farther from the edge should be the point of entrance and exit of the needle (Fig. 26). Traction exerted upon one long strand certainly puckers the edges of the wound; to correct this defect the idea was conceived of using buried sutures in layers of different depths. A layer of interrupted catgut sutures brings together the deepest portion of the wound, successive layers approximating the remainder of the surface. Werth, in 1879, applied this method to perineorrhaphy; Schröder and his school at once adopted it. In many cases it is an excellent procedure, but it possesses the disadvantage of leaving knots of the catgut in the depths of the wound, materially interfering with the approximation of the surfaces. The continuous suture has obviated this difficulty. When, at the instigation of a number of surgeons,

this suture, so long in disuse, was again brought forward, Bröse lost no time in applying it to the plastic operations of gynæcology. Schröder and his pupils likewise made extensive use of it. It is both efficacious and rapid in its application, and is particularly useful where several operations have to be done at one sitting; as, for example, amputation of the cervix with anterior colporrhaphy, colpoperineorrhaphy, and Alexander's operation.

Simple Continued Suture.—This can be advantageously employed wherever the surfaces to be approximated are neither extensive nor deep; it is

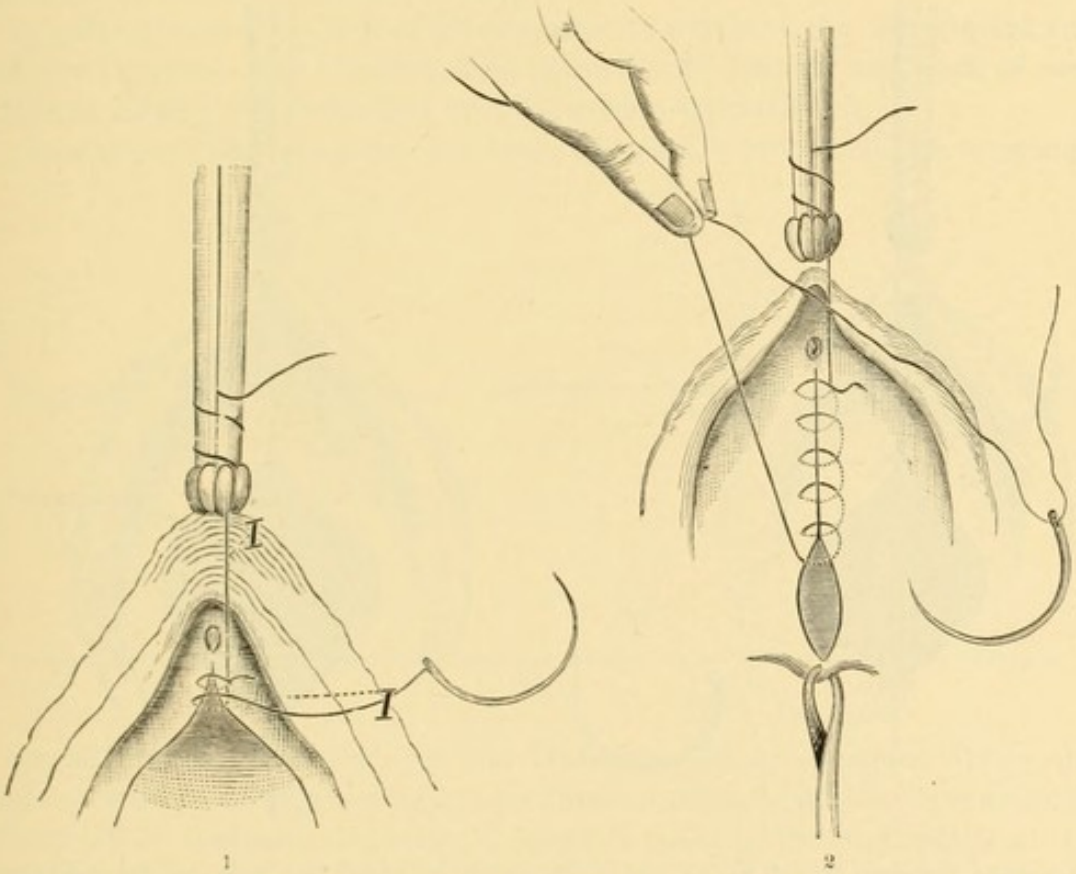
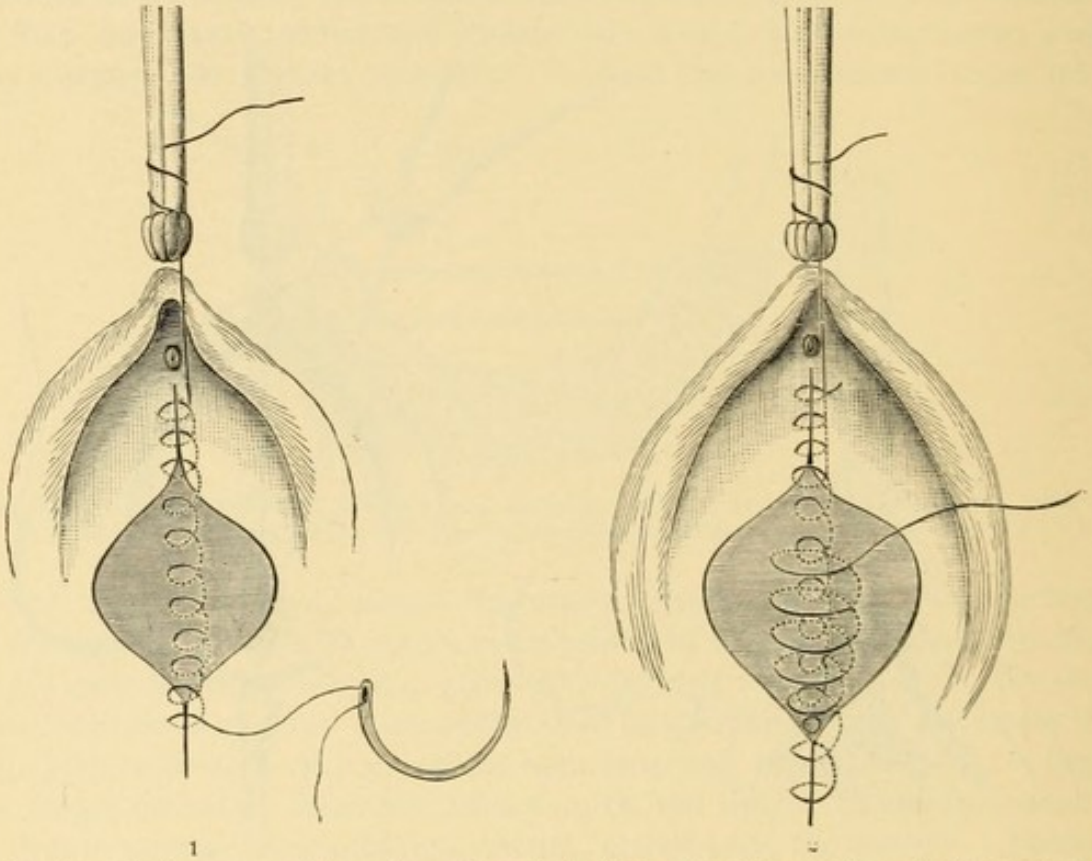


FIG. 27.—1, First step in a continued suture. *I*, *I*, Catgut. 2, Final steps in the continued suture.

also used in hæmostasis, as I have already remarked. The needle is introduced at one extremity of the wound, and the terminal end of the catgut tied in three knots, leaving a short free end which is grasped by forceps. This is held by an assistant, and serves to steady the suture (Figs. 27 and 28). Introducing the needle a little from the edge, it is carried below the surface of the wound and emerges at a corresponding point on the opposite side; the thread is gently pulled through, and an assistant holds the forceps while the second stitch is taken. He must be cautioned not to let it go suddenly when the second stitch is drawn through, but to follow the motion with his hand to prevent relaxation of the first stitch. When the suture is about half done, it is well to make light traction upon the opposite angle of the wound

with a bullet forceps, in order to have the edges even. The thread may be tied to the eye of the needle to prevent slipping.

3. *Continuous Sutures in Layers.*—These are used where one row of sutures does not suffice to approximate the denuded surfaces. In this case the needle, instead of being introduced through the skin outside of the wound, is carried into the raw surface, the distance from the edge depending upon the extent of the wound and the depth to which the needle can be carried. When the deepest surfaces have been drawn together, the sutures are taken through the skin, and the operation is terminated by a superficial spiral



1 2

FIG. 28.—1, Continuous suture in layers (one at the angle, two in the centre of the wound). 2, Continuous sutures in layers (one at the extremities, three in the centre of the wound).

suture forward and then back (Fig. 28). It may be necessary to make three layers of stitches. They should not be taken too closely together nor pulled too tightly.

We may fasten the suture in several ways. If we have brought the thread by a second layer back to the starting-point, we simply tie it three times to the projecting end; if the ends of the thread are not together, we draw the last stitch out into a long loop and tie that to the end; or we may draw the end of the thread through the eye of the needle in such a way as to leave a projecting end after the last stitch is taken—this we tie to the double loop of the stitch.

If, in suturing the upper part of the wound, the thread of the deeper

suture should accidentally be cut, or should it break, another stitch should immediately be taken at the point of rupture and securely tied; the suture is continued with this second thread. Wherever the thread is liable to be much pulled upon, as, for instance, at the point where the suture changes its direction, I strongly recommend the insertion of supporting stitches of silk or silver wire, to take off the strain from the catgut (Fig. 30).

In a perineorrhaphy I place one at each extremity of the perineum; the anterior one encircling the terminal point of the reconstructed recto-vaginal partition, the posterior uniting the extremities of the anal sphincter. In a colpoperineorrhaphy, I put in one only at the fourchette.

4. *Mixed Sutures.*—It is often advisable to combine the interrupted and continued sutures. To illustrate this point, I will describe my mode of procedure in closing the abdominal opening after a laparatomy.

As soon as the peritoneum has been cleansed, a protective gauze sponge

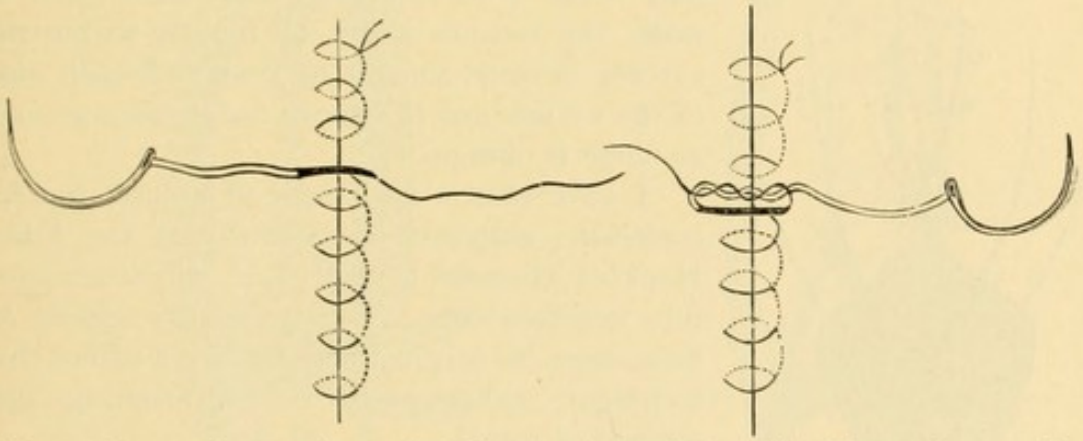


FIG. 29.—SUTURE IN LAYERS. Shows method of fastening the thread in the middle of the suture by means of a loop.

is spread like an omentum over the intestines, and an assistant draws the edges of the wound together and holds them in place. With a curved needle and catgut of moderate thickness, a stitch is taken in the peritoneum at the lower part of the wound, the end of the catgut being held with a forceps to exert a certain amount of traction; without cutting the thread, the operator rapidly sutures the peritoneum with long, basting stitches (Fig. 31); when the upper part of the wound is reached, the gauze sponge is withdrawn, and the operator now returns to the starting-point by a somewhat closer row of stitches on the aponeuroses, closing in any muscle sheath which may have been opened (Fig. 32). The forceps are now removed and the two ends of the catgut united. There now remains only the joining of the integument and the subcutaneous tissue, which often, however, forms a very thick layer. With a large curved needle, and silk of a strength proportioned to the thickness of the parts to be traversed, separate stitches are placed at intervals of about a half-inch. These sutures are introduced at about the same distance from the edge of the wound, penetrate through the adipose tissue until the

aponeurosis is reached, and return in a similar manner through the second lip of the wound. Both ends of each suture are held by forceps, the edges are approximated, and with a small needle and fine catgut, or silkworm gut, one or two superficial interrupted sutures are placed in each interval between the deep sutures. They must be quite close to the edges and bring them into exact juxtaposition. (I often replace these by a fine continued catgut suture.)

It is not until they are all placed and tied that the deep sutures are fastened over small rolls of iodoform gauze which obviate the production of grooves in the skin by these sutures (Fig. 34 *c*).

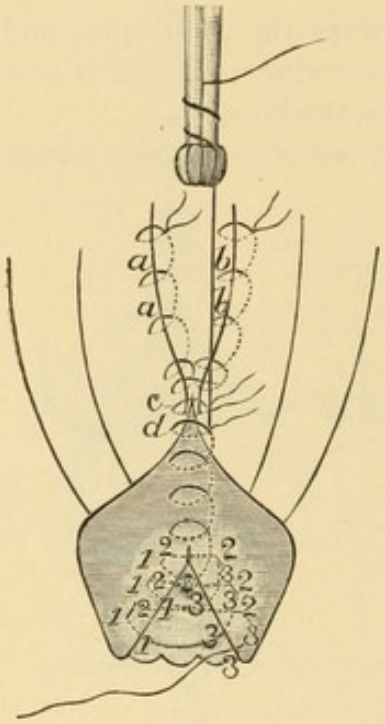


FIG. 30. — CONTINUOUS SUTURE IN LAYERS IN OPERATION FOR RUPTURED PERINEUM. 1, 2, 3. Course taken by the thread; *a*, *b*, simple continued suture; *c*, interrupted supporting suture; *d*, starting-point of the continued suture in layers.

It frequently happens that the superficial cutaneous sutures leave their mark for several months in the form of stripes, at first red, but occasionally becoming pigmented later. This may occur even when care has been taken to make the tension slight, to include within the sutures an equal amount of tissue on each side of the wound, and to remove the stitches as soon as union is obtained.

I have seen a new mode of suture, the intradermic, employed successfully at the Johns Hopkins Hospital of Baltimore, which obviated this inconvenience. Kendal Franks appears to have been its originator. I have modified his technique considerably before adopting this method of suture.

The intradermic suture may be either interrupted or continuous.

In the interrupted intradermic suture the lips of the wound are held firmly and are pierced successively with the needle, taking care to pass each time through the substance of the skin immediately below the surface of the skin. Unless the suture lies as near as possible to the surface the lips of the wound become everted after it is tied, leaving the incision slightly open. The interrupted intradermic suture seems to be of use only when very fine catgut is used and in exceptional cases, such as to strengthen a continuous intradermic suture. If silk or any other non-absorbable material were used, it would have to be left in place, and on account of its proximity to the surface of the skin it might easily protrude slightly and become infected eventually.

The continuous intradermic suture is much more serviceable. Kendal Franks used catgut exclusively for it. I consider it safer to use silk, and recommend a very fine suture and a small curved Hagedorn needle. The upper angle of the wound must be kept steady, and each of its lips is succes-

sively held firmly and everted by two forceps, one of which is held by the surgeon, the other by his assistant. The needle first enters a centimetre above the angle of the wound, passes through the entire skin, and enters the wound, drawing after it the suture until stopped by a knot which has been made in the latter. It now enters one of the lips, where it runs intradermically for three or four millimetres, re-enters the wound and is passed into the opposite lip at a level corresponding exactly to its point of emergence

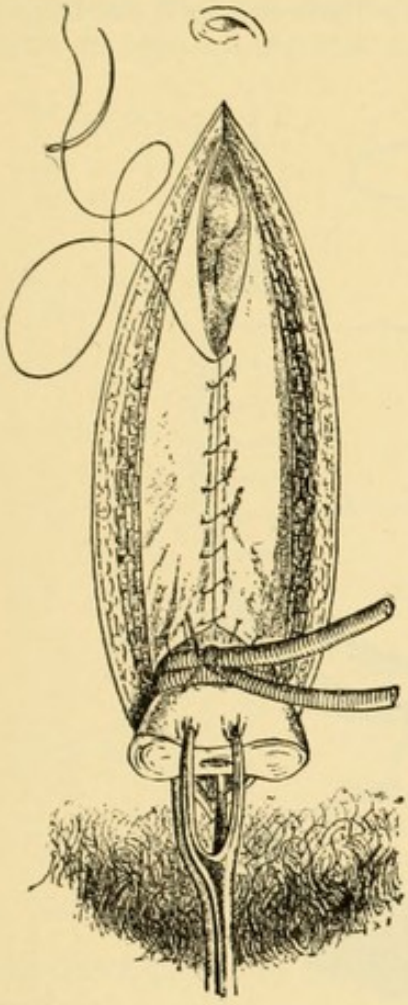


FIG. 31.—SUTURE OF ABDOMINAL WALLS AFTER HYSTERECTOMY. First stage of the continuous suture (peritoneum).

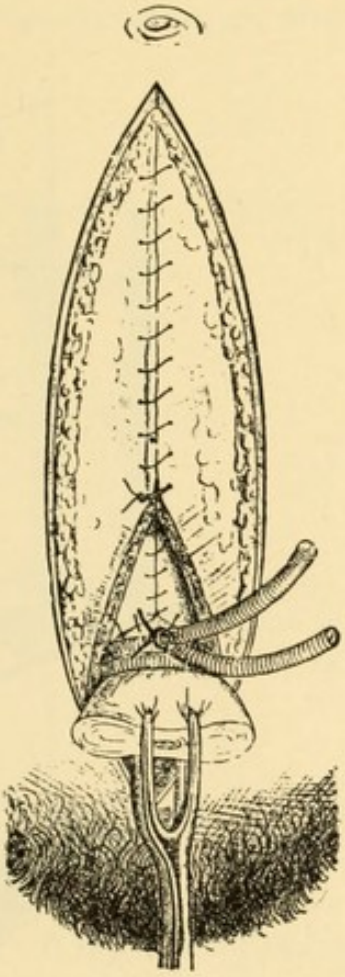


FIG. 32.—SECOND STAGE OF CONTINUOUS SUTURE (Musculo-aponeurotic Layer).

from the first. The skin on either side is thus traversed alternately until the lower angle of the incision is reached, where the needle is brought out through the skin at a distance of one centimetre from the lower extremity of the wound (Fig. 34, *a*). The course of the suture recalls a corset lace, the eyelets being represented by the intradermic passages.

There remains now only to tighten the suture from above downward by drawing on each loop successively with a hook, unless each stitch has been tightened as it was placed (Fig. 34, *b*). When this has been done, the wound

has been reduced to the line of incision and the suture is completely concealed except at the two extremities. It is usually of no use to introduce complementary intra- or extradermic interrupted sutures in order to prevent gaping of the wound, but if it is considered necessary they may be resorted to. A knot may be made in each end of the suture at the level of the skin so as to prevent it from slipping and becoming relaxed.

To remove the intradermic suture (which is usually done on the eighth day), the upper end is pulled upon until a portion is drawn out from within

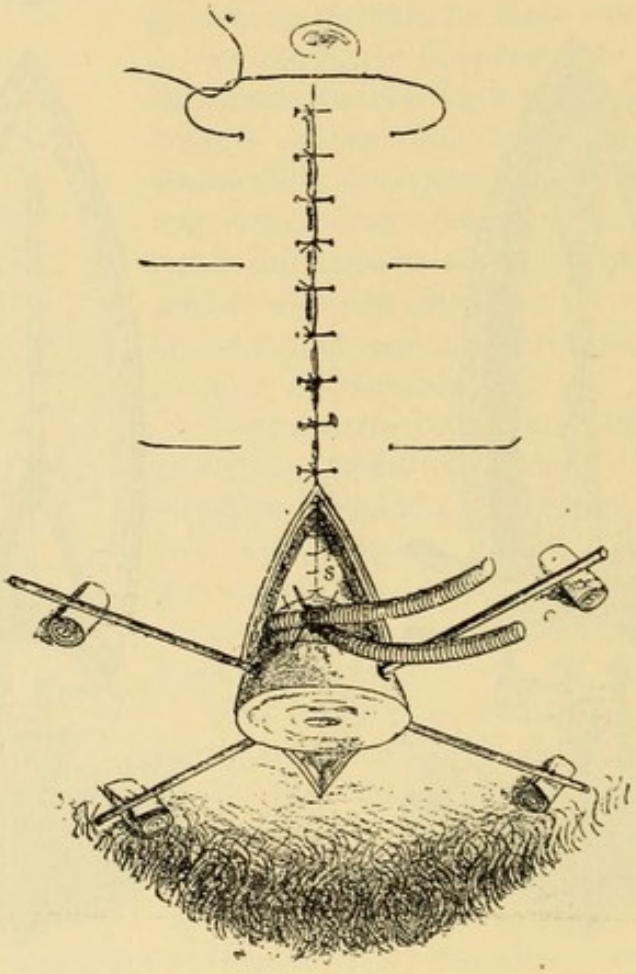


FIG. 33.—SUTURE OF ABDOMINAL WALLS AFTER HYSTERECTOMY. Interrupted suture of the integuments and subcutaneous areolar tissues.

the skin; it is cut close to the latter and the rest is removed by drawing upon the lower end. During the next eight days I occasionally apply a small strip of iodoformized diachylon to protect the cicatrix from tension. I have in this way obtained cicatrices which were almost entirely invisible a few weeks after laparatomies.

[In using the buried suture, whether continuous or interrupted, whether of fine silk, of catgut, or of other material, the most important factor in insuring success is the maintenance of an aseptic wound. With favorable conditions it gives results attainable by no other method, bringing like tis-

sues together, leaving the minimum of scar with the maximum of strength. An essential point is that *all* the sutures should be buried, so that there are none above or in the skin when the wound is finally closed, the superficial row being just beneath the skin. When it is thought necessary to employ stay sutures they should be passed at such a distance that there is no possibility of their coming in contact with any of the buried sutures and so possibly infecting them. Other conditions favoring success are that the wound shall not have been bruised by the unnecessary use of hæmostatic forceps, by careless handling or rough sponging, and shall not

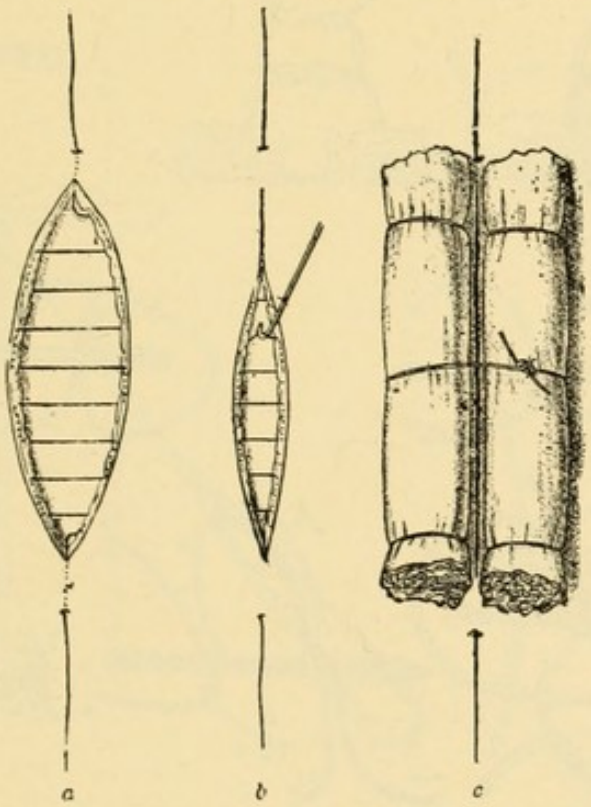


FIG. 34.—CONTINUOUS INTRADERMIC SUTURE.

have been soiled by pus or other septic material. If these conditions cannot be attained, the buried suture should not be employed.]

5. *Quilled Sutures.*—Small rolls of iodoform gauze are now substituted for the quills and lead plates in former use. Lister's button suture, with the heavy silver wire and piece of lead, has also been superseded by better processes. It is no longer used in perineorrhaphies, but there are some exceptional cases in which it may be employed. For instance, when a large abdominal tumor adheres anteriorly to the parietal peritoneum, its removal will leave an extensive raw surface, caused by the stripping of the peritoneum from the internal abdominal wall. The liability to septicæmia is increased by the presence of this large and moist surface. It will then be found useful, before closing the abdomen, to carry a long, deep suture from one side to the other, supporting it at each end with a roll of iodoform gauze. This

will fold the abdominal walls above and parallel to Poupart's ligament, will exercise a beneficial pressure upon the raw surfaces, prevent hemorrhages and serous exudation, and thus eliminate one source of infection. These sutures can be withdrawn in from five to six days.

Hæmostasis.—We have compression for capillary hemorrhages, torsion for small arteries, suture for the surface of wounds. But the two methods to which I call especial attention are ligation and forcipressure. I shall

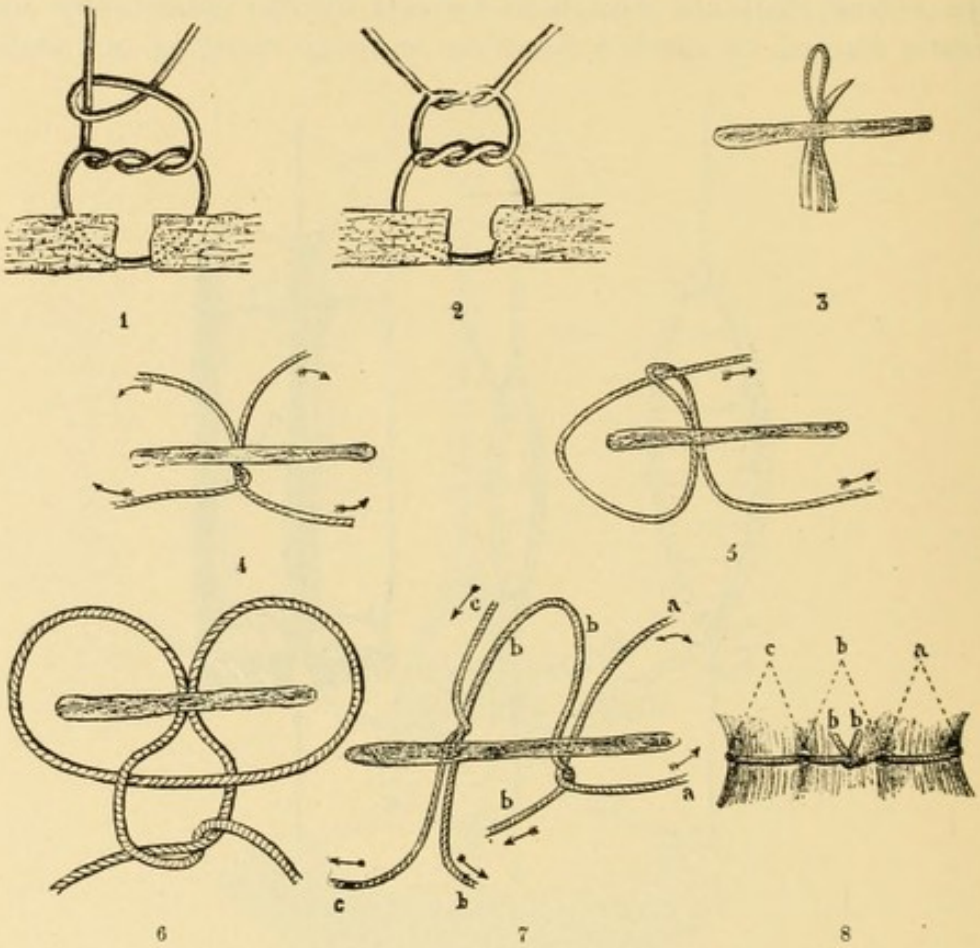


FIG. 35.—1, An improperly tied surgeon's knot; 2, properly tied surgeon's knot; 3, transfixion of the pedicle with a needle and loop of silk; 4, crossing of ends of silk after transfixion of pedicle; 5, Bantock's knot for ligation of small pedicles, 6, Lawson Tait's knot (Staffordshire knot) for ligation of small pedicles (the loop is to be thrown over the tumor); 7, continuous ligature for a large pedicle; crossing of threads; 8, continuous ligature for large tumor; threads tied (side view).

not touch upon ligation of the vessel alone, as it has no especial bearing upon the subject in hand, but pass on to ligature in mass, which is of superlative interest in gynæcology, and by means of which we are able to control the often formidable hemorrhages of the pedicles of abdominal tumors. Wire, silk, catgut, elastic cords, and tubes have all been used in its application. We shall take up the matter more in detail when we study the subjects of ovariotomy and hysterectomy.

Silk is the most widely used agent for ligation in mass, as it offers the greatest amount of resistance in the smallest bulk. Braided and not twisted

silk is always to be used. When, however, the ligatures are to be buried in the abdomen it will be found disadvantageous to use a material which is non-absorbable for a great length of time, and yet so absorptive as to increase the liabilities of secondary infection. Since catgut prepared in oleum juniperi does not possess these drawbacks, many gynæcologists do not hesitate to substitute its use for that of silk in buried ligatures, notwithstanding the fact that it is more difficult to tie it tightly than the silk.

In using the ligature in mass, if the part to be embraced is relatively

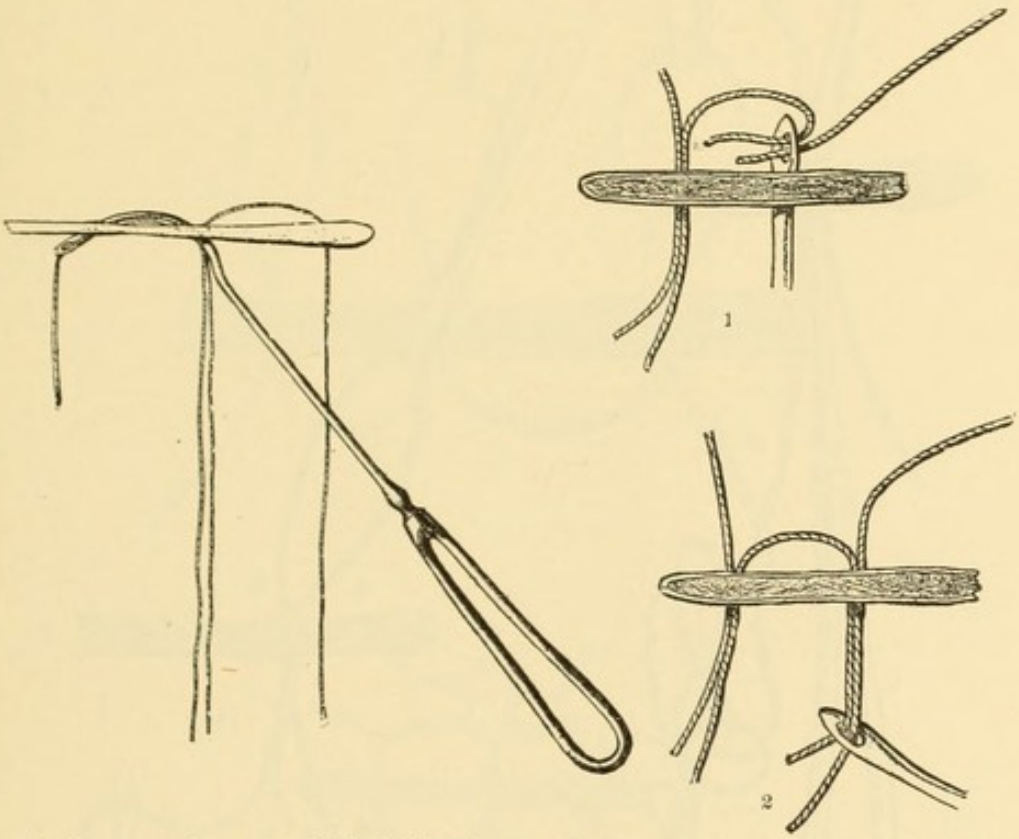


FIG. 36.—CONTINUOUS LIGATURE. Method of introducing threaded needle twice through the same opening (membranous pedicle).

FIG. 37.—1, 2, CONTINUOUS LIGATURE. Method of introducing threads of the second loop. The first loop transfixes the pedicle and is then cut, which leaves a protruding end; this is threaded into a blunt needle in company with a new thread, and the two are again carried through the pedicle.

thin, one loop of thread is passed around it and securely fastened with a surgeon's knot (Fig. 35, 1, 2). If the pedicle is thick and yet requires only two loops, it must be transfixed in the centre by a needle threaded double (Fig. 35, 3); the loop is cut, which leaves two ends on each side of the pedicle; these are crossed and tied on either side (Fig. 35, 4) or, better yet, to avoid having two knots (knots being less well tolerated by the tissues than the rest of the thread) we may use Bantock's knot (Fig. 35, 5) or Lawson Tait's Staffordshire knot (Fig. 35, 6). In a laminated pedicle, such as we find in certain ovarian pedicles, membranous adhesions, or broad ligaments, we pass a series of ligatures, so linked together that when they are tightened

no laceration of the tissues results (Fig. 35, 7, 8). Figs. 36, 37, 38, 39 show with sufficient clearness the methods generally used in applying these ligatures, as well as the method which Wallich proposes to employ in their stead.

I will merely allude to the kangaroo tendon proposed for use by American operators, and to the reindeer tendon recommended in Russia. They

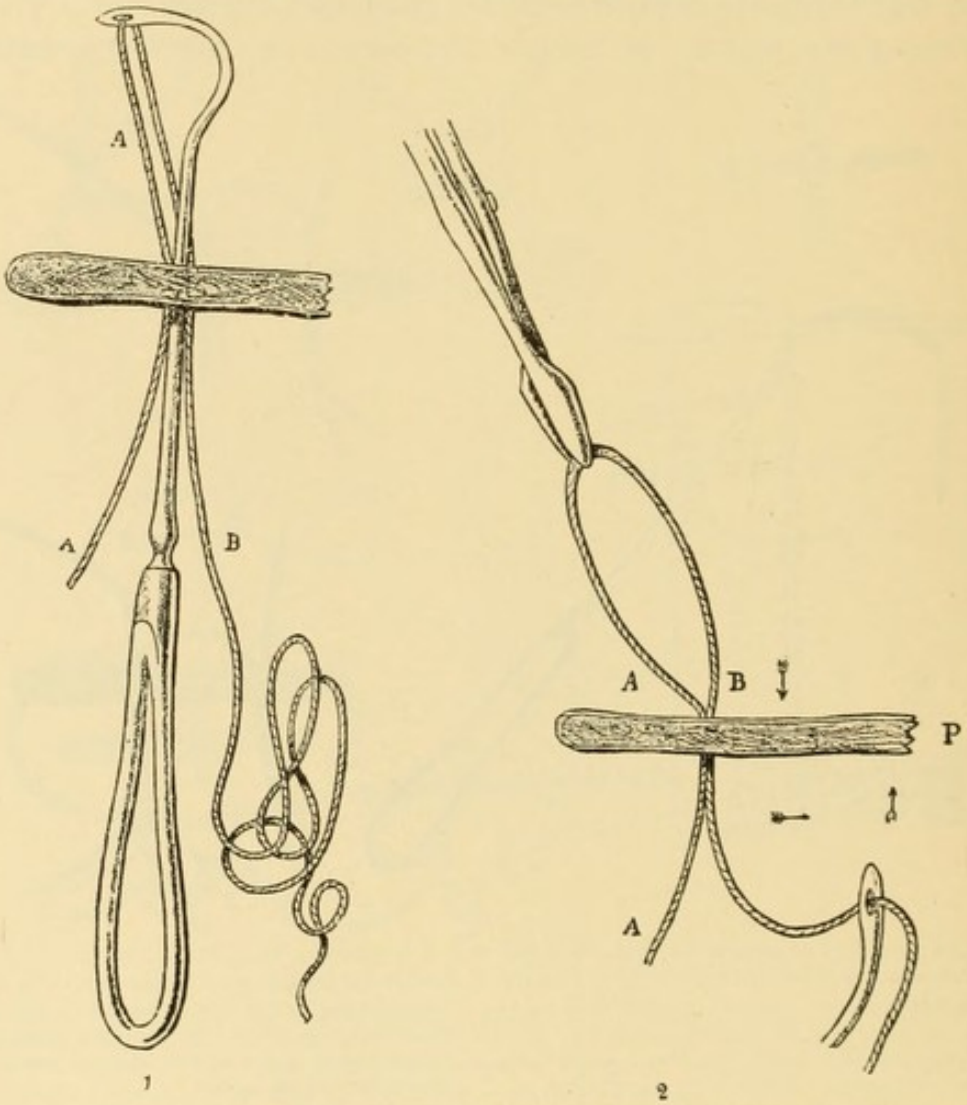


FIG. 38.—CONTINUOUS LIGATURE (WALLICH). 1, Deschamp's blunt needle transfixing the pedicle; one thread of the loop is to be seized at *A* and kept outside the pedicle, the other long end, *B*, is held coiled in the hand of the operator. 2, The loop is grasped by the forceps and held while the needle is withdrawn; it slides down the thread, *B*, and then following the direction indicated by the arrows, pierces the pedicle again, leaving a second loop in place.

doubtless possess a remarkable power of resistance, and when deprived of their fatty constituents by ether, and submitted to a process similar to that used in the preparation of catgut, would be a better material for ligature in mass. But the difficulty of obtaining them renders their general use impossible. Ligature in mass upon the surface of the body causes death of the strangulated tissues. When buried in the abdomen, with antiseptic precautions, the constricted portions do not mortify, their vitality being preserved

by vascular adhesions and by blood-vessels which pass like a bridge over the groove of the ligature. After a while the stump shrivels and is absorbed. This has been well shown by experiments on animals.

Hegar has witnessed the perfect absorption in a few weeks, by the peritoneum of a dog, of freshly extirpated bits of muscle; and Czerny has seen

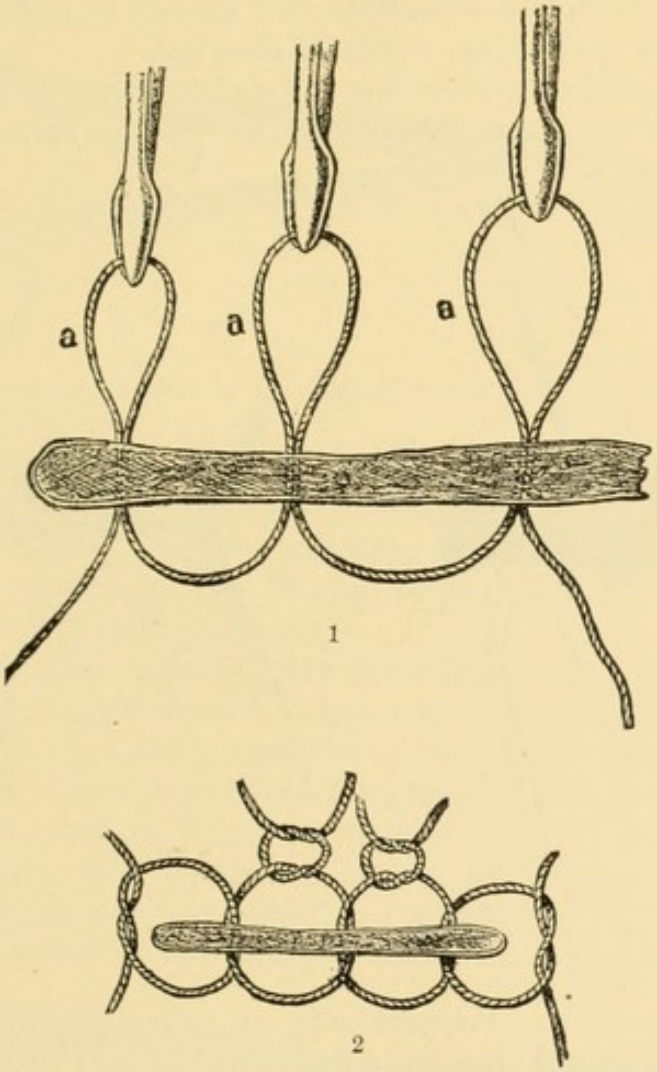


FIG. 39.—STEPS IN THE APPLICATION OF WALLICH'S CONTINUOUS LIGATURE. 1. The threads in place, the loops are to be cut at *a*, crossed and tied. 2, Threads crossed, tied, and ready to be tightened.

the same thing with portions of cancer, Ziegler with fragments of bone, and Tillmans with pieces of liver, kidney, and lung.

Thomson has made a series of interesting experiments with the suture materials most in use for laparatomies. Carbolized catgut is absorbed in ten days; chromic-acid catgut lasts for several months, as Sänger and Döderlein ascertained upon patients who survived Cæsarean section. Silkworm gut was intact at the end of two months. Silk is somewhat disorganized at the end of fifty days. The silk threads are at first infiltrated with a new cell growth, become encysted, and finally disappear, but this is a process which it takes several months to accomplish, and before that time they may

play the part of foreign bodies. The only explanation of this infection is the passage of germs through the intestines or the Fallopian tubes; unless, indeed, we admit the existence of a species of latent microbism, called into activity by a vicious local or general condition. To avoid infection when the cut surface of the pedicle may be septic (salpingitis, etc.) it is best to use catgut, or to use both cauterization and ligature in mass. The aseptic slough produced by the hot iron is rapidly absorbed.

Kaltenbach found in a subject who had died of tetanus eight days after the operation that the cauterized surface was smooth, charred, and showed

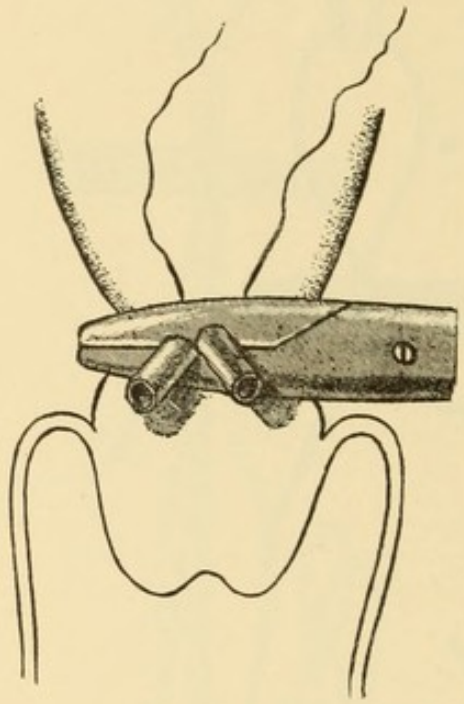


Fig. 40.—Hegar's Forceps Temporarily Holding an Elastic Ligature in Place, while a Permanent Ligature is being Adjusted.

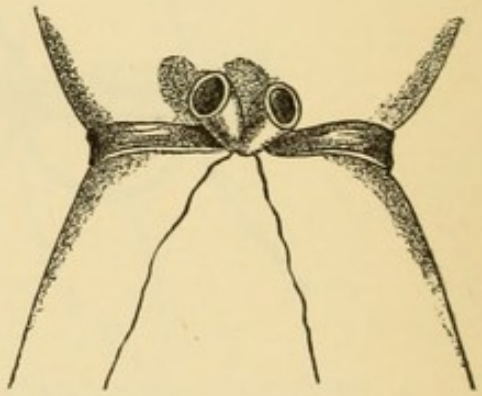


Fig. 41.—Elastic Ligature Tied with Silk Thread (Hegar).

no trace of inflammation. Heppner, after an interval of two years, found the merest trace of animal charcoal in the neighborhood of the pedicle.

Of elastic ligature, buried or on a free surface, I shall here mention only a few general points, reserving technical details for the chapter on hysterectomy. It has, however, been used in the ligation of other than uterine pedicles. Hegar uses it in profusely bleeding ovariotomies. To keep the elastic cord in place, Olshausen ties it twice, and with a few additional silk stitches fastens it to the pedicle. Thiersch draws the ends through a leaden ring, which he then compresses. Hegar ties two silken ligatures around the elastic, at a little distance from each other (Figs. 40, 41, 42). Since I first introduced an instrument for placing ligatures many modifications have been proposed, not only to facilitate the application of the cord, but also to keep it in place. I consider this last precaution superfluous, as two threads of silk fully accomplish the purpose without the intervention of any instrument.

Forcipressure.—The process of obtaining hæmostasis by the temporary or permanent application of forceps is of ancient date. For a long time Charrière, the well-known manufacturer of instruments, attempted to induce

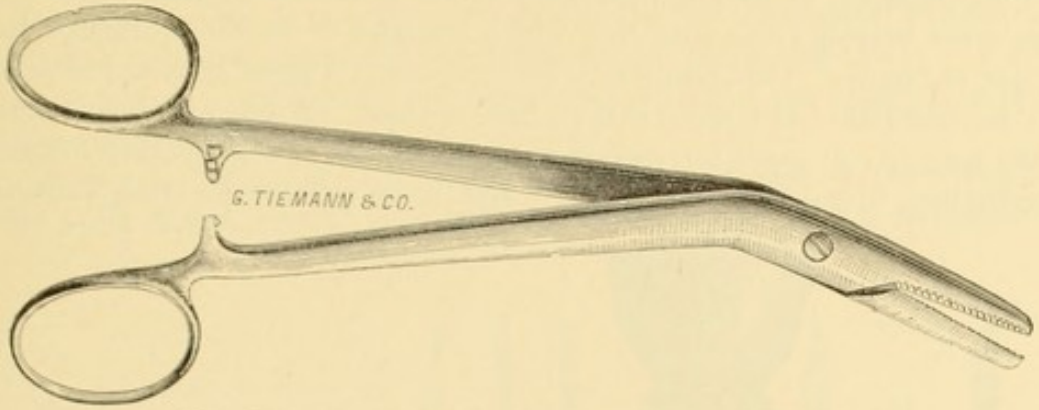


Fig. 42.—Hegar's Forceps for the Temporary Fixation of an Elastic Ligature.

surgeons to adopt forcipressure. In his catalogue, published the 15th of April, 1851, he shows forceps almost identical with the Koeberlé-Péan forcipressure instrument. He then made them for the purpose of seizing insects and reptiles in narrow spaces. In 1859 he pointed out their value in arresting arterial hemorrhage by pressure.

This method was, however, only occasionally used, until Koeberlé and Péan adopted it to save time in major abdominal operations. It is at the present day used in general surgery as well as in gynæcology.

The popularizing of this valuable method of hæmostasis is due to Koeberlé in the first place, to Péan, and finally to Verneuil.

In England, Spencer Wells has become an enthusiastic apostle of the process, and its use is now general.

The use of forcipressure during an operation is of great value, not only

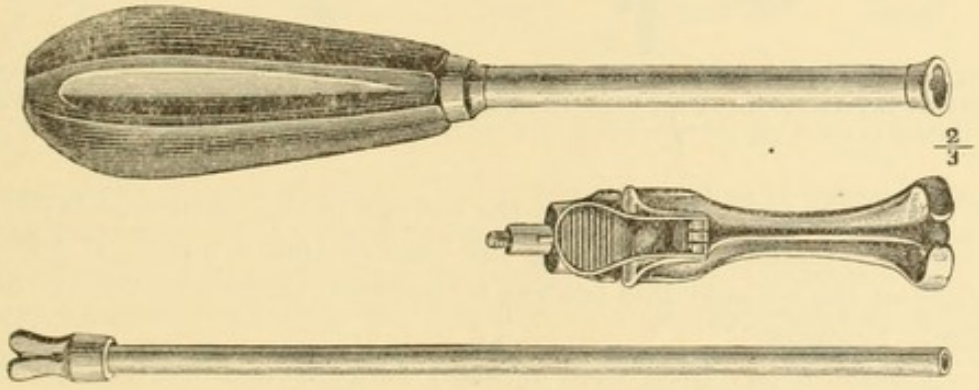


Fig. 43.—Pozzi's Ligator Taken Apart.

for the immediate arrest of bleeding, but because the temporary hæmostasis effected by it nearly always becomes permanent. One may by its means perform a laparatomy without once being interrupted to tie an artery.

In plastic operations the use of this method must not be carried to excess, for the pinching to which some portions of tissue are subjected by the forceps is an obstacle to immediate union.

Forcipressure, as well as ligature, may be divided into that which compresses the vessels alone, and that which includes in its compression a large amount of tissue. This temporary constriction is a great adjuvant to permanent hæmostasis. It is desirable to have on hand forceps of various kinds. In the majority of cases forcipressure is resorted to as a temporary measure; nevertheless, in cases of necessity, it has been utilized for the permanent

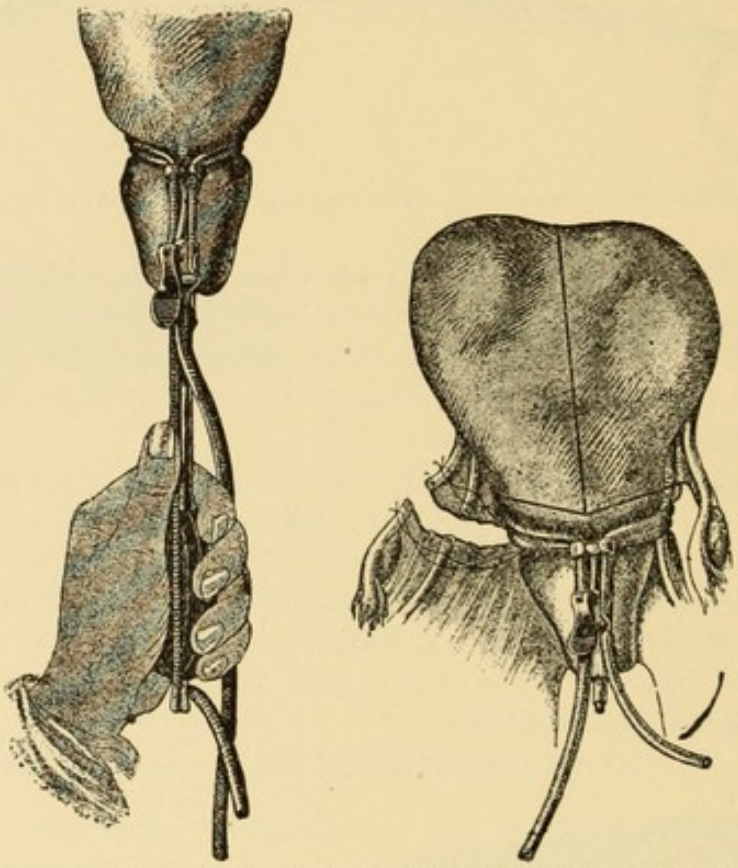


FIG. 44.—APPLICATION OF POZZI'S ELASTIC LIGATURE. The elastic cord drawn under the clamp is held in place by it; the lower part of the cord is disengaged from the furrow; the instrument is taken apart by unscrewing the lower part of the shank on a level with the upper part of the groove. Only the head of the instrument remains temporarily in place.

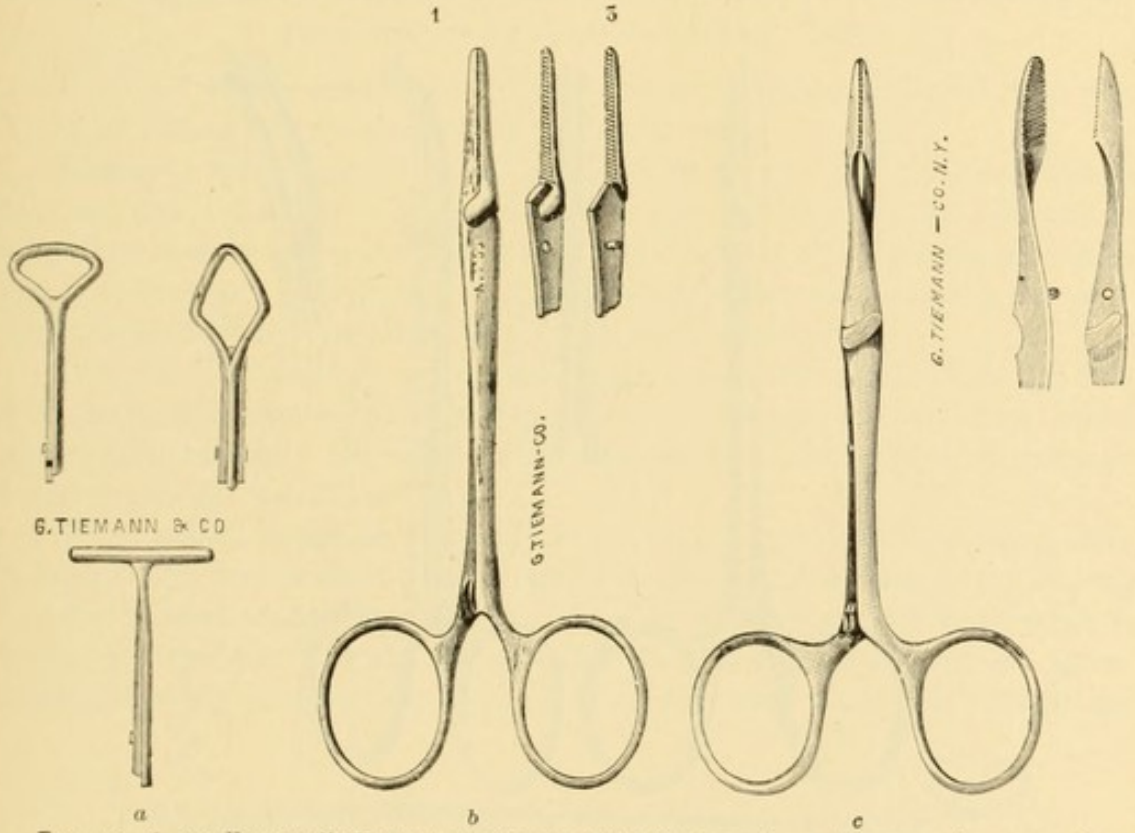
arrest of hemorrhage. Péan leaves the forceps in the peritoneal cavity after abdominal hysterectomy, gathering the handles into a bundle at the lower extremity of the wound; this process is, however, inferior to the use of buried elastic ligatures.

Forcipressure has been used by many surgeons as a matter of necessity in vaginal hysterectomy, but it remained for Spencer Wells and Jennings to suggest its use as a matter of choice, and for Richelot to systematically adopt it as such, even where ligature would be easier and, seemingly, preferable. Many surgeons now do the same. I shall return to this subject in the chapter upon vaginal hysterectomy. I would only observe in this con-

nection that hæmostasis by permanent forcipressure, when in mass, is always followed by the death of a much greater amount of tissue than when applied to isolated ligature. From the antiseptic point of view, it is inferior to ligature.

Drainage.—This is not the place to discuss the indications for drainage whether of reunited superficial wounds or of the peritoneal cavity. I would simply establish a few general principles and point out the practical methods for their application.

Drainage of Wounds.—In a suture in layers (étages) of the abdominal cavity after laparatomy, it is usually not necessary to place a drainage tube



FIGS. 45, 46, 47.—KOEBERLÉ'S HÆMOSTATIC FORCEPS WITH RATCHET CATCH ALLOWING GRADUATED PRESSURE FOR FORCIBLE COMPRESSION. *a*, Various forms of jaws for pressure forceps (Péan); *b*, Lawson Tait's pressure forceps; *c*, Péan's hæmostatic forceps with Collin's joint.

between each series of stitches. Yet it is well to do so if the surface of the cut has been exposed to infection, for instance, from pus; for in this case, notwithstanding the most energetic aseptic washings, a serous or sero-purulent exudation may supervene, and unless it is promptly carried off by prophylactic drainage may interfere with primary union. Under these circumstances it is advisable to place a small drainage tube between the aponeurotic and cutaneous sutures; this tube should be divided into three segments, and a safety-pin transfixing the outer end will prevent its being lost in the wound. In the hospital at Pesth, I have seen used, in place of the pin, a small flat piece of hard rubber sewed to the end of the tube with two lateral stitches.

The best drainage tubes are of thick rubber, uniting elasticity, which keeps them open, to a flexibility which permits of bending them as required. It is not necessary to use glass or hard-rubber tubes if the soft ones at hand are of sufficient thickness and good quality.

[With a presumably infected wound buried sutures should be discarded in favor of plain through-and-through sutures of silver wire or silkworm gut.]

Drainage of the Peritoneal Cavity.—From the earliest days of laparatomy this has been done to prevent the accumulation of liquids (blood, ascitic fluid, more or less septic serum, etc.). Peaslee, in 1855, first pointed out the necessity for it. He used an elastic catheter which penetrated into

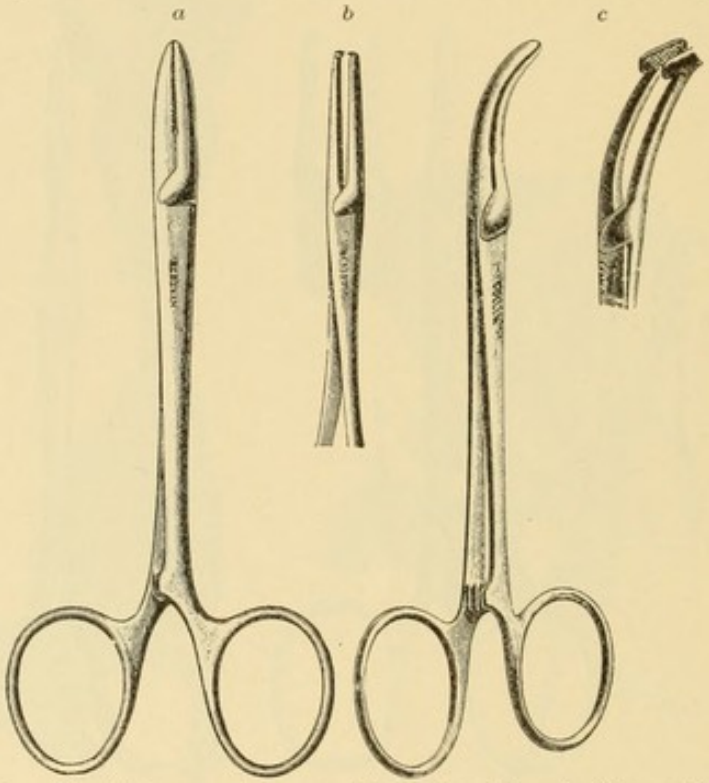


FIG. 48.—*a*, Terrier's hæmostatic forceps; *b*, Kocher's model; *c*, Pozzi's curved forceps.

the pouch of Douglas and emerged through the vagina. Koeberlé, in 1867, drained through the abdominal wound by means of a glass tube terminating in a bulb, and perforated at intervals in its entire length with small openings. The two directions to be taken in peritoneal drainage were from that time determined. But the debatable ground, then and now, is the indication for drainage. Sims, in 1872, recommended systematic drainage after every ovariotomy. This exaggerated view at least showed the harmlessness of drainage when attended with proper precautions. It is well to bear in mind that, at the end of a few hours, the tube is surrounded and in a measure isolated by a newly formed pseudo-membrane. Only a persistent oozing in the abdomen will cause the formation of a cavity at the end of the tube in which fluids accumulate.

The problem has been further simplified by the recognition of the great absorptive powers of the peritoneum when this physiological function is not interfered with by extensive or ragged wounds, or by long exposure to the air and paralysis of the intestines. Consequently in a laparatomy uncompli-

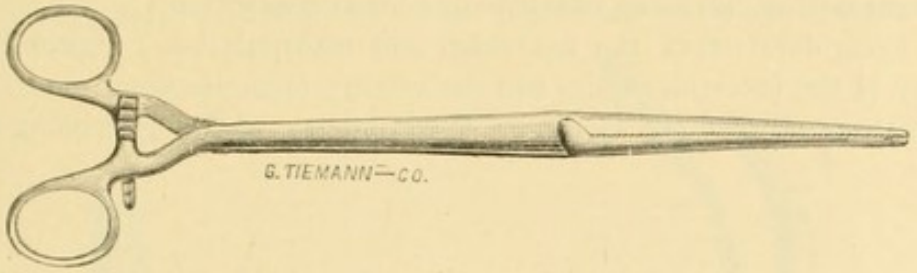


Fig. 49.—Straight Forceps for Forcipressure in Mass.

cated by the above conditions a large amount of blood or serous fluid may be rapidly absorbed without injury to the patient.

Chénieux asserts that this absorption is more beneficial than evacuation, and we would scarcely wish to contradict him. The difficulty consists in knowing when it will occur; if it does not occur at all, septicæmia is more likely to follow. I have said in a preceding chapter that washing the peritoneum temporarily interferes with its absorptive powers.

(Wegener, basing his conclusions upon experiments with dogs and rabbits, estimates the absorptive powers of the peritoneum in man at two and a half quarts an hour; toxic injections have as rapid action as if introduced directly into the blood-vessels.)

The "toilet" of the peritoneum having been properly accomplished, after a laparatomy, by means of gauze sponges introduced by the finger or long forceps into all dependent portions, there is nothing to fear from what is left in the abdomen but purely from what may come later and remain there. Each and every surgeon must judge for himself what constitute indications

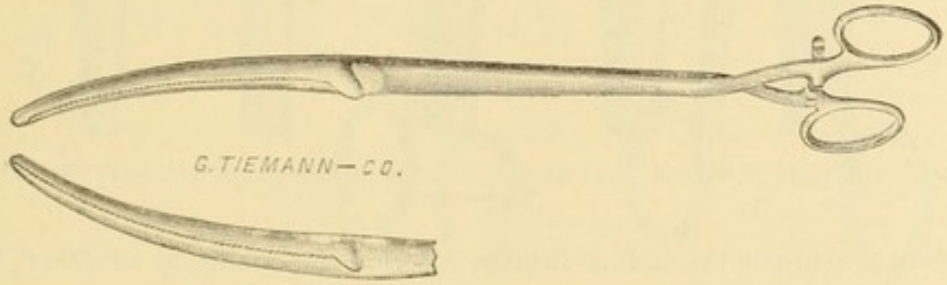


Fig. 50.—Curved Forceps for Forcipressure in Mass (Péan and Richelot).

for drainage, it being manifestly impossible to lay down strict laws; yet we may formulate the principal indications.

1. Abundant parenchymatous oozing of blood or serum after closure of the abdominal walls, the absorbing power of the peritoneum being impaired by special anatomical or clinical conditions. Drainage, in this case, serves not only to carry off the fluid, but possesses hæmostatic action as well.

2. The existence in the peritoneal cavity of a septic body (shred of a cyst wall, suppurating surface) which would occasion the formation of fluid whose absorption would be harmful; lesions of the peritoneum.

3. Large tear of the peritoneum acting in two ways: (*a*) as a source of persistent oozing, (*b*) as an obstacle to normal absorption.

4. Long duration of the operation and manipulation compromising the tonicity of the intestinal walls and the vitality of their serous covering.

Drainage through the Vagina.—The cul-de-sac of Douglas being the most

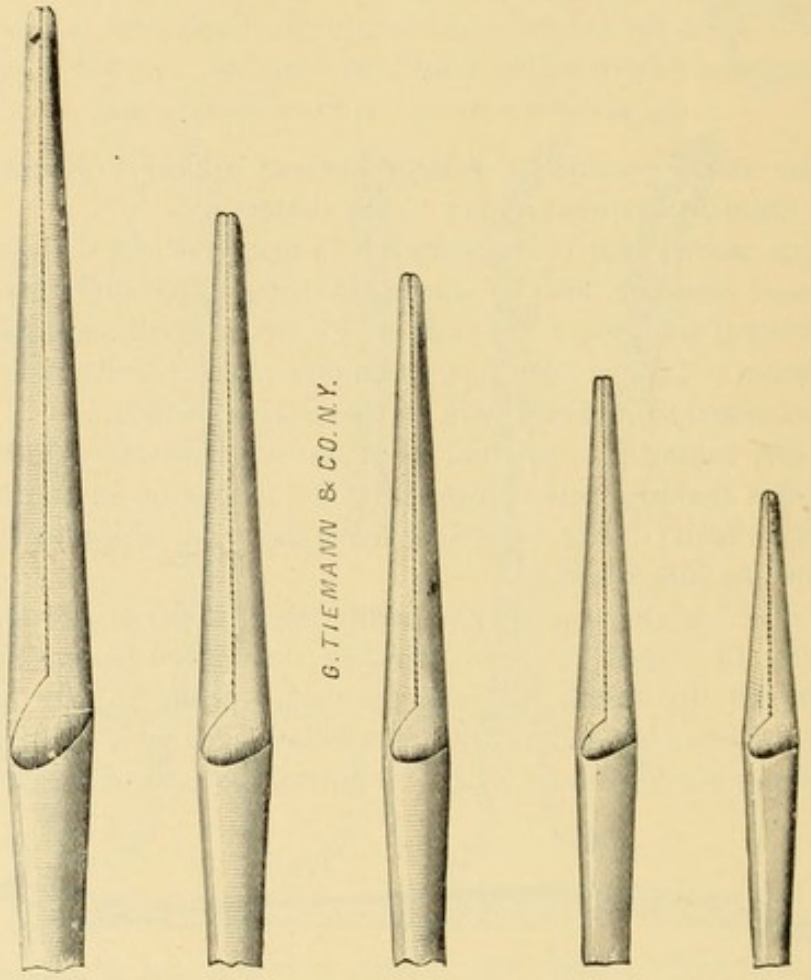


FIG. 51.—INSTRUMENTS OF SEVERAL SIZES FOR FORCIPRESSURE IN MASS (ADHESIONS) WITH COLLIN'S JOINT. Natural size.

dependent portion of the pelvic cavity, it seems reasonable to utilize it for the purpose of draining. Moreover, by its use we avert the danger of weakening the abdominal walls, and thus favoring the occurrence of a hernia by delay in union at any point. The only objection to be raised against the vagina as a canal for drainage is the fact that antisepsis is rendered more difficult by the large number of micro-organisms always present in the genital tract.

Without dwelling upon inefficient or complicated methods of drainage, I shall describe the one that seems to me of the most value. It consists in the introduction of a cross-shaped tube formed of two rubber tubes firmly

united. (This may be done with silk sutures, but there is danger of secondary infection.) After a laparatomy this tube may be inserted through an incision in the posterior cul-de-sac, or directly by puncture with a large trocar, or, better still, with Wölfler's forceps.

I have seen them inserted by A. Martin without previous puncture of the

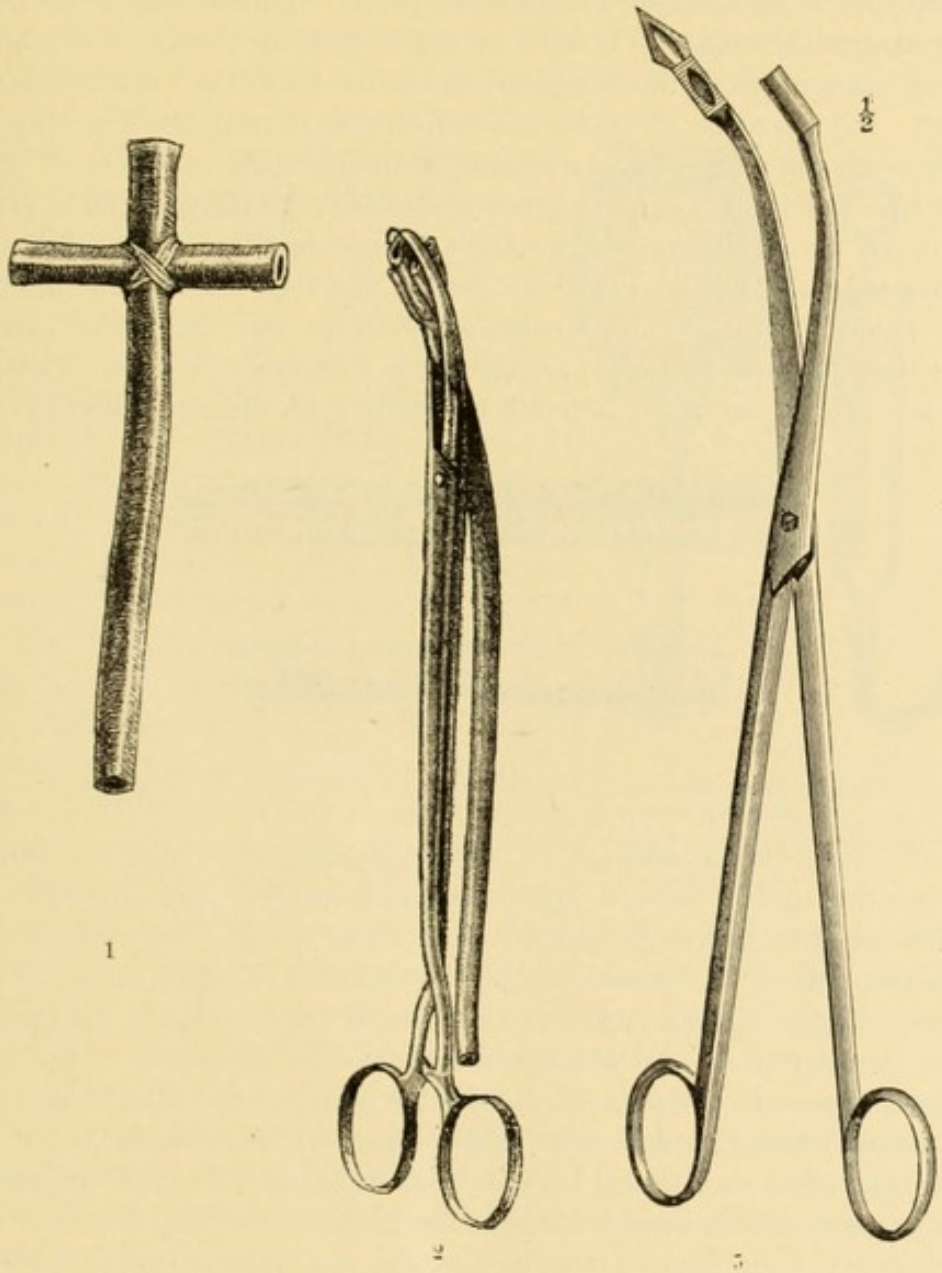


FIG. 52.—1, Rubber cross-shaped drainage tube for draining cavities. 2, Method of seizing the tube in the forceps for insertion in a cavity. 3, Wölfler's forceps for introducing tubes by transfixion.

tissue. The transverse arms of the tube were held folded in the teeth of the forceps; the surgeon placed two fingers in the pouch of Douglas, and, while the cervix was held down by an assistant, the operator forcibly pushed the forceps behind the cervix into the posterior cul-de-sac, bursting through its walls and carrying the tube into the abdomen between the guiding and sup-

porting fingers. The inventor of this process claims that rapidity of action is secured and danger of hemorrhage or of wounding the rectum is averted. For my part I prefer the cautious use of Wölfler's forceps (Fig. 52). The transverse arm of the tube is held securely in place and yet in such a way that it can be taken out when necessary, by strong traction. The vaginal extremity should be wrapped in iodoform gauze. Unless special indications call for longer drainage, it is left in place eight or ten days at most. A feeling of discomfort in the abdomen warns us when the tube ceases to be tolerated. As a matter of prudence, it is better to administer no injections either through the tube or in the vagina while the tube is in place; exuded fluids can be absorbed by gently pushing iodoform gauze into the vagina.

Drainage through the abdominal walls has hitherto been done chiefly with glass tubes. It is advisable to have an opening only at the inner end. This is inserted into the cul-de-sac of Douglas and the upper extremity emerges from the abdomen into an absorbent dressing. Lawson Tait uses a special sort of cupping-glass to pump out fluid. [A slender forceps is better

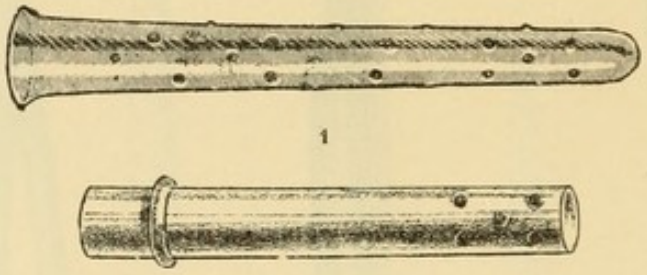


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Fig. 53.—Tubes for Peritoneal Drainage. 1, Koeberlé's tube. 2, Keith's tube.

and more easily kept aseptic than cupping-glass or syringe for removing fluid from the tube. With it small pieces of sterile gauze or cotton can be easily carried into the tube and the fluid entirely removed.] Koeberlé, as early as 1867, filled the canula with pledgets of carbolized cotton to absorb the fluid. Hegar adopted this process, with improvements, bringing into play the capillarity of the absorptive substances contained in the canula, which were frequently renewed. He finally changed the canula into a large abdominal speculum (Bauch speculum) of glass or hard rubber, one or two inches in diameter and seven inches long, filled in his earlier experiments with carbolized cotton, later with iodoform gauze. On the first day this is renewed every hour, then every two hours, and finally every four hours. Hegar has since abandoned this method for that of capillary drainage by means of iodoform gauze only. It is evident, then, that capillary drainage has for some time been an auxiliary to tubular drainage through an abdominal opening; it counteracts the injurious effects of pressure far better than Nussbaum's method of turning the patient upon the side or the abdomen. The credit of reducing to a system what was previously a more or less empirical process is due to Kehrer. He proposed the use of lamp-wick about

as thick as the little finger, thoroughly disinfected by boiling in a five-per-cent carbolic solution; in practice, however, it is usual to immerse the wick in iodoform ether, and then thoroughly dry it.

Since the publication of Kehrer's article, antiseptic lamp-wick, iodoformed or carbolized, has been extensively used in Germany, both in gynæcological operations and in general surgery. Breisky has long used it for drainage after vaginal hysterectomy for uterine cancer. Billroth used it for several purposes, but seems now to prefer strips of iodoform gauze. Nevertheless the lamp-wick has recently come into favor again. Gersuny considers its absorptive powers greater than those of gauze, and Chrobak took the trouble to demonstrate its superiority by means of comparative experiments. He used it in draining after ovariotomy and supravaginal hysterectomy. Yet operators of no less authority than Hegar, Mikulicz, etc, affirm that the absorptive powers of gauze are all-sufficient, and that, other things being equal, it is best to avoid multiplying the number of materials used for dressings. The indications for simple capillary drainage of the peritoneum, as distinguished from the combination of it with tamponing, to which I shall shortly allude, are, I believe, very few. For my part, I use it only after vaginal hysterectomy. Instead of inserting one or two tubes into the peritoneal opening, or leaving it quite open as do many surgeons, I prefer to reduce the size of the wound by a few lateral sutures and push in, to the depth of about a finger, a large strip of iodoform gauze doubled upon itself, its two ends tucked into the vagina and easily recognized by a thread tied about them. At varying intervals, depending upon the amount of exudation, the other pieces of iodoform gauze which complete the intravaginal dressing are renewed, but the strip in Douglas' pouch is left in place as a drain and only removed after a lapse of six or eight days.

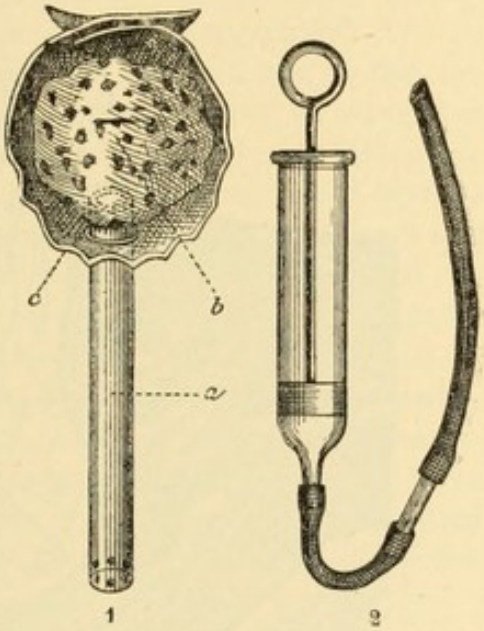


FIG. 54.—ABDOMINAL DRAINAGE. 1, Glass tube, *a*, surmounted by a sponge, *b*, covered by rubber tissue, *c*. 2, Syringe for aspirating fluid from bottom of tube.

Antiseptic Tamponade of the Peritoneum.—It was a bold step to stuff antiseptic pledgets into a portion of the peritoneal cavity so as to isolate it from the remainder of the serous membrane. This isolation is produced in the first few hours by the tampon barrier alone, later by the adhesions formed at its periphery. This audacious proceeding was suggested by the success following the tamponade of wounds which replaced drainage in Kocher and Bergmann's practice. The second step was Hegar's use, in the opening of

pelvic abscess, of a process founded upon Volkmann's method of opening hepatic abscess. Finally tamponade of the peritoneum itself was recommended by Mikulicz. It has been used in Germany and in America, but I can find no record of its use in England, and in France I was the first to describe and make use of it.

Method of Application.—Mikulicz advises the insertion, in the first place, in the cavity to be tamponed, of a pocket formed by stuffing in a piece of ten-

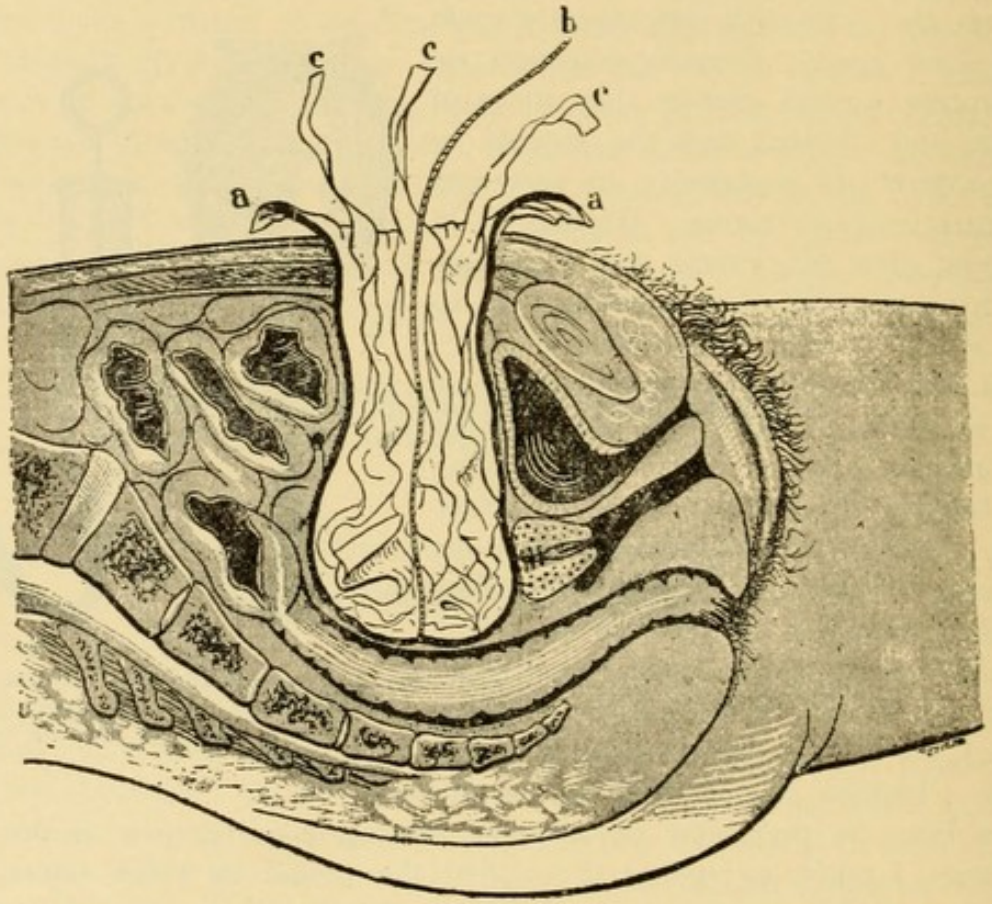


FIG. 55.—TAMPONADE OF THE PERITONEAL CAVITY AFTER HYSTERECTOMY. *a a*, Pouch of iodoform gauze; *b*, silk thread fastened to centre of pouch; *c c*, strips of iodoform gauze.

per-cent iodoform gauze. To the centre of this piece of gauze is attached an antiseptic, double silk thread by means of which it may later be withdrawn. To save time, this should be arranged before the operation; the gauze when in place looks like a tobacco pouch; five or six long strips of iodoform gauze are now stuffed in and spread over the whole surface of the cavity, their ends project from the gauze pouch, and with it emerge from the lower extremity of the abdominal wound (Fig. 55). This process may be simplified by merely pushing the strips of gauze directly into the cavity, if that cavity be small or tortuous—but one must take care that the gauze has no loose threads upon its edges.

It is well to insert a large drainage tube at the same time; this will give

central support to the tamponing and prevent the accumulation below of fluids too dense to filter through the gauze.

I also advise that sterilized gauze or steamed iodoform gauze be used, for I have occasionally seen signs of mild iodoform poisoning. It is well, also, to attach threads of different color to the various strips of gauze, so as to know which ones to take out first.

How long should the tampons be left in place? Mikulicz says the strips of gauze should not be removed under forty-eight hours, and the bag itself three or four days later. One should be guided by the amount of oozing, and the condition of the parts to which tampons have been applied. At all events, the pouch should not be taken out before the fifth day, so that the peripheric adhesions may become firm enough to be safe from all danger of tearing. It is easy enough to remove the strips of gauze, if you follow my advice and put on some mark by which they may be distinguished and removed in consecutive order. Otherwise their extraction may be difficult and cause injury. Gluck has recently proposed the use of tampons which can be absorbed, as catgut, etc. This seems to me a theoretical idea incapable of practical application. Though it be necessary to leave the tampons in place long enough to permit of the formation of plastic, aseptic inflammatory adhesions surrounding and circumscribing it, it is self-evident that the external dressings should be changed as often as necessary—or about three times a day. The serum secreted at the depth of the wound and transmitted by capillary drainage through the tampons is very rapidly absorbed by this external dressing.

It is no more possible to lay down an absolute rule in reference to cases demanding the use of packing than it was in the case of drainage. Much is necessarily left to the judgment of the operator. Tamponade should certainly be reserved for exceptional use, an *ultima ratio*, either for parenchymatous oozing (hæmostatic tamponade) or in case of threatened septic infection (protective antiseptic tamponade). In the latter case, two different conditions may exist.

A. A part of the wound is already septic at the time of operation, and on account of the presence of septic tissue which cannot be removed without danger, or of the large effusion of pus and septic fluid, irrigation and cleansing seem to produce no effect.

B. The danger of infection occurs after closure of the abdominal wound, and is due to the falling apart of a badly made suture, or to perforation of some organ affected before or by the operation (intestines, bladder). In either case, I have obtained good results from an antiseptic tamponade. [This method is also valuable and most often used in cases in which, for any reason, such as the presence of universal adhesions or because of anatomical relations, it is impossible to complete the removal of any abdominal or pelvic cyst. In these cases, after stripping off, if possible, the lining membrane of the sac, the cavity is stuffed, as described, with an iodoform-gauze pouch

filled with plain gauze to lessen the risk of iodoform poisoning. This is allowed to remain *in situ* for from forty-eight to sixty-four hours or longer if there be no rise of temperature, when it is removed and the cavity repacked if necessary. The cyst cavity rapidly shrinks and soon becomes a granulating surface, which after a time becomes obliterated.]

Intra-uterine Drainage.—Capillary drainage of the uterus, by means of thin strips of iodoform gauze successively pushed into place with a sound, is used as a preventive of infection from uterine catarrh. These strips are removed at the end of twenty-four hours and replaced with fresh gauze, a procedure easily accomplished because of the increased dilatation of the cavity. Should the uterine cavity need thorough disinfection, the drainage or tamponing may be conducted in a very similar manner to that which I have described for the peritoneal cavity.

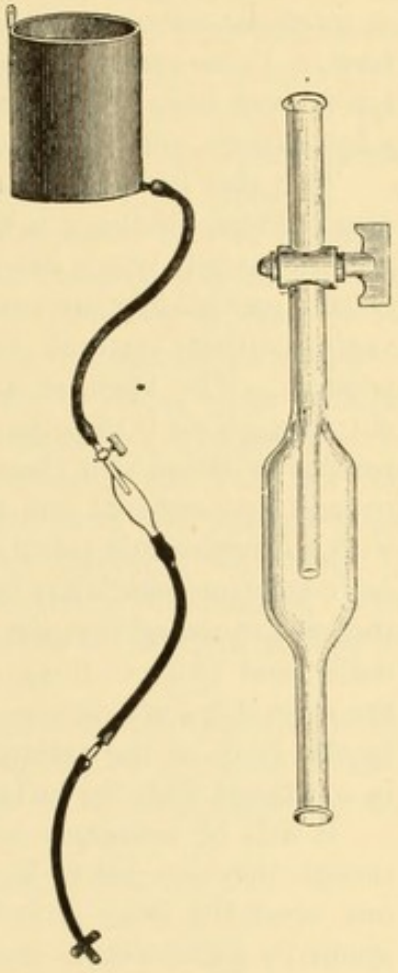
Langenbuch, Theide, and Schede have used a drainage tube closed at the upper extremity, but perforated with holes in the intra-uterine portion. By its aid one can make frequent injections into the uterus, but it is a mistake to think that the mucus will be carried off. It is too thick to go through the small apertures; the tube, moreover, is kept in place with difficulty. It is a bad method, and may even cause intra-uterine infection instead of preventing it. The case is altered when the uterus is sufficiently dilated to allow of the insertion of a large cross-tube, which is a far better instrument than the metallic ones which have been recommended but which are likely to injure the uterus. It is both easier to introduce and keep in place, and safer in its use; and is of especial value when a permanent source of infection exists in the dilated uterus, as a sloughing shred from a fibroid, or a piéce of fœtal membrane which has evaded curetting. When necessary this drainage can precede continuous irrigation, and in any case it facilitates the evacuation of concealed fluids and the frequent administration of intra-uterine injections.

Continuous Irrigation.—The following is my method of applying it:

The arms of the crossed drainage tube are doubled up in the forceps and inserted (Fig. 52, 2) into the uterine cavity, which, having already been dilated, offers no obstruction. As a preliminary, you rapidly introduce two or three pints of a strong antiseptic solution (3 : 1,000 of carbolic, 0.5 : 1,000 of bichloride), then begin the irrigation to the full capacity of the canal, and finally, drop by drop, either by the use of an ordinary stopcock, or Schücking's minim-dropper. The solution used should now be weaker (one per cent carbolic, one-fiftieth per cent bichloride), and should be maintained at a temperature of 95° to 100° F. This drainage and irrigation may be continued for several days (Fig. 56).

The patient is to be kept upon a rubber apparatus or sheet so arranged as to carry the fluid into a receptacle placed upon the floor by the bedside (Figs. 4 and 58). The buttocks and genital organs are to be anointed with vaseline to prevent excoriation.

Antiseptic tamponade of the uterine cavity was first used by Fritsch in the dressing of certain cancers of the body of the uterus, and has proved of use to me in similar cases. Long strips of iodoform gauze are prepared and gently pushed into the uterus with some blunt instrument, as long and slightly curved forceps, being packed in gradually, somewhat as a tooth is filled (to use Fritsch's expression). The gauze may be left in place from three to six days, and renewed from time to time until the disinfection is thoroughly accomplished. Intra-uterine tamponade may be hæmostatic as well as antiseptic; it is then well to use a gauze which is prepared with resin as well as iodoform: this can be made upon the spot when necessary by thoroughly dusting some Lister's gauze with iodoform powder. Very exceptionally one may add a few drops of the perchloride of iron after curetting a cancer or enucleating a fibroid. Such a tamponade, preceded by hot injections, and followed by the administration of ergot, may be of inestimable value. It has recently been applied to post-abortum and post-partum hemorrhages, and used in the treatment of uterine atony.



1. 2.

FIG. 56.—1, Apparatus connected with a cross-tube for continuous irrigation of the uterine cavity or vagina. 2, Schücking's minim-dropper.

Tamponade of the Vagina.—This must not be confounded with the mere insertion of tampons. To deserve the former appellation, the vagina should be filled through its whole extent with a column of a more or less elastic substance—lint, cotton, gauze, or wool—rendered aseptic and antiseptic by previous treatment. Various medicinal agents may be incorporated with it, but the tamponing is the chief object in view.

It may be used for two different purposes. (1) Hæmostatic; (2) antiphlogistic.

(1) *Hæmostatic Tamponade.*—This is not a method adopted from choice, but from urgent necessity, a profuse metrorrhagia calling for immediate interference. To seek the cause and treat it directly is always best, but not always possible, and to gain time we resort to vaginal tamponade, inserting below the os uteri a large pledget of cotton which is permeated with great difficulty, and causes coagulation of the blood in the uterus. Emmet, to attain the same object, has had recourse to temporary suture of the external os. We must not forget that this is an expedient merely, and not treatment properly so called; danger would attend its protracted use, either from the hemorrhage itself, or from reflex reactive action caused by the foreign body

in the vagina. But, bearing in mind the possibility of such an occurrence, the method is capable of rendering good service.

The old way of tamponing consisted in the introduction through a cylindrical or bivalve speculum of dry lint, arranged something like a kite-tail. This lint, filled with germs, was often left in place long enough to initiate infection. Since the era of antisepsis, lint has been replaced by cotton or gauze saturated with carbolic, salicylic, or boric acid, bichloride or iodoform. These materials are not, however, of equal value; dry absorbent cotton is even injurious owing to its permeability; well-packed gauze is so in a less degree, yet productive of harm unless previously well moistened.

That this little operation may be effective, I advise the following mode of procedure, bidding you bear well in mind that its use is rarely called for except in cases in which life is endangered. We first assure ourselves that the rectum and bladder are empty. The best position for exposure of the whole vagina without fatigue to the patient is the Sims or lateral semi-prone position. The blade of a speculum depresses the posterior wall, and the entrance of air brings the parts into view. Irrigation with carbolized one-per-cent solution will clear out clots and accumulated blood. For the tamponade I recommend the use of pledgets of cotton, a few of them saturated with a concentrated solution of alum, the greater number with the weak carbolic solution which has been used for irrigation. Just before using them, they are squeezed into the shape of flat discs about the diameter of a silver dollar and twice or three times as thick. With long forceps, five or six of the alum discs are rapidly packed around the cervix in the culs-de-sac, down to the level of the external os. When this is covered over, the tamponing is continued with the carbolized discs, squeezed as dry as possible.

It will be necessary to have a large number of these cotton pledgets, though they are not to be forcibly pressed into place, but simply inserted one upon the other so as to form a homogeneous mass. The speculum is gradually withdrawn as the discs are introduced, and will be entirely free just before the completion of the tamponing. As this cotton column may compress the neck of the bladder, it may be necessary to use the catheter from time to time. The tampons should not be left in place more than twenty-four hours; after their removal a hot douche is administered, and the tamponade is only repeated if absolutely necessary.

(2) *Antiphlogistic Tamponade.*—The results aimed at by the inventors of the process of columning the vagina are: the mechanical uplifting of the uterus by relaxing the strain upon its ligaments, diminution of venous stasis due to its prolapse, the slowing of the arterial current by eccentric pressure on the parts; combating thus congestion and inflammation and bringing the tissues into a favorable condition for the reabsorption of exudations, and the cessation of pathological reflex phenomena. Bozeman seems to have been the first to use both the name of "columning" and the process. Taliaferro was the one to introduce it into general use. It is a popular method of treat-

ment in America, and the happy results obtained prove that it is worthy of serious consideration as a therapeutic measure, especially in the case of subacute or chronic perimetritis, subinvolution, etc. The following is the correct method of procedure. The best position in which to place the patient is the genu-pectoral; this permits of free access to the vagina, which is opened out by the inrushing air. [This position is a disagreeable one for the patient, and practically equally good results may be obtained in the Sims position.] One should have at hand, (1st) small pledgets of antiseptic absorbent cotton, soaked in glycerin and squeezed dry; (2d) pieces of fine wool, purified in a sterilizing oven, washed in a one-per-cent carbolic solution and wiped dry; this substance is employed because of its elasticity. A tamponade composed entirely of absorbent cotton would be too compact; cotton from which the oil has not been expressed, although less elastic than wool, may conveniently replace it if necessary. Tampons or discs to be used are soaked in glycerin and squeezed out, then inserted in the posterior cul-de-sac, surrounding the cervix, holding it firmly in place. The packing of the vagina is completed by filling it with well-carded wool or non-absorbent cotton almost to the vulvar opening. The patient should keep her bed for one or two days after the first tamponing, which is always applied more compactly than those which follow. Should an erythema supervene, it would be well to use only dry substances well covered with vaseline. The tamponade is renewed every two or three days, and to be effectual should be persisted in for several consecutive weeks or months.

One may produce a topical effect upon the vaginal mucous membrane by saturating the cotton or the wool with medicinal agents, as glycerole of tannin, etc., but when this is done, tamponing ceases to be tamponade and becomes merely a collection of tampons.

CHAPTER IV.

METHODS OF GYNÆCOLOGICAL EXAMINATION.

The chief positions in which we are called upon to examine patients are the erect, the dorsal, the lateral, and the genu-pectoral.

Erect Position.—The vaginal touch with the patient standing affords only limited information, but is useful in cases of displacement of the pelvic

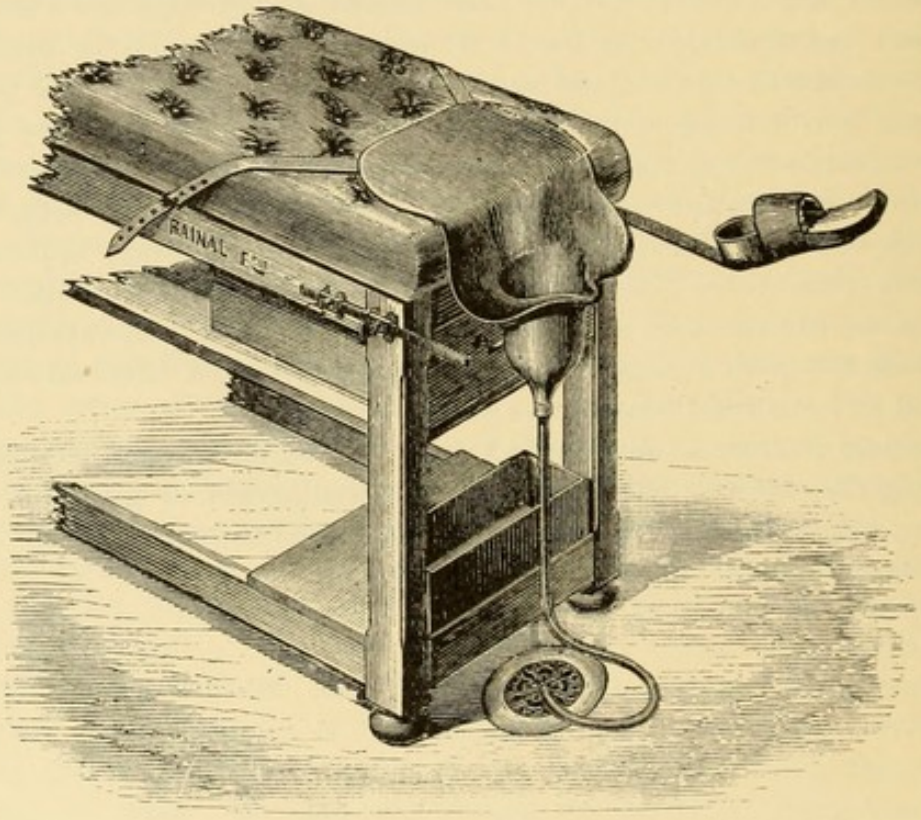


Fig. 57.—Metal Sheet for Continuous Irrigation (Lourcine).

organs and in abdominal tumors. It is not suitable for complete examination and deserves no further mention. [I cannot quite agree with the author in his estimate of the value of the examination in the erect position. Very many symptoms of pelvic disease are more marked or only noticed when the patient is on her feet, and certain conditions of descent, prolapse, or displacement may entirely disappear or change when the intra-abdominal pressure is removed in the dorsal or Sims position. Further a pessary which seems to support a displaced uterus perfectly while the patient is recumbent may be found inadequate when she is erect. As these conditions cannot be cer-

tainly determined in any other manner, the value and often necessity of examination in this position is evident.] The examiner, standing mostly in front of the patient, places his left knee on the floor and the left arm back of the patient's waist, while the right knee, semiflexed, supports the elbow of the same side while the examination is progressing.

Dorsal Position.—For an examination of the abdomen or the simple vaginal touch we may have the patient lie on her back, with her head on a cushion, the legs a little flexed and the thighs abducted. In this position she may be examined provisionally in bed; but it does not produce sufficient

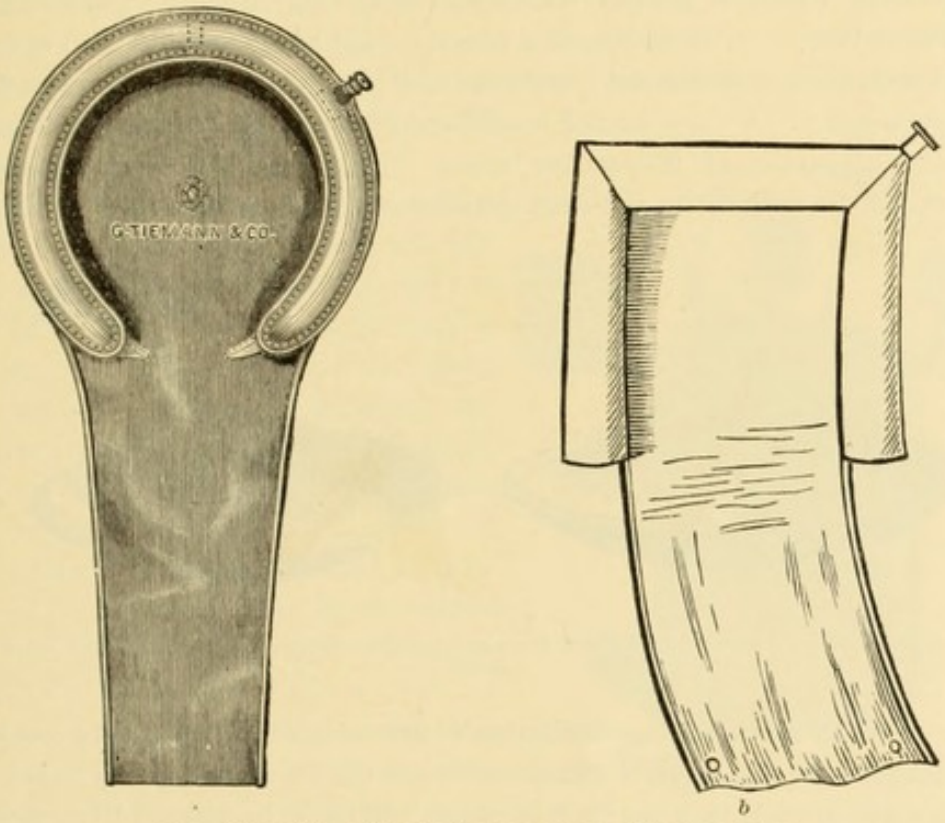


FIG. 58 (*a* and *b*).—KELLY'S OVARIOTOMY AND PERINEAL PADS.

relaxation of the abdominal muscles to allow satisfactory palpation, nor does it permit the use of the speculum.

Modified Dorsal Position. (Semi-recumbent position).—This position combines the advantages of relaxation of the abdominal muscles and easy examination of the vagina by the finger or the speculum, and is to be preferred where we wish a complete exploration. The patient is placed at the edge of a bed or table; the upper part of the body is a little raised, as if the woman were half sitting; the legs are flexed upon the thighs, and they in turn upon the abdomen, and are held in this position by the assistants or with the aid of foot-holders.

Dorso-sacral Position.—This is the most satisfactory position for all operations on the external genitals, the vagina or the uterus per *vias naturales*, since it renders all these parts most accessible to the surgeon. The

patient is placed at the edge of the bed or the table; the head is elevated by a pillow, the trunk is horizontal, the pelvis is flexed upon the vertebral column so that the sacrum presents a marked obliquity both vertically and from behind forward. The knees are bent and the thighs strongly flexed over the abdomen and maintained in this position by supports, or, better, by the assistants, each taking the flexed knee on his side under his axilla, thus leaving the hand free to assist the operator. If one has no assistants, the ingenious leg-holder of Fritsch may be employed, in combination with his speculum-holder. Many forms of leg-holders have been invented; the type of such being Clover's crutch, which has been ingeniously modified by Ott of St. Petersburg. [I have found a sheet folded diagonally like a cravat and used in the same way as the device shown in Figs. 65 and 66, perfectly efficient and convenient.] A very useful modification of this position is obtained by a decided elevation of the pelvis above the rest of the body; a position which might be called the inclined dorso-sacral. This tipping of the pelvis

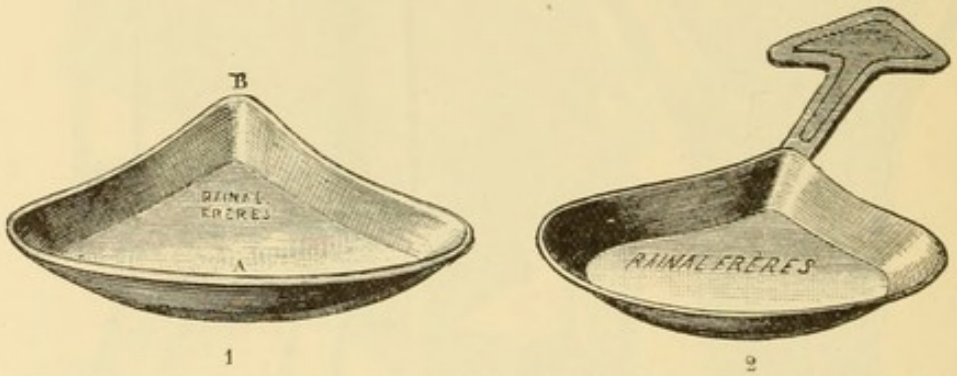


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FIG. 59.—1, Triangular basin for dressings. 2, Basin with handle; to be placed under patient in dorso-sacral position.

has the effect of allowing the abdominal contents to fall toward the concavity of the diaphragm and renders examination of the true pelvis very easy. For a simple examination this position is easily obtained by letting the patient lie on a couch, the legs flexed over the head-board, which serves as their support. If one has assistants at his disposal, he may let them turn their backs and take each a leg of the patient over their shoulders. This position is at times of great assistance to the operator, in freeing the pelvis of its contents; as, for instance, in examining for small tumors of the uterine adnexa. It has been recommended by Trendelenburg in searching for tumors of the bladder, and by Pawlik in catheterizing the ureters; and has lately been reintroduced by Mendes de Leon. To render exploration easy and the organs of the pelvis accessible during laparatomy, it has been found equally advantageous to allow an assistant to elevate the uterus by two fingers in the vagina, or to introduce into that canal an air pessary—a procedure analogous to Petersen's use of a balloon during lithotomy.

[This posture—the Trendelenburg position with the pelvis elevated, the body resting upon an inclined plane at various angles up to 45° from the

horizontal—is now employed by many as a routine measure during the performance of laparatomy; it seems to possess few disadvantages, does not interfere with the breathing, renders shock from acute anæmia less liable, besides causing the intestines to gravitate toward the diaphragm and rendering all parts of the pelvis readily accessible both to touch and sight, thus lessening markedly the technical difficulties of intrapelvic surgery.]

Latero-abdominal or Semi-prone Positions.—This, the Sims position, is particularly adapted to examinations and treatment with the duck-bill speculum, the weight of the abdominal viscera, drawing forward and upward, neutralizes the intra-abdominal pressure and causes an easy and perfect separation of the vaginal walls. While of great use in many different circumstances, it is particularly desirable with very modest patients.

The woman, with all bands about the waist loosened, should lie upon her left side, at the edge of the bed or the table, flexing the legs at right angles with the thighs and these at the same angle with the body. The lower extremities may be held by an assistant, or by a support fastened to the table (Fig. 67).

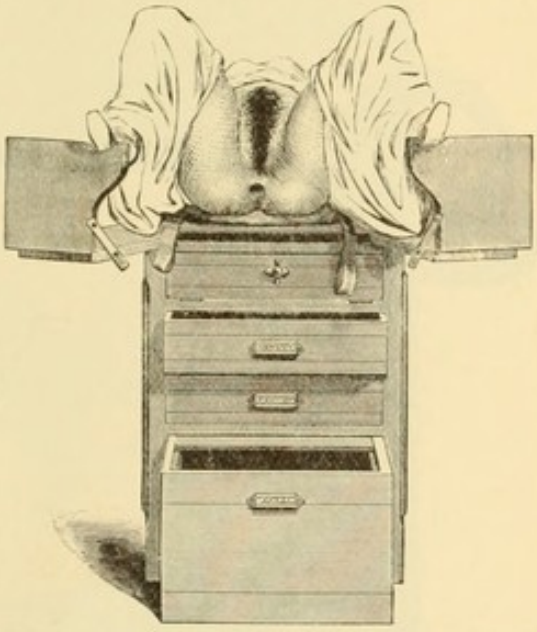


Fig. 60.—Patient in Modified Dorsal Position on Chadwick's Table.

The patient's body, instead of resting wholly on this side, is so turned that her chest is directed obliquely toward the table, and this is best accomplished by drawing the under arm out behind and allowing it to hang over the edge of the table. ["In this position the woman lies partly on her side and partly on her chest and abdomen, the abdominal viscera gravitate forward and downward away from the pelvic cavity; the pelvis has a lateral and downward inclination, so that a line drawn from the coccyx through the rima vulvæ will strike the left popliteal space. The posterior vaginal wall is thus superior to the anterior and the uterus sinks downward and forward. For ocular examination this position is unrivalled and for many instrumental and operative procedures on the vagina and cervix almost indispensable. While a hard table, covered with a blanket or lightly upholstered, is undoubtedly the best couch for this position, and the examination is facilitated by giving the table a lateral and downward inclination toward the lower side and head of the patient, a tolerably satisfactory examination may be made on a firm, level sofa or bed, which does not allow the hip to sink to the level of the vulva. The table should be so placed that the light falls directly upon the vulva over the

right shoulder of the operator; the table will, therefore, occupy a diagonal position before the window."]

Genu-pectoral or Knee-chest Position.—In this position the body rests on the upper chest and knees, the pelvis being the highest point. The thighs are at right angles to the pelvis, the knees near the edge of the table or bed, with the feet projecting over its edge; the head is turned and rests upon the side of the face. [All clothing must be loose about the waist. In this position the weight of the abdominal viscera draws strongly upward and forward (in relation to the patient), tending to displace the contents of the pelvis in the same direction, and as soon as air is allowed to enter the vagina, to distend it to the maximum. For these reasons it is extremely valuable in the reposition of certain retrodisplacements, particularly of the

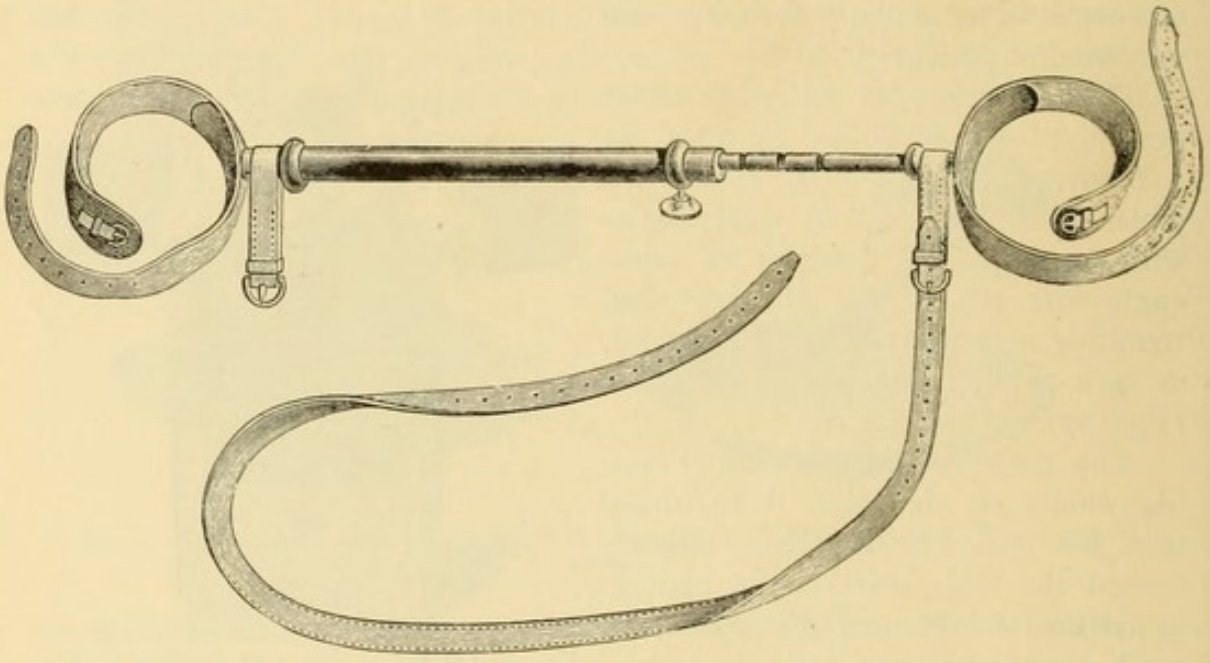


FIG. 61.—OTT'S LEG-HOLDER. The long strap passes under the patient's back.

gravid uterus, or in freeing small incarcerated tumors.] Patients do not readily assume this position, claiming that it is immodest, but in certain cases, because of the reversal of intra-abdominal pressure and the vaginal distention, it is indispensable. The position is irksome, cannot be long maintained, and is not free from danger if used during anæsthesia.

Genu-cubital or Knee-elbow Position.—This, vulgarly known as the "cow" position, is little used except in Bozeman's operation for vesico-vaginal fistula. The patient rests on the elbows and knees and is supported by special apparatus (see figure under Vesico-vaginal Fistula). Anæsthesia in this position is somewhat dangerous because of the interference with respiration.

Simple Abdominal Palpation.—The patient is placed in the dorsal position with the knees a little bent, and advised to open the mouth, breathe without effort, and avoid rigidity. The bladder and rectum should be empty,

and it is well to completely clear the large intestine beforehand by a cathartic and an enema. Both hands are used at the same time. They should be warm, for when cold they excite reflex contractions. Beginning very gently, the abdomen can be accustomed to the manipulation, and then the tips of the fingers may be pressed in with more force for the purpose of deeper exploration. A certain amount of massage disarms the abdominal muscles, prevents reflex contractions, and permits the examiner to make a satisfactory palpation. It is advisable to proceed methodically, examining the hypogastric region and then the iliac fossæ, determining the amount of alteration in the internal organs from their normal size or position; then proceeding to the

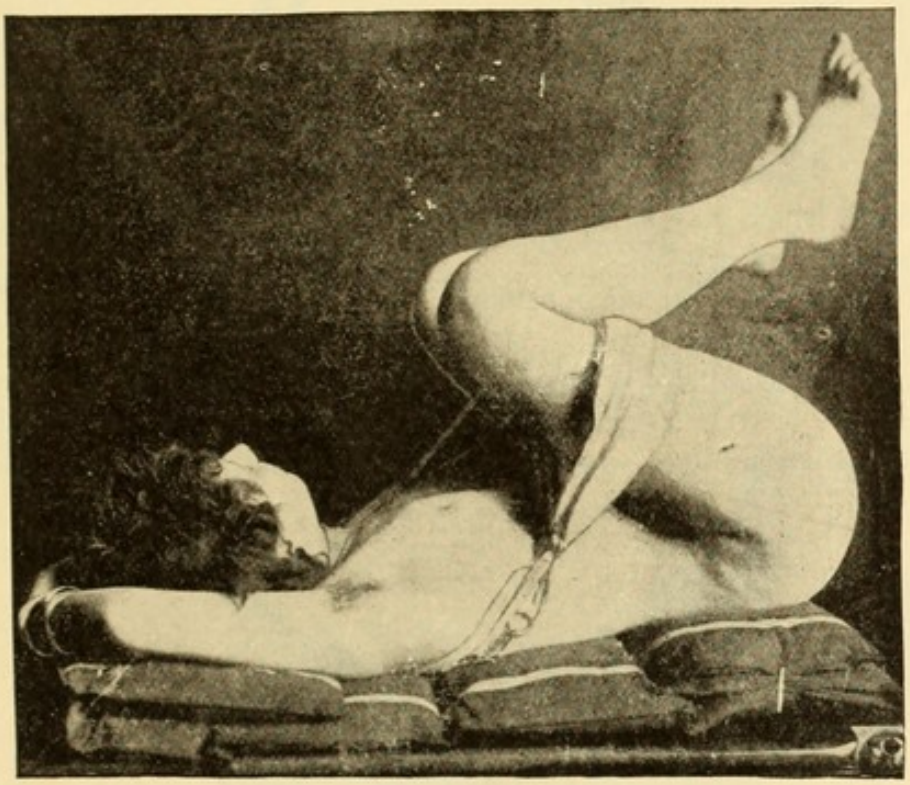


FIG. 62.—PATIENT IN LITHOTOMY POSITION (lateral view).

umbilical and lumbar regions, and finally to epigastric and hypochondriac. The normal tension and consistence of the abdominal walls presents marked extremes. The age of the patient, previous pregnancies or multiparity, leanness or obesity, the distention to a greater or less extent of the stomach and the intestine from gas in dyspeptics, etc., are all conditions which present great diversities and may be the sources of error. I cannot pass them all in review, but will mention certain ones.

If the bladder and intestines have not been emptied, one is not safe against the illusion that there is a tumor, really due to their contents; and at all times too great confidence must be avoided. The soft consistence of fæcal matter gathered in the cæcum or the sigmoid flexure, its presence in the lumbar regions, and the possibility of making a dent in it which shall

persist, as in clay, are all characteristic qualities which will distinguish it from other things. But even a vigorous cathartic may fail to remove scyba-

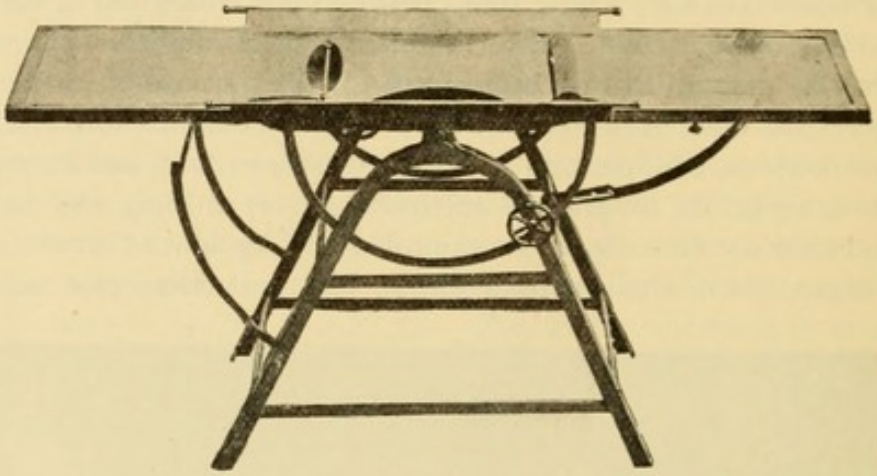


Fig. 63.—Cleveland's Laparatomy Table.

lous masses which may have accumulated, especially if there is any mechanical cause for constipation.

An enormously distended bladder, reaching to the umbilicus, has frequently been mistaken for a cyst. This distention may be due to long retention and incomplete urination, so that the bladder gradually assumes an unusual size; or to pressure upon the vesical neck; or to nervous affections which lessen sensibility. I was once summoned to an asylum for the insane

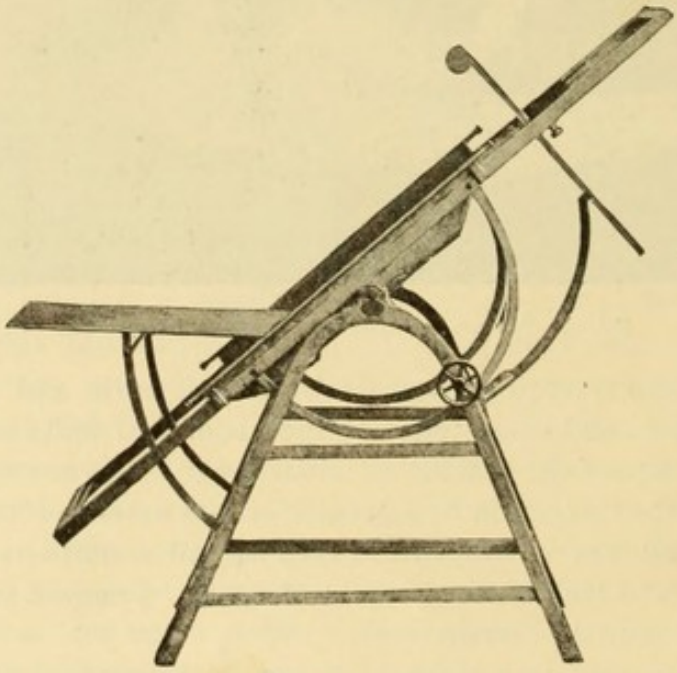


Fig. 64.—Cleveland's Laparatomy Table Arranged for Trendelenburg's Position.

to puncture an ovarian cyst, which proved to be nothing but extreme vesical distention in a patient with general paralysis. Therefore always pass a catheter before making such examinations.

Finally, catheterism if rapidly done may not empty the bladder wholly. There are cases in which the organ is bilobed, wallet-shaped, from compression between a pelvic tumor and the pubis, and the communication between the two portions may be so restricted that the stream of urine ceases when the lower compartment is emptied. If this condition be suspected, a long catheter, which should be of stiffened rubber, will easily relieve the difficulty and empty the upper portion. It thus seems, occasionally, as if there were a pseudo-cyst overhanging a veritable tumor, with some obscure connection between them. The recti muscles of the abdomen often simulate tumors by rigid contractions of their mass and the sharpness of their borders. Especially is this true when there is a separation in the linea alba with lateral displacement of the muscles. It seems also that there may be partial contractions between two tendinous intersections, which increases the difficulty of diagnosis.

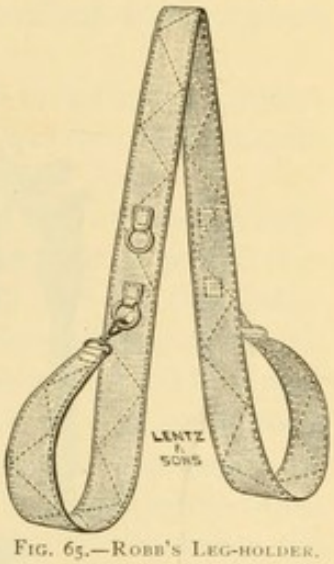


FIG. 65.—ROBB'S LEG-HOLDER.

Meteorism may be so developed that it resembles either a tumor or pregnancy. In this case percussion gives us great assistance but does not remove

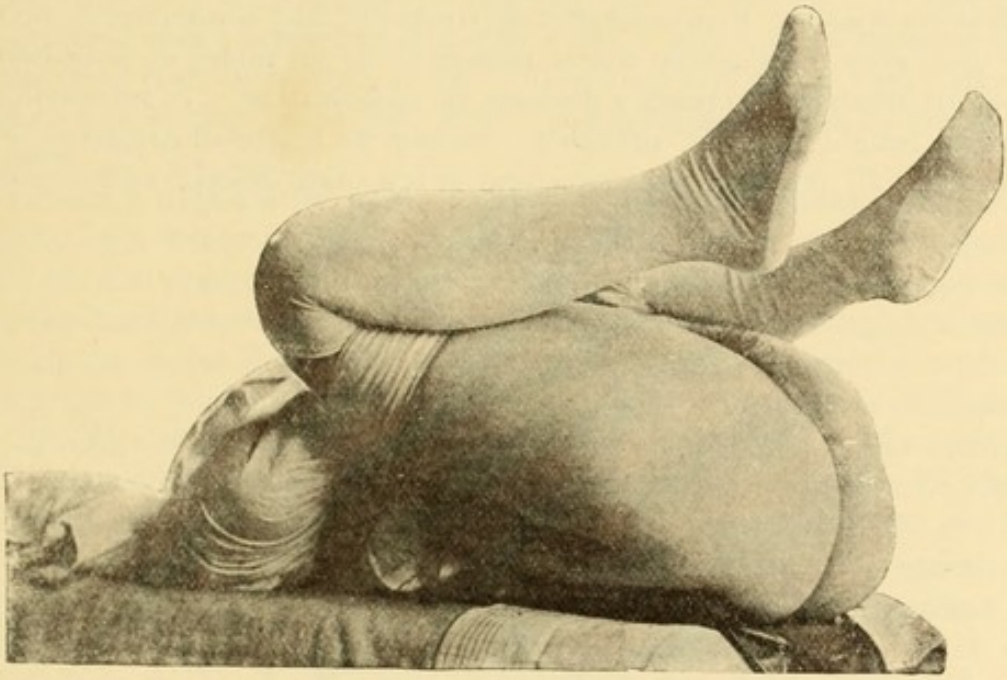


FIG. 66.—PATIENT IN DORSO-SACRAL POSITION; SHOWING APPLICATION OF ROBB'S LEG-HOLDER, OR OF THE FOLDED S[illegible].

all doubt; there have been cases of hysterical meteorism which have deceived the most distinguished observers.

Extreme obesity, especially of the flanks, may render the examination

very uncertain. I have often observed a local excess of adipose deposit in the hypogastric region on women who had some chronic disease of the geni-

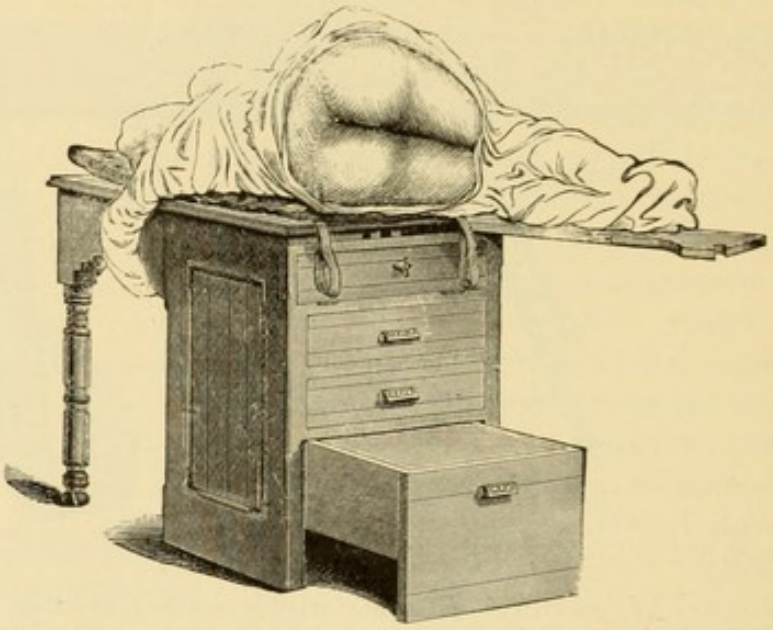


Fig. 67.—Patient in Latero-abdominal (Sims') Position.

tal organs, as one often sees a like formation over the epigastrium of dyspeptics.

Women who are hyperæsthetic, or cowardly, and consequently become rigid upon even the slightest touch, require to be put under an anæsthetic if it is at all necessary to reach a decision by examination. It is possible to obtain an insight into the patient's condition by bimanual palpation, which far exceeds all others in precision, and in few cases (except where there is

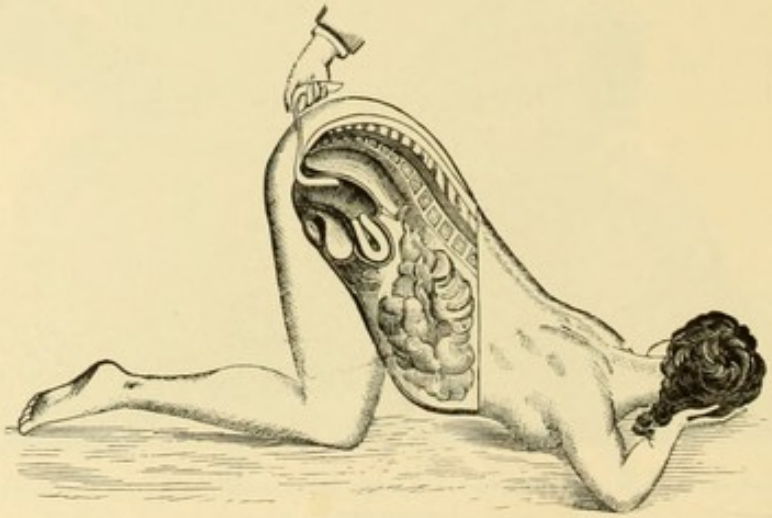


Fig. 68.—Genu-pectoral Position, showing the Dilatation of the Vagina and the Falling of the Viscera toward the Diaphragm.

unusual flaccidity or leanness) can the ovaries and tubes be reached by abdominal palpation without anæsthesia. The various connections of a tumor

cannot usually be exactly determined without such aid. Often, for instance, a tumor which appears to be connected with the uterus while the patient is awake becomes easily separable under anæsthesia; or a tumor which appears hard is found to be plainly fluctuant.

[*Inspection.*—Before making a vaginal examination in a strange patient, it is well to inspect the external genitals to detect the presence of any anomaly, of pediculi, of specific or other ulcerations or eruptions, etc.]

Vaginal Touch.—The clean index finger is first covered with some antiseptic lubricant as borated vaseline, or carbolized oil, and is then passed into the vagina with a motion from behind forward, gliding over the fourchette. Many gynæcologists advise the use of antiseptic injections after such examination; in my opinion they are not less demanded beforehand. The finger may gather and carry with it germs from the vagina and then go on to make an erosion upon the cervix and so inoculate the patient. As a general rule, then, vaginal touch should be practised only between two antiseptic injections. To show the need of these precautions it is well to remember the accidents which used to follow simple vaginal touch in the days before antisepsis. Verneuil, for example, reports a case of death from extremely acute peritonitis, the day after the examination, by touch and speculum, of a woman with uterine polyp; he cites another of peritonitis which recovered in a woman with polyp; and a third, of ulcerated polyp, where death occurred after vaginal touch, the operation being postponed but one day. Howel cites a similar case in his practice, and one in Broca's, where death followed light cauterization with nitrate of silver. More recently, in Le Fort's service, a woman with uterine polyp died after a vaginal examination by finger and speculum.

The index finger is the most convenient for vaginal touch; the thumb should be kept straight, turned obliquely toward one or the other genitocrural fold, and always avoiding the median line; the other fingers are half-flexed and make gentle pressure against the perineum and intergluteal space. To reach the os the finger should follow the lateral or posterior wall, and should it not be passed in the axis of the canal slight movements of rotation, from behind forward and reversed, will show its position. The examiner then considers, in regular order, the direction of the cervix, its size, its shape, its consistence, the degree of its dilatation and the condition of the external os. Next the finger explores the posterior cul-de-sac, then the lateral, and lastly the anterior. The examination is not complete, however, without the aid of abdominal palpation; that is to say, bimanual exploration, which will be treated farther on. On withdrawing the finger, the vaginal walls and perineum are examined as to their condition. There are times when the uterus is very high up and difficult to reach; in such a case both index and middle finger must be deeply introduced, at the same time the pressure against the perineum is increased, if necessary, by allowing an assistant to raise the elbow of the examining hand. Occasionally cases are met in which

the cervix cannot be reached in any position except Sims' or the knee-chest. At times it may be necessary to practise the vaginal touch with the woman erect, as in certain displacements and abdominal tumors. The hymen, if present, may be an obstacle to the introduction of the index, but usually this membrane is elastic enough to allow the touch, with some care, even upon virgins, without fear of injuring it. If this manœuvre is very painful, it is better to anæsthetize the young woman unless the desired insensibility can be obtained with cocaine. In such cases rectal touch does not take the place of vaginal, although some authors have asserted it.

Rectal Touch.—It is necessary to introduce the finger into the rectum, especially to examine the pouch of Douglas and the posterior aspect of the uterus. Swellings and tumors of this neighborhood are not to be appreciated at their just value by any other way. It is often very useful in determining whether the rectum is full or empty; the lumps of fæces felt by the finger in the vagina might, perhaps, be mistaken for pathological products. On the other hand, a novice may feel the cervix from the rectum and make a similar error. One must especially accustom himself to the sensations acquired by touch in the normal condition. The combination of rectal with vaginal touch is particularly valuable in examining the condition of the recto-vaginal septum. Schroeder strongly advises, in practising rectal touch, that the thumb be passed into the vagina.

Manual exploration of the rectum, introduced by Simon, of Heidelberg, is to be employed in certain exceptional cases. The patient is thoroughly anæsthetized, the anus is dilated as for operation in fissure of the part, and the fingers, gathered into a cone and well coated with vaseline, are gradually pushed into the orifice as a wedge; when the sphincter has been passed the hand rests easily within the rectal ampulla and the fingers may be separated for the examination. I have found this procedure of service on two occasions and each time have introduced my hand to the wrist without any resulting accident, erosion, or incontinence. Nevertheless I consider it dangerous, especially if the surgeon's hand is not unusually slender and pliable; there have been serious accidents in certain cases.

Vesical Touch.—This method has only a restricted application, but in view of the size and dilatability of the female urethra, it is generally easy to carry out without recourse to incision as proposed by Simon. I have found no difficulty in its performance without producing any disagreeable consequences after previous dilatation of the urethra by graduated bougies. This method has been recommended in cases of cancer of the cervix with doubtful invasion of the vesical wall to determine the mobility of the mucous membrane upon the cervix and the presence or absence of the complication.

Noeggerath's combination of vesical and rectal touch renders excellent service in atresia of the vagina and in practising palpation and bidigital exploration of the uterus and appendages.

Among combinations of methods we may further mention vesical catheterism with vaginal or rectal touch.

Bimanual Exploration.—I have described the vaginal and the rectal touch singly for convenience' sake, but in practice one seldom examines without adding abdominal palpation also, which supplements them admirably. Thus arises the most valuable method of gynæcological investigation, bimanual exploration.

The glory of the discovery of bimanual palpation belongs wholly to Puzos, the celebrated obstetrician of the eighteenth century, and to the French school.

For the employment of the method the patient is placed in simple dorsal

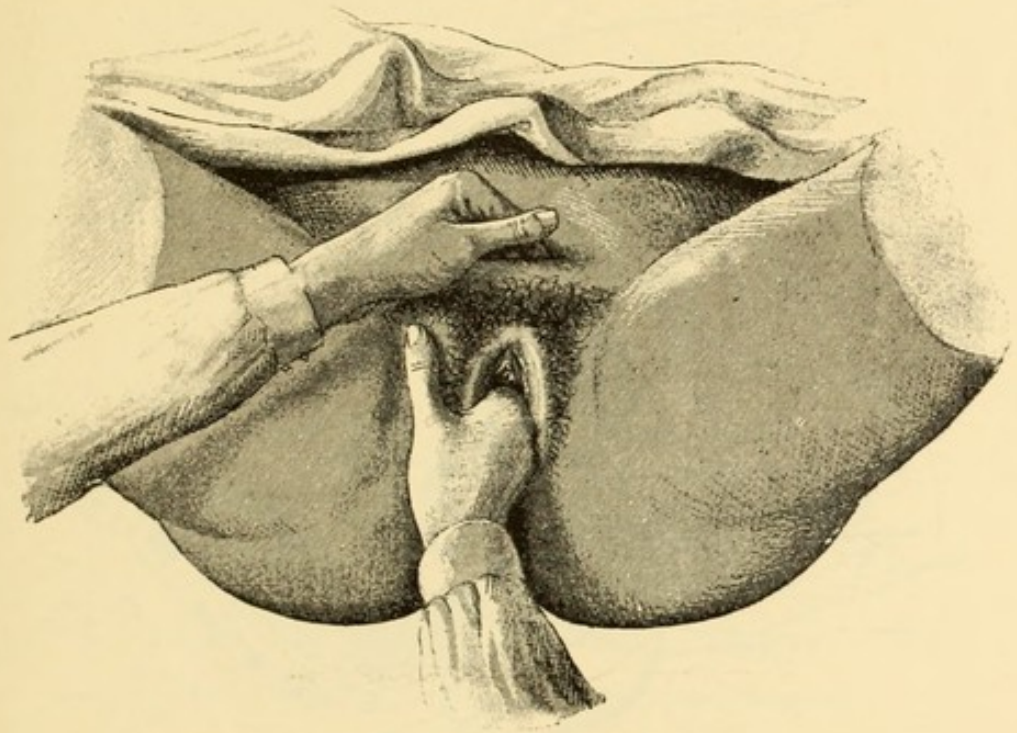


Fig. 69.—Bimanual Exploration.

decubitus, or, if that position offers any difficulty, as for lithotomy; while the index of the right hand practises the touch, as described, the left hand is laid above the pubis, and the fingers sunk inward with gentle, even pressure, thus driving the pelvic contents toward the vaginal finger. To make clear the exact position of the uterus, this procedure is carried out in the hypogastric region, then in the inguinal, and lastly the lumbar should be examined, the vaginal finger exploring the depths of the cul-de-sac toward the other hand; thus the bases of the broad ligaments and the uterine adnexa are easily examined for abnormal enlargements. At the same time account should be taken of the sensitiveness of the parts; in the healthy condition, pressure over the adnexa, as also elevation and tossing (ballottement) of the uterus, are free from pain.

Bimanual palpation should then be performed by rectum and abdomen; it is particularly advisable in disease of the adnexa.

By the combined method one can palpate the ovaries, with special facility if the patient is anæsthetized, but even without such aid. It is well, as Hegar advises, to have the uterus gently pulled down by an assistant, the cervix being fixed with a bullet forceps while the surgeon palpates the abdomen and passes the index finger of the other hand by turns into vagina or rectum; the ovary is felt to glide between the fingers like a small testicle. The left ovary is more easily reached than the right, which Olshausen attributes to its position in front of the rectum. With obese patients this method of examination has many difficulties. Instead of adopting Noeggerath's vesico-

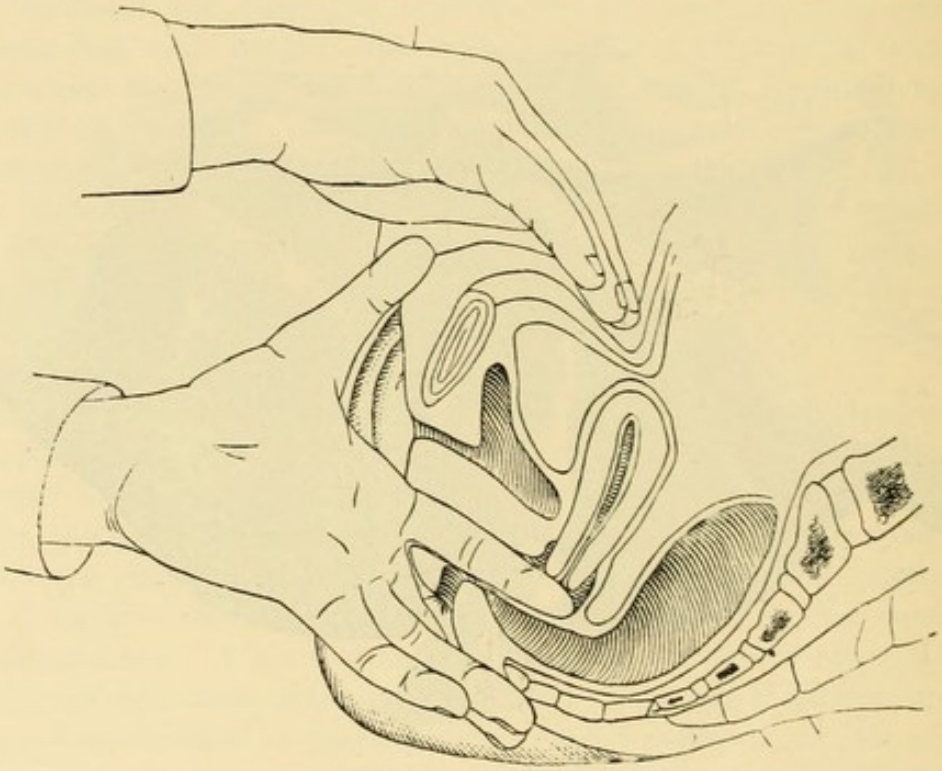


FIG. 70.—BIMANUAL EXPLORATION. Sectional view (Davenport).

rectal method, I think it better to have recourse to the plan advised by Ulmann in difficult cases where ovarian palpation seems indispensable; the bladder being emptied, there is passed into the rectum a balloon filled with 200–250 gm. of water. Now bimanual palpation reveals the uterus and its appendages strongly elevated and held in that position upon a resistant body, which makes them very accessible.

Examination by Speculum.—After Récamier had reinvented the speculum, this valuable instrument led to the neglect of all other exploring methods; from this point of view, one may assert that the great service it has rendered to gynæcology has been equalled by the temporary evil it has caused.

The form of the instrument has undergone endless changes; but of these, however ingenious, only a small number are absolutely necessary.

There are three chief types, the cylindrical, the bivalve or the trivalve, and the univalve.

The Cylindrical Speculum.—This form is particularly suited to topical applications; made of wood or ivory it protects the vaginal walls from heat during the use of the actual cautery; made of silvered glass and covered with hard rubber [or better of hard rubber or white celluloid] it cannot be used for that purpose, but is valuable on account of the clear view it gives and the ease with which it can be introduced, both for superficial examinations and for the different dressings and applications which are required for the cervix. These specula should not be too long and the end should be

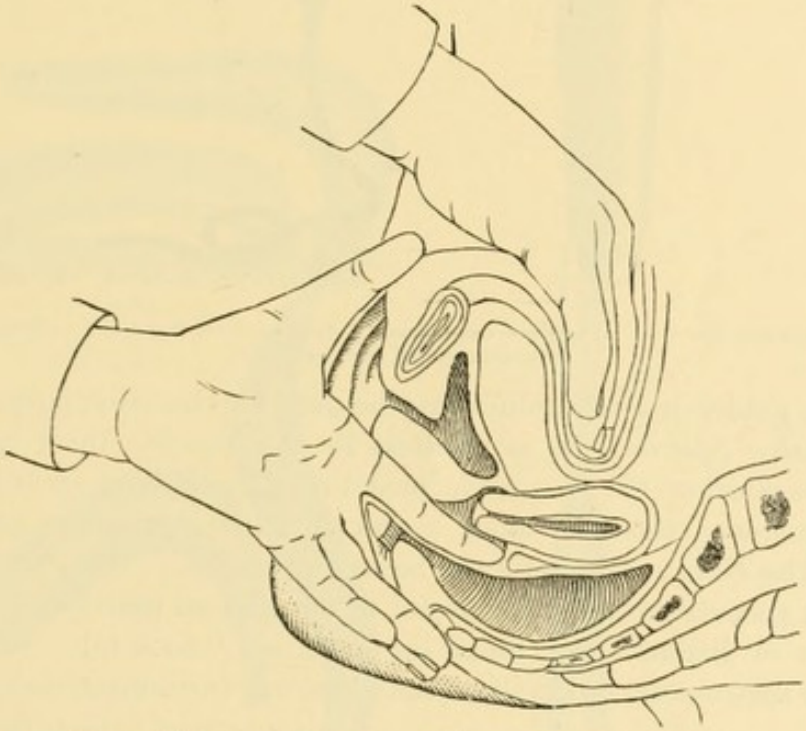


FIG. 71.—BIMANUAL EXPLORATION IN RETROVERSION (DAVENPORT).

bevelled to correspond to the greater depth of the posterior vaginal cul-de-sac. It is necessary to have at least three different sizes.

Before introducing the speculum it is well to dip it in warm water so that its polished surfaces may not be dimmed by the vaginal moisture. It is then coated with vaseline and presented obliquely to the vaginal orifice, whose lips are separated by the fingers of the other hand. The point of its bevelled end is then pressed backward against the perineum, and glides over the groove of the fourchette, avoiding friction against the urethra and anterior vaginal wall as much as possible. When the vaginal orifice has been passed, the instrument is tilted so that its axis corresponds with the direction of the cervix, previously ascertained by the finger, is pushed up gently, aided by the sight, to embrace the external os, guarding against the tendency to search for that structure too far behind and too deeply. [In certain cases where the vagina is very voluminous, or the cervix in an unusual position, it

may be difficult to engage the cervix in the lumen of the speculum. In these instances the sound may be first introduced and the speculum passed

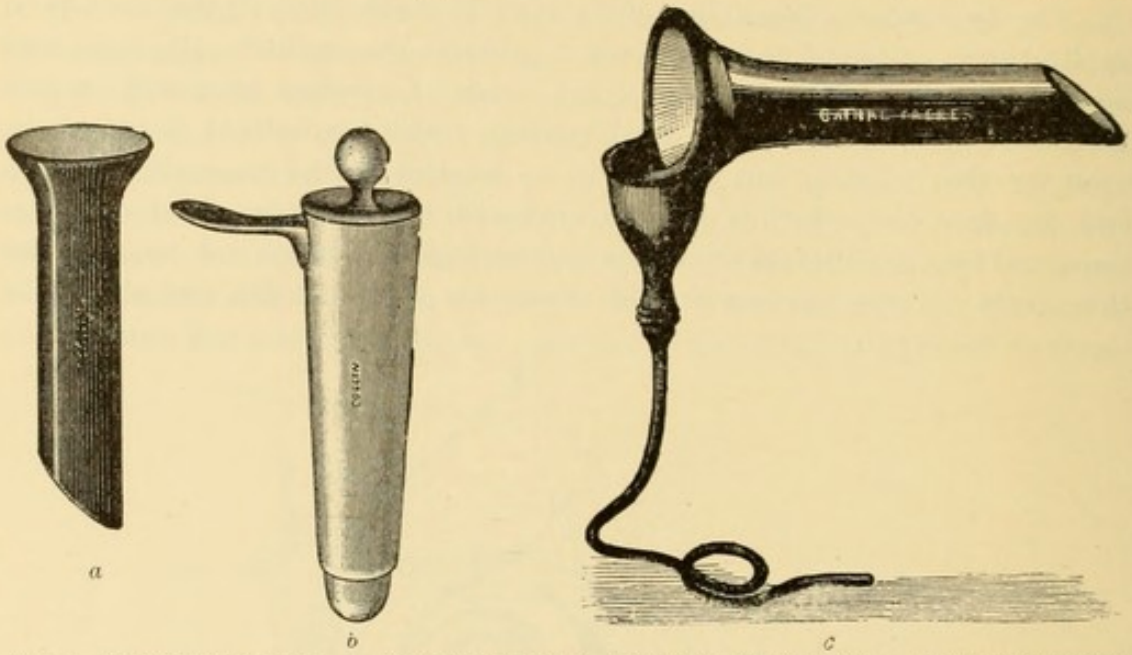


Fig. 72.—Cylindrical Specula. *a*, Ferguson's speculum. *b*, Speculum with obturator. *c*, Ferguson's speculum with rubber funnel for dressing, etc.

over it as a guide, or a tenaculum may be used for the same purpose.]

Multivalve Specula.—It is needless to describe the three-valve instrument of Segalas, or the four-valve model of Charrière, in spite of their interesting history; those of more recent invention appear to me but little better. [The Nott speculum is the best of this class.]

Bivalve specula are the most useful to the general practitioner.

Cusco's or Brewer's speculum, the so-called "duck-bill," is an elegant and simple instrument, especially adapted for use in examinations; it has the advantage of allowing inspection of first the os, then, by gradual withdrawal, of the culs-de-sac and vaginal walls. Its small size and readiness of introduction make it valuable, and it may be kept aseptic by placing it a few minutes in boiling water or strong carbolic-acid solution. The introduction of this instrument is accomplished according to the rules laid down for the use of the cylindrical. I would merely remind students that the axis of the vulva is perpendicular to that of the vagina, and that while the end of the speculum should be turned obliquely, at an angle of 45°, to open the vulvar orifice, it should be

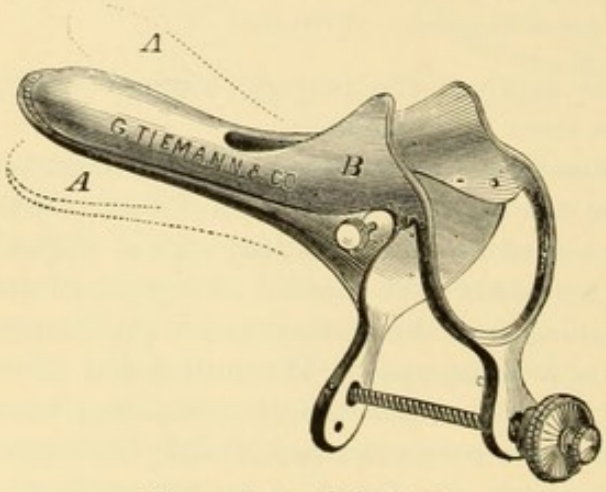


Fig. 73.—Brewer's Speculum.

restored to the horizontal position as soon as it has passed in. The blades must not be separated until the instrument is wholly within the vagina, in order that the vulva may not be unduly distended. In all of the bivalve specula, it is necessary to have a groove or slit in the upper blade to avoid pressure upon the sensitive parts about the urethra and to render the introduction of instruments (sound) less difficult.

One must not forget that the introitus is the narrowest part of the geni-

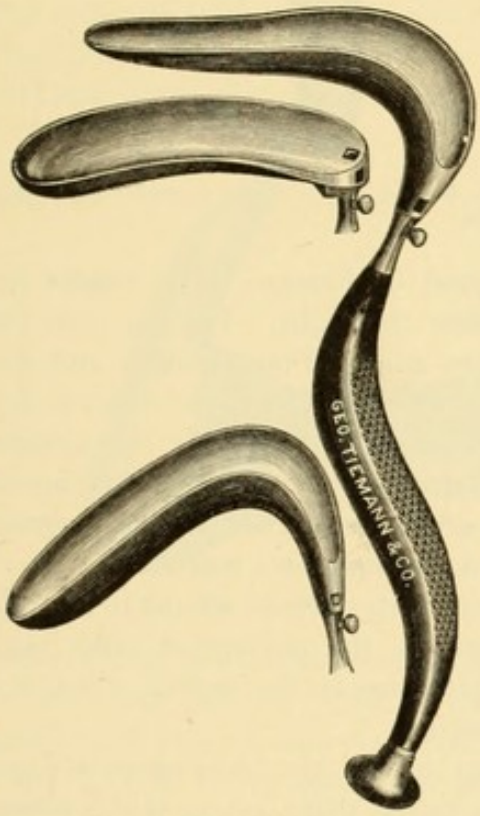


FIG. 74.—SIMON'S SPECULUM.

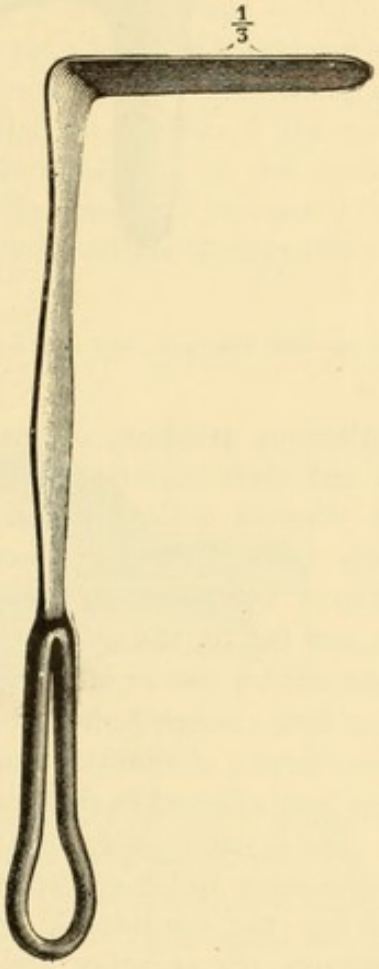


FIG. 75.—VAGINAL RETRACTOR.

tal canal, and that just within it the vagina forms a kind of pouch comparable to the rectal ampulla; the diverging of the blades in the bivalve speculum is therefore seen to be essential.

Univalve Specula.—These instruments are chiefly intended for use in operation. With only one it is easy to reach the vaginal wall opposite the instrument, and so with the patient in the Sims or genu-pectoral position one can easily reach the cervix. With two single blades, employed at the same time, we have the best possible method of examining vagina and cervix, but it has the inconvenience of requiring assistance. Long before Sims made the use of the univalve speculum common such instruments had been employed by certain skilled practitioners.

Sims' speculum is to be employed in the semi-prone position which bears his name. In his instrument two blades are joined end to end to lessen the number of single instruments. In the semi-prone position this arrangement presents no difficulty, but it is almost impossible to use the instrument in

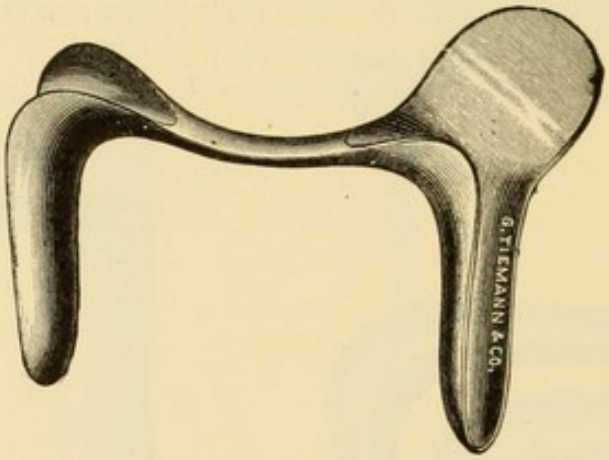


FIG. 76.—SIMS' SPECULUM. One blade is shown with the flange devised by Mundé for supporting the upper buttock.

the lithotomy position, ordinarily adopted in France. The blades are of metal and their surface is bright to reflect the light. For my own part, I prefer Simon's hollow blades. They are mounted on a handle and have a strongly marked sweep. They come in sets and are made concave for depression of the posterior vaginal wall (this shape augments the amount of light), and flat for the anterior wall. Moreover, in the course of an operation one can employ one or more retractors, which are narrow blades mounted on handles long enough to keep them out of the surgeon's way.

One variety of Simon's blades is very short, reduced almost to its anterior portion and widened at that place to increase the amount of reflecting surface; this is particularly useful for operations on the cervix, where it is to be drawn down to the entrance of the vagina.

[While the comfortable and efficient use of the Sims speculum usually necessitates the presence and aid of a nurse, there is no other means by



FIG. 77.—*a*, Sims' depressor for the anterior vaginal wall. *b*, Tenaculum with stiff shank.

which the cervix and anterior vaginal wall can be so perfectly exposed without interfering with the natural relations or mobility of the parts. In manipulations requiring the use of one hand only, such as applications or tamponade, the operator can, if necessary, hold the instrument with his left

hand, the flanged modification of Mundé being employed so as to support the upper buttock.

There are many modified forms of the Sims speculum, varying in curve or breadth, but none are better than those here shown, which can be procured in several different sizes. Many attempts have been made to devise a perfect self-retaining speculum of this class, but none have proven entirely satisfactory. That devised by Cleveland is good and efficient in most cases. It can also be used with the patient in the lithotomy position, being held in place by a piece of rubber tubing laid under the patient's hips, and retained by her weight. There are two instruments, the depressor and tenaculum, which are indispensable in using the Sims; the first to press forward the anterior vaginal wall and to bring the cervix forward into the axis of the speculum, and the latter to steady it or draw it slightly downward or forward. To insert the speculum, the patient being in the Sims position already described,

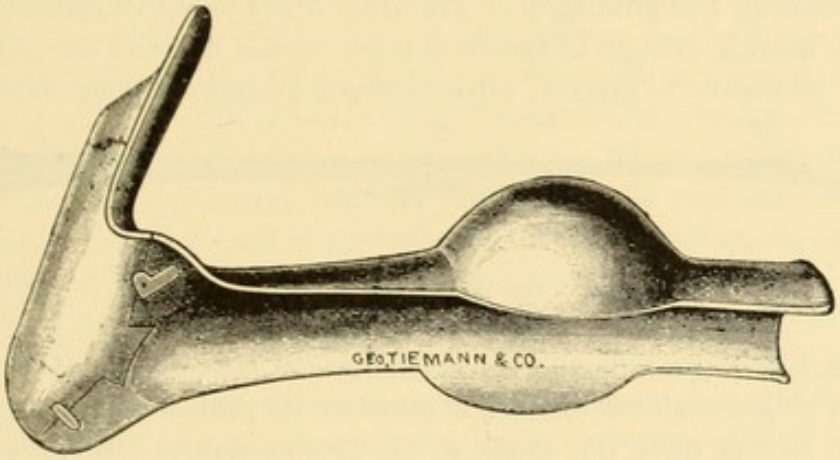


Fig. 78.—Fealick's Self-retaining Perineal Retractor.

the warmed and lubricated instrument is taken firmly by the external blade in the left hand, and the point of the blade to be used passed into the vaginal orifice with the concavity directed upward (or downward), the upper buttock and labium being lifted out of the way by the right hand or by the nurse. As soon as the point of the blade is fairly in the vagina, the concavity is turned forward and the point backward when it glides along the posterior vaginal wall until completely inserted, when on retracting the perineum backward and slightly upward the cervix will be exposed. A slight upward tilt of the outer end of the speculum allows a better light. The cervix being exposed, the speculum is handed to the nurse, who, standing at the patient's sacrum, grasps the blade firmly with the full hand and continues the traction in the same direction, her arm resting against her side. This holding of the instrument is at first very irksome and difficult, but it is an accomplishment soon acquired after a little practice. The traction must be even and steady so as not to cause pain to the patient, and must be made so as not to tip the point of the blade too far forward or backward. If the posterior wall is closely followed in inserting the blade and it is passed behind the

cervix, the latter will come into view easily, and it is not necessary to pass in the blade on the finger as was formerly taught. There is sometimes difficulty in exposing the cervix where the vagina is long and voluminous, and in these instances it is very necessary to have the patient in good position and all clothing loose. Very rarely it may be necessary to put the patient in the knee-chest position.]

Uterine Sounds.—Levret appears to have been the first who explored the uterine cavity by introducing an instrument, but it was only after the writings of Huguier in France, Simpson in England, and Kiwisch in Germany, that its use became general. As it first became known it was much abused, and Scanzoni complained with reason against such excess. The forms of the hysterometer have been multiplied, without real advantage; the simplest is the best. It is a single graduated metallic stem, ending in a small button above, and below in a broad spatula-shaped handle, which facilitates the operation of holding and guiding it. The instrument should have some rigidity, and yet be flexible enough to take and preserve the different curvatures which it may be necessary to give it; silver and pure copper are the best materials

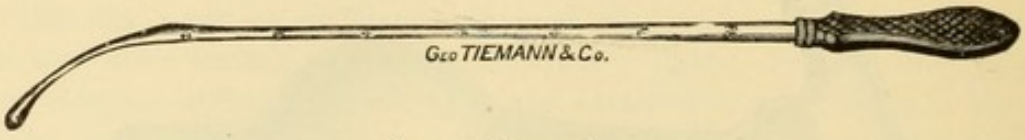


FIG. 79.—UTERINE SOUND.

for this purpose; the inflexible hysterometers of German silver should be rejected. The little slides which are made to be pushed along till flush with the cervix, and so mark the depth of the uterus, should also be proscribed; it is sufficient for this purpose to seize the sound with dressing forceps at the desired point [or to place the finger against the sound at the os as it is withdrawn] and read the degree marked on the scale. The sound should never be used without having previously ascertained the position, shape, and size of the uterus [and the absence of peri-uterine inflammations or the possibility of pregnancy] by means of bimanual palpation; otherwise one gropes in the dark and may produce serious injuries. It is enough to bend the tip of the instrument in the desired curve and to carry the handle in the opposite direction, to introduce it with ease, even in flexions of the uterus.

Flexible sounds have been invented, furnished or not with dials, which seem to me better than simple rubber bougies, when a rigid sound will not enter on account of the sinuous curves of the cavity. [These are practically never required.] The best position for sounding is the dorso-sacral. It can be done without the aid of a speculum, by slipping the instrument along the palmar aspect of the index finger held at the orifice of the cervix. The pressure applied must be very gentle, and one must bear in mind that there is almost always a feeling of constriction at the upper part of the cervix. The finger applied to the stem, at the margin of the external os, shows how deeply it

has penetrated. It is probably better to employ the speculum that there may be no difficulty in the procedure and because of the aid to diagnosis; the cervix should be drawn down and fixed by a pair of hooked forceps. This is at times the only way of reaching the cervix if it is displaced into one or the other of the vaginal culs-de-sac as in malpositions of the uterus. I have found gentle traction upon the cervix of value, from its effect of straightening the uterine canal.

[It must be remembered that the passage of the sound is to be accomplished with the utmost gentleness, the instrument being held delicately between the thumb and forefinger, and that skill must take the place of force. The conditions under which it may be employed have been mentioned and necessitate a practical knowledge of bimanual palpation. The physician will find that the more skilful he becomes in pelvic examination, the less often he will need the information given by the sound. I prefer to use the instrument with the patient in the dorsal position and without the speculum, as much more information as to the mobility and position can be obtained. The beginner usually finds difficulty in passing the internal os when the uterus is in a normal position or anteflexed. This obstruction is usually overcome by markedly depressing the handle of the sound when its tip reaches this point. In a few cases this manœuvre may fail and it may be necessary to put the patient on the side and pass it through the Sims speculum, steadying and straightening the cervix by means of a tenaculum.]

The most vigorous asepsis is indispensable when passing the uterine sound, the instrument being disinfected as already described, and after each examination heated in the flame of an alcohol lamp. A vaginal injection and a thorough antiseptic cleansing of the cervix, by means of a stick wrapped with absorbent cotton, are necessary preliminaries. The researches of Winter have demonstrated that in the majority of cases the cervix contains pathogenic germs, dormant and inactive, possessed of a very slight virulence as inoculation proves; but these germs have never been found by him within the cavity of the uterus unless the sound had previously been used. The sound, therefore, can without any doubt transport these germs to the upper portions of the genital tract, where normally they are not present, and this is the cause of the accidents—metritis, salpingitis, and perimetritis—which one may observe after the use of a proper sound which has passed through a cervical cavity not previously cleansed.

I would consequently recommend with emphasis that the young doctor should never use the uterine sound without being assured of two chief points: 1st. The fact that the uterus is empty, ascertained by careful questions and bimanual palpation; in the case of any doubt, indicated by delay in menstruation for several days, the procedure must be given up, for numerous abortions were produced during the time when the sound was used with too great frequency. 2d. The strict asepsis of the instrument. The notches marking its graduation are difficult to clean thoroughly, and it would be better to

use instruments which are not so marked at the price of making measurements a little less conveniently.

The sound must be held in the flame, after having been washed with carbolic-acid solution, immediately before its introduction. I have known several cases of metritis and salpingitis after the use of the sound in the hands of well-known physicians, which are to be attributed to the lack of minute antiseptic precautions.

The uterine sound affords us an exact idea of the permeability of the cervical canal, of the two diameters of the uterus, longitudinal and transverse, and also of the organ's general direction. In the normal state the sound passes without difficulty, except for a slight resistance at the level of the isthmus, to the depth of five or six centimetres in nulliparæ, and six or seven (two and one-half inches) in those who have borne children.

The extent of lateral movement which it can make is very limited; it is, so to say, immobilized between the anterior and the posterior wall. If, however, the point of the instrument is freely movable and can be turned in different directions, it is because the antero-posterior and transverse diameters are increased and the cavity is of unusual size.

Is it possible to pass the sound into the Fallopian tubes? This is the explanation of some authors in those cases in which the instrument penetrates deeply into the abdomen and can be detected through its wall. That this may occur there must be a combination of very unusual circumstances: a latero-version of the uterus which brings the orifice of the tube into the long axis of the cervix and an exceptional wideness of its opening. This condition actually existed in a case observed by Bischoff, and was verified after death following ovariotomy. But in almost every one of the published cases of pretended sounding of the tubes, it is far more likely that there was a perforation of the uterus—a condition which is easily produced without exaggerated efforts when the uterus is softened and thinned from pregnancy or recent abortion, or when it is displaced; the benign character of such wounds has surprised most of those who have witnessed their production and has induced them to seek an explanation which appears more plausible. This is without doubt the significance which must be given to two cases recently reported by Gönner, of Basel. Finally we may note the possibility of establishing permanent false passages and the introduction of the sound by the same route into the abdominal cavity. But these are, in truth, but pathological curiosities, with which we have little to do.

Fixation and Downward Traction of the Uterus.—This procedure should be classed among exploratory methods, not that it is employed by itself, but because it renders immense service, associated with other means, in facilitating examination.

Hegar has shown that it is possible by his method to examine the entire posterior aspect of the uterus, and even to reach beyond the fundus by rectal touch, simply by seizing the cervix with a pair of forceps and gently drawing

it downward. I have already indicated all the advantages procured by the passage of the sound with fixation of the cervix and without infratraction. We will see also that direct exploration of the uterine cavity demands the same auxiliary.

Many practitioners dread to employ this method of drawing down the uterus. Before the antiseptic era many accidents were attributed to it which were due to infection. The profession was urged to contend against such fatal practices. But nothing is less dangerous than infratraction of the uterus when antiseptic precautions are observed; even when the procedure is carried out with force, as in bringing the external os to the vulva in certain operations, there is no danger with strict antisepsis. For my part I daily practise the one or the other method in my service and have never met with an accident which could be attributed to it. It is only necessary to remember that there is danger so long as there is the *least sign* of acute or subacute peri-uterine inflammation.

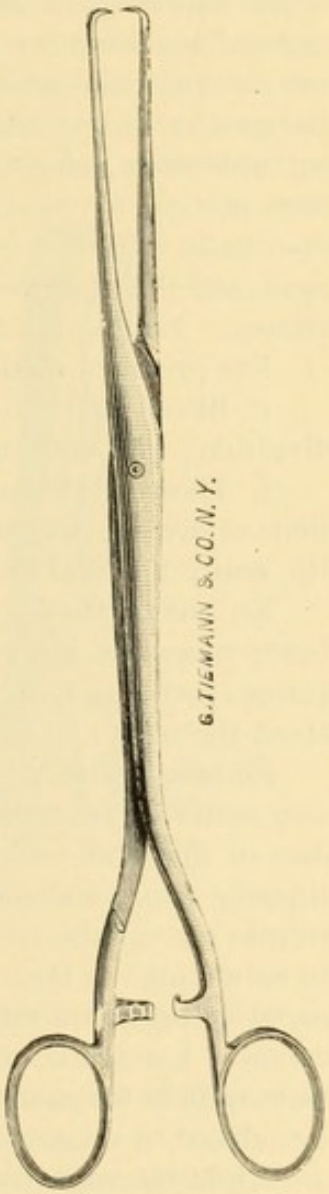


Fig. 80.—Fixation Forceps.

It seems advisable to me to establish a distinction between fixation and downward traction. The first denotes merely holding the uterus steady with as little traction as possible upon its ligaments; the other actually pulls the organ downward, with a perceptible effort, below its normal level. Now, in examining it is rarely necessary to go beyond simple fixation, and if the organ is at all drawn downward, the degree of such traction is very moderate.

The method employed is very simple. The patient being placed in the dorso-sacral position, the operator grasps the anterior lip of the cervix, guided to it by his index finger, or through a speculum. A hooked forceps (which is merely an American bullet extractor) is the best instrument for the purpose (Fig. 80); it makes only two trifling punctures, which cause no discomfort and bleed but little. It is only when the force employed needs to be great, or the position maintained a long time, that Museux's forceps are required; we must then take care that they are constructed according to the model I have recommended, where the blades meet exactly without the over-riding which is found in the form most commonly used. With this small matter correct, the wound made is very slight, and the surgeon need run no risk of injury to his finger as he passes it over the part seized.

Artificial Dilatation of the Uterus, and Intra-uterine Touch.—There are

certain rare cases in which it is necessary to explore the uterine cavity with the finger, either to confirm a diagnosis or as a preliminary to operation. This bold plan originated with Simpson; to accomplish it several methods have been proposed. Before discussing them it is necessary to establish a distinction; the cervix presents a narrow canal, not a simple orifice, which has an upper, supravaginal, and a lower, or external mouth. The points requiring especial consideration are the condition of the internal os and of that part of the cervical canal which lies above the vagina. In certain cases the patency and greater or less degree of softening of the internal os present no obstacle to exploration, except below at the os externum; for instance, in certain intra-uterine fibromata and polypi, just after abortion, etc. Such cases are essentially different from those in which the whole extent of the canal is rigid, and the same measures will not produce equivalent effects in these two classes. Let us pass the principal procedures in review.

The principal methods of dilatation may be divided into two classes:

1. Bloodless methods, comprising: (A) Gentle dilatation by tents; (B) divulsion; (C) immediate progressive dilatation.

2. Those accompanied with bleeding, consisting of two important operations of diverse character, viz.: (A) Opening of the external os by incision; (B) entire bilateral division of the cervix.

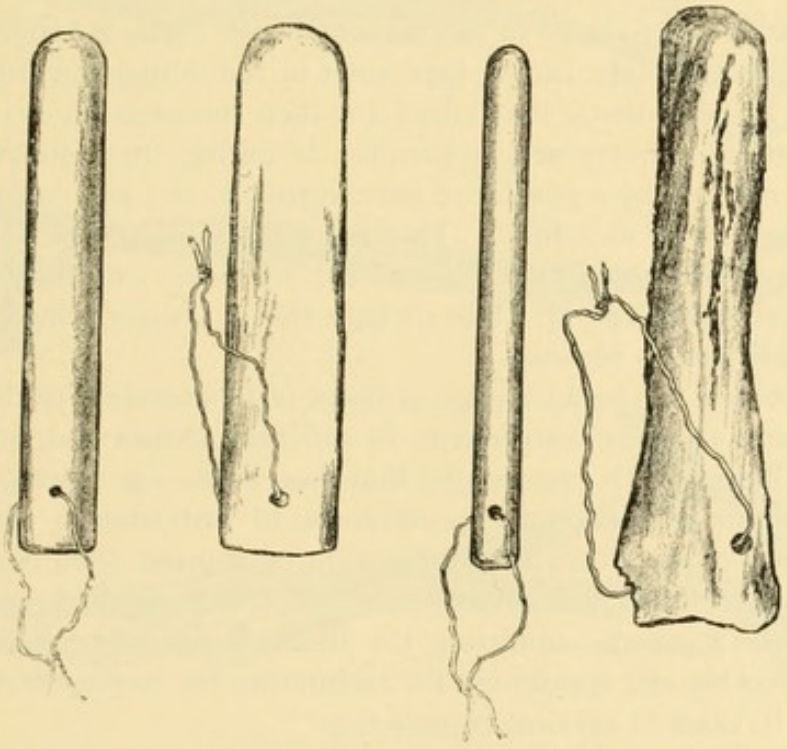
No one of these procedures should be adopted in practice unless absolutely necessary, and every dilatation of the uterus should be regarded as dangerous, particularly if there is the least reason to suspect recent inflammation about the uterus or its appendages.

Bloodless Methods.—(A) Gentle dilatation by means of absorbent expansive materials is accomplished by introducing into the cervical canal cylinders of different material, among which prepared sponge, laminaria, tupelo, slippery elm, decalcified ivory, and gentian root are advocated. I will not stop to discuss the relative merits of these various tents; the matter seems to me decided in favor of laminaria, and although I do not wholly reject prepared sponge, rendered aseptic, I still believe that it has only a limited application. Laminaria, used in fagots, that is, several tents at once, if necessary, suffices for nearly all our needs. This excellent therapeutic agent was introduced to surgeons by Sloan.

After thorough disinfection by laying them in iodoform-ether, tents are employed in the following manner: The vagina is carefully irrigated; the patient then being put in the dorso-sacral position, the cervix is exposed by the bivalve speculum or two of Simon's blades; it is then advisable to grasp the anterior lip of the cervix with a tenaculum forceps and thus hold it firm during the introduction of the tent; the position of the uterus must have been ascertained beforehand by the use of bimanual palpation and the sound. The tent should be slightly curved to adapt it to the natural curve of the canal which is to receive it; then, well covered with vaseline, it is grasped by a forceps and gently introduced. The end, to which a small thread is

attached, must be left outside the cervix. Two or three tents may thus be inserted within the canal if the introduction of one of sufficient size is too difficult, for violence must never be employed. The fixation forceps being removed, a tampon of iodoform gauze is placed over the cervix and then the speculum is withdrawn.

About ten hours are required for the laminaria tent to become thoroughly dilated; then it is removed by gentle traction upon the thread passed through its lower end. Sometimes, however, there is some difficulty, as the tent may have assumed an hourglass shape, from constriction at the internal os. Then the extremity must be seized with a forceps, and withdrawn by



a *b*

FIG. 81.—(*a*) TUPELO AND (*b*) LAMINARIA TENTS BEFORE AND AFTER DILATATION BY SOAKING FOR EIGHT HOURS.

combined traction and rotation, while the finger offers a point of support at the external os.

Despite all antiseptic precautions, we must not regard dilatation by tents as an inoffensive operation; for one sometimes encounters symptoms of acute metritis after their use, with severe pain and marked febrile movement. They should, therefore, be employed with more moderation than is usually advised.

[While no other tent dilates so rapidly or produces so great a degree of softening of the uterine tissues as one of compressed sponge, their use is entirely abandoned in America, because of the difficulty of rendering and keeping them sterile and the great danger from septic accidents following their employment. Their place is very satisfactorily taken by the compressed

tupelo (made from the strongly compressed root-wood of the Nyssa uniflora, Wang.) which can be procured of any necessary dimensions, has little tendency to become septic, dilates rapidly and gently, causes only moderate pain, and does not irritate the uterus excessively. While, as I have said, these tents have little tendency to become septic, we can easily render their sterility absolute by enclosing each one in a small sealed paper envelope and baking them at a temperature of 250° F. for three hours; the envelope being opened only at the moment when they are to be inserted. These tents are especially valuable when considerable dilatation is required, as in cases of incomplete abortion with contracted os or before the removal of submucous fibroids, etc.

Tents may be introduced in the Sims or in the dorsal position, and at the patient's home where she can be kept quiet in bed during the period of their retention. No anæsthetic is required for their introduction or removal, but in many instances pretty severe pain is felt during their dilatation. This can best be relieved by a powder of phenacetin (gr. iv.) and codeine (gr. ½), which I prefer, or by morphine. The tent selected should be one which can be readily passed through the internal os; its inner extremity should not reach much above this point, while its base should project somewhat into the vagina to facilitate its removal.]

(*B*) *Divulsion.*—The advantage at times of immediate dilatation by force has given birth to many instruments of different shapes and powers. The dilator of Ellinger, with two parallel branches, is the one I prefer; Schultze, Sims, and others have invented special forms of instruments. But they are all objectionable, since they take their point of support from portions which are liable to yield and tear under the strain, and by themselves they do not suffice to make a passage admitting the index finger. The Ellinger dilator is very serviceable and convenient for facilitating the passage of the sound or the curette in cases of cervical constriction.

[Palmer's dilator, with the intra-uterine portion of the blades two and a quarter inches long and capable of dilatation to one inch, is most convenient and efficient for general use. Where a more powerful instrument is needed, Goodell's modification of Ellinger, with blades two inches long, corrugated to prevent slipping, and opening to a width of one and a half inches, is one of the best. For slight degrees of dilatation an anæsthetic is not necessary. To avoid tearing or unnecessary injury to the parts, dilatation should always be done slowly, occupying from ten to twenty minutes, with the least possible degree of force and preferably without the use of the screw attachment. It should be done through the speculum, with the patient either on the back or the side, the vagina being filled with a pool of antiseptic fluid in which the cervix is kept immersed.]

(*C*) *Immediate Progressive Dilatation.*—This method is well known to surgeons, who apply it in dilating urethral strictures by means of graduated sounds. Of these there are many devised for the use of the gynæcologist;

Peaslee's; Tait's, of conical form; Hanks', ovoid; Fritsch's, and lastly, Hegar's, which are the most practical. They are cylindrical metal bougies with conical ends, and measure twelve to fourteen centimetres (four and one-half to five inches) in length, exclusive of the flat handle (about two inches). The diameter of No. 1 is two millimetres and they increase by one millimetre per bougie (three millimetres in circumference); this increase is a little too rapid for the higher numbers, and, according to Hegar's own advice,

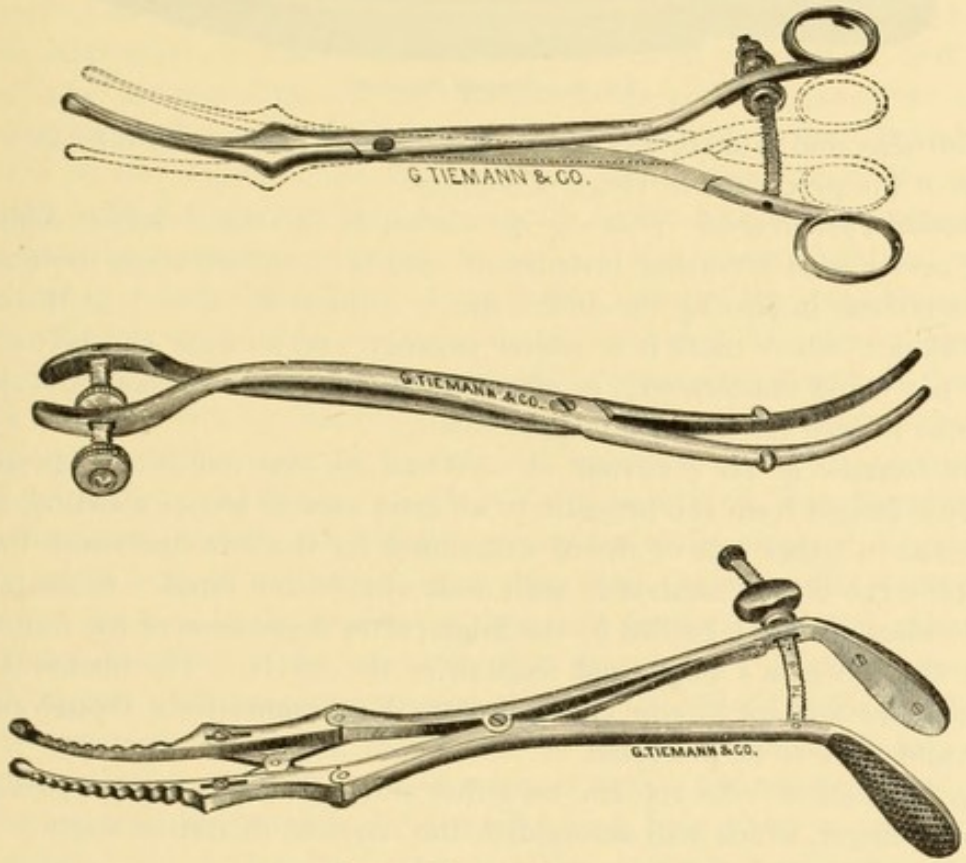


Fig. 82.—Uterine Dilators.

it is well to have some bougies for difficult cases, which increase only by half-millimetres.

To use them, the patient is anæsthetized and placed in the dorso-sacral position, the fourchette is depressed with a short blade, the anterior cervical lip is seized and fixed with a hooked forceps, the position of the uterus having been previously determined by the aid of bimanual palpation and the sound. Then the first bougie is covered with vaseline and passed in, and should be of a calibre which enters with but little resistance. Immediately afterward a second, and then a third are introduced, and, if any difficulty is encountered, the bougie is allowed to remain from one to three minutes or the previous one is introduced a second time.

When the cervix is naturally or artificially softened, it is possible to reach in fifteen minutes a sufficient dilatation to admit the index finger. When the cervix is dense, an hour or even more is necessary. The procedure must

be abandoned, if there is risk of laceration, as soon as a sufficient dilatation is reached. Hegar's bougies are extremely useful if the cervix is already soft and dilatable, as it is directly after abortion or parturition; when, however, the cervix is rigid throughout its whole length, I recommend the insertion of a laminaria tent for ten to twelve hours to produce a certain degree of dilata-



FIG. 83.—HEGAR'S DILATOR.

tion, softness, and dilatability, and, at the time of its removal, the rapid completion of the process with Hegar's bougies.

Operation for Rapidly Dilating the Cervix by Incision.—Rapid dilatation of the cervix with a cutting instrument may be indicated when the obstacle to be overcome in passing the index finger within the cervix is at the external os alone; when there is a special urgency and no time can be lost, the cervix not being obliterated; or when the surgeon does not have the special apparatus needed for the bloodless method.

(*A*) *Incision of the External Os.*—When the external orifice has spontaneously enlarged from the pressure of an intra-uterine polyp, abortion, etc., a simple cut in either side of the os will suffice for the introduction of the finger; then the bloody method is both most simple and rapid. Scissors with long handles are used, guided by the finger, after depression of the fourchette with a short Simon's blade and fixation of the cervix. The blades of ordinary scissors are apt to slip, and therefore Küchenmeister's, though not indispensable, are to be preferred.

An incision of 1 to 1.5 cm. on either side is enough for the passage of the index finger, which will accomplish the required dilatation itself. After

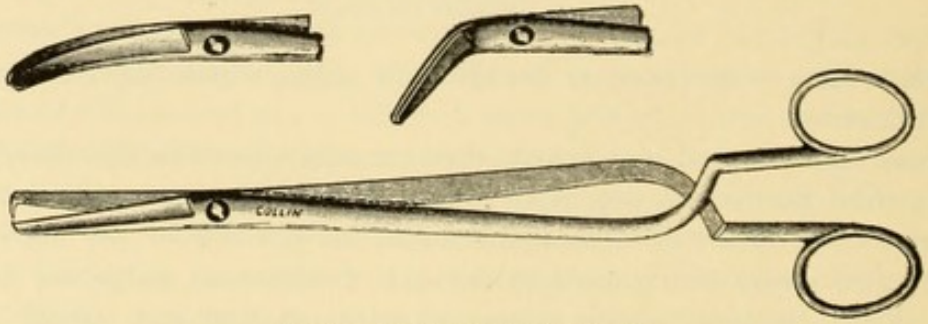


FIG. 84.—KÜCHENMEISTER'S SCISSORS.

the exploration is complete, the uterus should be irrigated and the cuts closed with catgut.

(*B*) *Complete Bilateral Division of the Cervix.*—This procedure is so truly an operation that one should not undertake it if he has not already a large experience in uterine surgery. A necessary preliminary is ligation of the uterine artery. The patient being anæsthetized and placed in the dorso-

sacral position, the vagina is strongly retracted upon one side, while the cervix is drawn with a tenaculum toward the opposite side; in this manner one of the lateral vaginal pouches will be exposed. Then a long and strongly curved needle, or better a Deschamp's needle, threaded with silk, is passed through the cul-de-sac across the finger outside of the cervix, taking care anteriorly not to go beyond a line tangent to the circumference of the cervix at that level in order to avoid the ureter. The surgeon must include the greatest possible thickness of tissue and must bring his needle out in the vagina posteriorly, as nearly as possible to the point of entrance and always at the same distance from the os. In thus keeping the points of the needle's entrance and exit close together, the surgeon endeavors to include as little as possible of the vaginal mucous membrane within the loop of his ligature. The silk is then firmly tied and the process repeated on the opposite side.

I have had occasion to make use of this preliminary ligation and can state that it is very efficacious. I think that it is not the main trunk of the artery which is included in the ligature, but probably its inferior branches; however that may be, the surgical result is excellent. One can then take up his bistoury with no fear of hemorrhage. The cervix being drawn down is incised on either side to the vaginal insertion, and then an attempt is made to introduce the finger; should this still be difficult, a probe-pointed bistoury is passed in along the index finger and, in withdrawing it, the cervix is scored on its internal aspect on either side, until the finger has room enough to pass. As soon as the exploration has been finished, and the uterus irrigated, the cervix must be restored with great care. For this purpose a needle armed with catgut is passed through the cervix at the level of the vaginal insertion, so deeply that, with the finger as guide, the loop of the ligature lies at the highest point of incision within the cervical canal. It is well to make all the stitches on both sides, and have them symmetrical, before drawing the first tight; otherwise the orifice is narrowed at once and the finger no longer serves as a guide. The first two superior stitches being placed and tightened, a sufficient number are taken below to adapt the mucous membranes accurately, both within the canal and without.

It is needless to leave the ligature of the artery indefinitely in place; it may ulcerate and injure the vaginal mucous membrane; it should, therefore, be removed, unless there are special indications to the contrary, at the end of three or four hours. Of course its removal must be far more speedy if there is reason to fear that the ureter has been tied, but this accident may always be avoided if the directions given are minutely observed.

Permanent Dilatation.—The dilatation obtained in one of these ways may be maintained by tamponing the uterine and cervical cavities. The idea has lately been current that continued dilatation favors diagnosis and treatment in certain uterine affections, since it exposes the parts to view.

Vulliet, who proposed this tempting procedure, thus describes it: The patient is placed in the genu-pectoral position, the cervix is exposed by a

Simon's speculum, and its canal explored. If constricted or misplaced, its natural direction and calibre are restored by preliminary treatment; if it is normal, a small tampon of cotton is passed into its cavity with a metal sound. These tampons vary in size from that of a pea to that of an almond, and are each furnished with a thread. They are first plunged into a mixture of ether and iodoform (1 : 10), then dried and kept in a well-stoppered bottle. Vulliet introduces tampons until the cervix is full to the external os. These he removes at the end of forty-eight hours. If it has been well stuffed, the cervical walls have become soft and have so far yielded that there is free space for the operator, who at once takes advantage of it and packs in a much greater number of tampons than before. In proceeding thus with gradual increasing tamponade, there are at least eight or ten repetitions of the method before the canal is so wide that it may be seen in all its extent. To save time and regulate the calibre of the cavity, Vulliet advises that the tamponing be alternated with laminaria tents.

This procedure is not always applicable in the conditions indicated by its author. There are a certain number of cases in which the requisite calibre cannot be obtained, as the observations of Porak and Sabail demonstrate; and there are other cases in which the repetition of the tamponade must be given up, either because of the pain produced, or because of nervous accidents; these latter symptoms appear to be due to the nature of the operation itself, not to the absorption of iodoform from poorly made tampons. Moreover, I do not think that vision furnishes more satisfactory information about the uterine cavity than can be gained by the different exploratory methods already described. Nor do I think that therapeutics have been greatly advanced by this plan, or that it will survive, ingenious as it may be, a legitimate interest, mixed with some astonishment, provoked at the moment of its appearance.

These remarks do not apply to hæmostatic or antiseptic tamponade of the uterine cavity, for I believe that this procedure will be retained in practice and more frequently employed.

The touch, by the introduction of the index finger into the uterine cavity, takes note of the softness or villosity of the mucous membrane, of vegetations, tumors, or abnormal projections which may exist there, and the manœuvre should be always combined with hypogastric palpation. It must be very rapidly carried out, and followed by an intra-uterine injection of carbolic solution (1 : 100), an iodoform tampon, and absolute rest in the horizontal position for two days. If the hemorrhage occasionally produced does not yield to very hot injections (115° to 120° F.), there should be no delay in filling the cavity with iodoform gauze tampons for a few hours.

Exploratory Incision and Curetting.—Diagnosis between malignant and benign growths is so important from an operative point of view that we should not hesitate to make an exploratory incision in doubtful cases. There may be alterations in the cervix when a doubt as to their nature could be

settled only by an operation dangerous to the patient. I remember an excellent instance: My regretted master, Gaillard, suspecting cancer, sent me for operation a woman who had a hard, irregular cervix and a bloody discharge. Though inclined to accept the diagnosis, it was with some reservation, and so I removed a small section from the cervix; the microscope showed simple chronic inflammation. She had escaped another surgeon who was just about to operate.

This mode of exploration has been praised by clinicians as of great value. The technique is very simple; fixation of the cervix, excision of a wedge-shaped piece with sharp scissors or a bistoury, thermo-cautery if necessary for the bleeding, since an antiseptic tampon may allow the flow to continue.

When it is necessary to determine the state of the uterine mucous membrane, scraping it with a cutting curette furnishes us with shreds enough for examination. Martin, who is a great partisan of this method, advises not to stop with partial curettage, but to make it complete and follow it with antiseptic irrigation and the injection of (2 or 3 gm.) perchloride of iron. The technique of the process will be described in the chapter on Metritis.

Exploration of the Ureters.—This entire subject is of recent date. In 1874 Tuchmann collected the urine from one ureter by compressing the other; Hegar, at the same time, proposed tying the ureter per vaginam for this purpose. But it is not until recently that Simon (1875) was able to catheterize the ureter by the guide of the finger placed in the bladder after urethral dilatation. For the same purpose Grünfeld employed the endoscope. But Pawlik, in 1880, discovered a method which cannot be called easy and yet is more or less practicable, by which to enter the ureter directly without previous operation, guided by external anatomical landmarks. Later labors of Newman, Kelly, and Byford have not added anything important to Pawlik's method. More recently Sänger (1886), more clearly defining the indications already sketched by Hegar, Chrobak, and Pawlik, attempted to introduce into practice vaginal palpation of the ureters; I have seen Pawlik and Sänger demonstrate their method. Without attempting to give historical details, which will be found complete in their works and which have been summed up by Schultz in a recent review, I will simply try to give an idea of the technique of these two skilled gynæcologists.

Reversing the chronological order for the logical, I will describe Sänger's method.

A. Palpation of the Ureters.—The anatomical relations of these ducts to the cervix and vagina have been studied with especial care of late because of their importance to the success of certain operations which have become the order of the day. As is well known, it is possible to feel through the vagina the anterior pelvic portion of the ureters, if injected, in the cadaver, just where they open into the bladder at the base of the broad ligaments; this is equal to a length of 6 or 7 cm. (2½ in.), that is, the greater part of the ureters within the pelvis and about one-fourth of their whole length. In

pregnant women we can feel as much as 10 cm. (4 in.), owing to the general muscular hypertrophy which all the pelvic organs undergo at that time. Moreover, one can take his supporting point from the head of the fœtus and feel the ureter against that structure.

In some cases of gonorrhœal and calculous inflammation of the ureters, Sänger was able to diagnose by touch that they were remarkably enlarged. When there is a chronic inflammation of the broad ligament the ureter is found to be very large and palpable upon the other side, as if from hypertrophy. Under Sänger's direction I have been able to palpate the ureters in

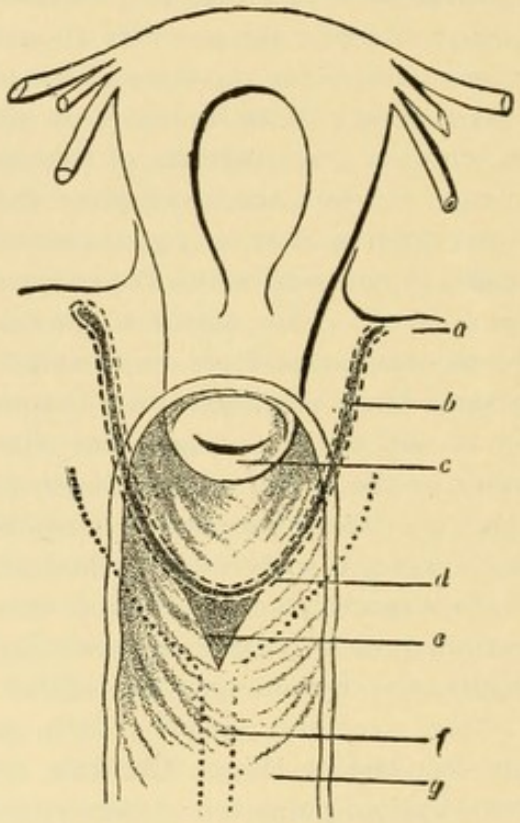


FIG. 85.—THE PORTION OF THE URETERS ACCESSIBLE TO TOUCH. (Figure diagrammatic; the posterior vaginal wall supposed to be removed and the ureters visible through the anterior wall.) *a*, Base of broad ligament; *b*, ureter; *c*, cervix; *d*, ligament between the ureters; *e*, trigonum; *f*, urethra; *g*, vagina.

pregnant women, but on attempting to repeat it at several different times the result has always seemed uncertain to me. Probably by reason of the great difficulty, and the doubtfulness of its results, as well as the rarity of practical conclusions furnished, the manœuvre is not likely to become general. To employ the method, several anatomical points must be held clearly in mind. The field of investigation is limited to the upper portion of the anterior vaginal wall. Diagrammatically the surface is a trapezium with oblique and divergent sides corresponding to the union of the ureters and the junction of the anterior with the lateral vaginal wall. The small base of this trapezium, which is really the truncated apex of a triangle, is placed below and horizontally, corresponding to the ligament between the

ureters; the larger base is above, formed by the point of exit of the ureters from the broad ligaments and a line joining them. In this space the finger encounters, in certain circumstances, 1 or 2 cm. (½ to ¾ in.) behind the os externum, in the depth of the vaginal pouch, two hard, longitudinal cords, one on each side, directed from without inward and from below upward, making a curve which is concave inward (Fig. 85, *b*). One cannot ordinarily trace them through their whole accessible length, which is 6 or 7 cm. (2½ in.) to the base of the trigonum; about 2 cm. is all that can be usually palpated.

The ureters are normally symmetrical, but they cease to be so after different lesions, and then their direction may vary from cicatricial contraction so much that the ureter of one side may be found upon the other; or their concavity may be directed upward instead of inward; or, finally, but one ureter may be palpable.

The average normal diameter of the ureter is 1 mm., but diseased, it may reach the volume of a goosequill or even a large crayon. They are more or less movable under the finger, or fixed in place by inflammation, and normally they are not sensitive to pressure, though they may become so if diseased.

To palpate them by the vagina one must proceed in the following way: With the index finger, trace up the urethra to its exit from the bladder, which brings the finger into the anterior vaginal pouch; there notice the direction of the cervix. To find the ureter we must seek in that portion of the anterior vaginal wall which is comprised between the internal orifice of the urethra and the anterior vaginal cul-de-sac. This region has an extent of not more than 2½ cm. (1 in.) and is remarkable for its loose attachments. With the lateral surface of the tip of the finger the vaginal wall is palpated to the front and side in the direction of the broad ligament, using the finger corresponding to the ureter sought. The left index finger can be used for the right ureter and *vice versa*, but in that case it is the palmar surface which palpates. It is necessary to work gently, with a gliding motion, and not by frequently applying and removing the finger. Delicate palpation demonstrates whether the ureters are normal or a little hypertrophied; they have the feel of an artery deprived of its pulsation. When one can compress them against a hard body, like the pelvic bones or the fœtal head, they roll about within their sheaths. Palpation is more readily accomplished when the vaginal wall is very flaccid.

The ureters must not be confounded with arteries, cicatricial bands about the uterus, or, according to Sänger, with the levator and sphincter ani. These errors may be avoided if one takes strict account of both their anatomical and their abnormal positions. It is none the less very difficult, without special training, to employ with profit this new exploratory method of the eminent Leipsic gynæcologist.

Catheterism of the Ureters.—Pawlik's method. It was during his stay

in Vienna as privat-docent that Pawlik, now professor at the University of Prague, made his first experiments toward his ingenious method in a case of doubtful diagnosis occurring in Billroth's clinic. I had an opportunity at the time of seeing and verifying the marvellous dexterity with which he accomplished the delicate manœuvre. There are cases in which it is of the greatest importance to determine whether both kidneys are diseased or only one; Pawlik made the matter perfectly clear on one memorable occasion, and

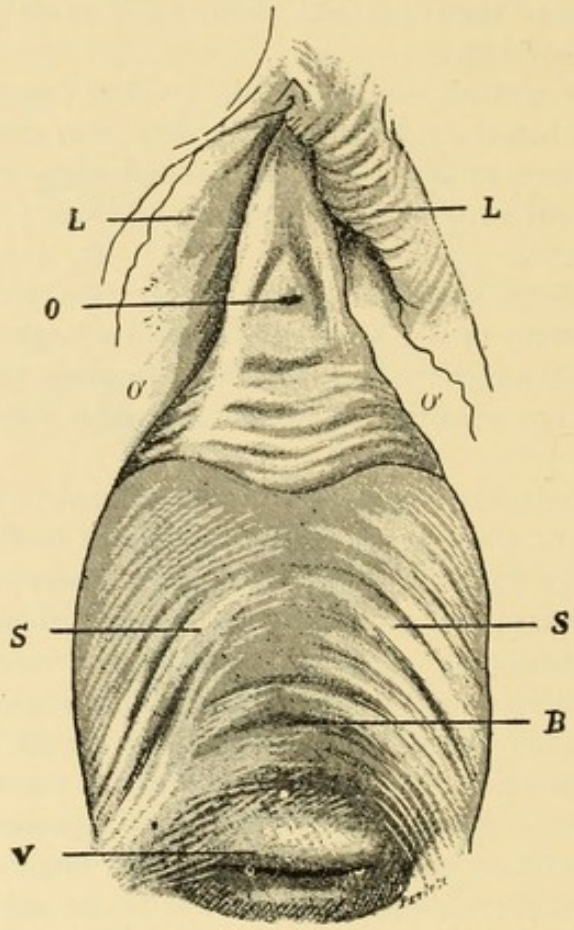


FIG. 86.—THE VAGINAL TRIGONE (PAWLIK). *L*, *L*, Labia minora; *O*, urethral orifice; *O'*, *O'*, urethral cushion; *V*, os externum; *B*, fold of mucous membrane, behind interureteral ligament, forming base of triangle; *S*, *S*, lateral fold, converging and corresponding to the sides of the triangle.

on another diagnosed a hydronephrosis and allowed the ureteral sound to remain in position. For this latter procedure, he constructed a special instrument (Fig. 87), but it is not free from all danger; for the metal piece which, in this instrument, is fastened to the long rubber sound, could not be removed, if separated, without an unusually fortunate combination of circumstances.

Certain anatomical points must be clearly understood beforehand in order to use Pawlik's method. In front of the lowest part of the bladder, on the posterior portion of the antero-inferior wall, the ureters are found at the posterior angles of the trigone, and the anterior is occupied by the urethra. Each of the three orifices is at the top of a papilla, which is more or less

prominent, of an irregular cylindrical form, made by a thickening of the muscular coat and invested by mucous membrane. These papillæ serve as landmarks. They are, moreover, connected by a marked band of the same formation, convex forward, thick and resistant enough to hold the point of a sound at its middle, where it is somewhat thinned, and to be appreciated by direct palpation. This fold is called the interureteral ligament, the pad or muscle of the ureter; it forms the curved base of Lieutaud's triangle, the other sides being indicated by less marked folds which point toward the urethra and become thinner. The dimensions of this triangle are naturally inconstant, but it is usually almost equilateral. Its base is estimated at 2 cm. 6 mm. to 4 cm. (⅞ to 1½ in.), its sides, at 2 cm. 7 mm., 2 cm., and 2 cm. 8 mm. or at 4 cm. (1 to 1½ in.). The distance between the urethral opening and the middle of the base is given as 1 cm. to 2 cm. to 3 cm. (⅜ to 1⅛ in.).

Pawlik has the patient put in the genu-pectoral position, but one can quite as well do the operation in the dorso-sacral; it is only necessary in the latter position to have the head well lowered and the buttocks strongly raised, that the viscera may fall toward the diaphragm. A Simon's speculum, as large as possible, is put into the vagina and the posterior wall depressed; the anterior wall is thus perfectly stretched.

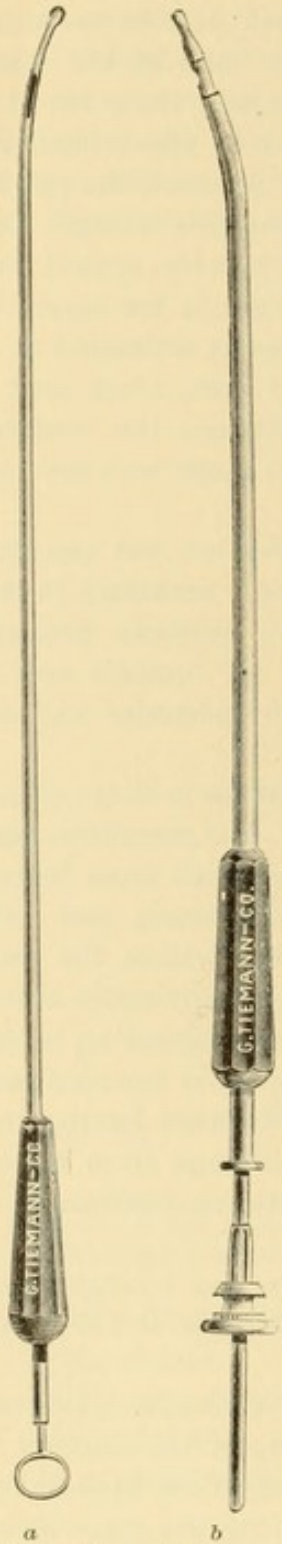
This tension of the anterior vaginal wall allowed Pawlik to note certain permanent folds of great importance topographically. He mentions near the external orifice of the urethra a pad or cushion elongated from before backward in the median line, folded or furrowed transversely and well marked, which corresponds to the course of the urethra within the wall (tubercle and anterior column of the vagina). This fold terminates at the internal meatus. Next there follows a triangular space corresponding to the base of the bladder or the trigone of Lieutaud. This space is bounded posteriorly by the interureteral ligament, slightly convex forward, having the orifice of a ureter at each end of it. The lateral folds diverge from before backward and end about 1 cm. (⅜ in.) behind the internal meatus, thus forming the truncated apex of the triangle (Fig. 88).

It can be demonstrated upon the cadaver that the vaginal triangle thus bounded corresponds line for line with the intravesical trigone of Lieutaud, and should therefore be called Pawlik's vaginal trigone.

Pawlik uses a catheter which has a probe-pointed extremity, about 25 cm. in length with a tip of 1.5 mm. diameter; the eye of the catheter is very much elongated, with bevelled edges, and is situated on the base of the point of the instrument on a slight curve continuous with the main stem, which tapers a little. At 1.5 cm. from the other end of the catheter is attached a holder, of octahedral shape, which carries a mark corresponding to the curve of the instrument, and beyond this handle the tube projects for about 1.5 cm. more.

To render the instrument aseptic the stylet is withdrawn and the instru-

ment washed out with water; then it is filled several times with ether, and finally passed through an alcohol flame. Before introducing the catheter, there should be a certain degree of vesical distention, and the shortest and surest way to obtain this is to empty the bladder completely and then inject (200 c.c. = 6 oz.) of water, which is plenty for moderate distention. The urethral catheter is then removed and the ureteral passed in.



a *b*

FIG. 87.—PAWLIK'S URETERAL CATHETERS. *a*, With stylet; *b*, permanent form with rubber tube which is passed through a metal sheath.

As soon as this instrument has passed within the internal meatus the other end of it should be raised so that the tip shall be brought toward the rectovaginal pouch at the level of the trigone. As the instrument is pushed gently in, its beak makes a slight prominence on the anterior vaginal wall, and as it passes onward, this prominence changes its place; thus the catheter can be guided, following the sides of the vaginal trigone and moving from within outward and behind forward, toward the orifice of the ureter. In this direction it meets the interureteral ligament or fold at its most projecting outer part; while, if it is held in the median line, it may pass over the middle of the fold, where it is flattest, and so miss it entirely. Arriving at the ureteral orifice, it is held there while small movements of gliding, rotation, elevation, and depression are made, until it has passed in; but always without leaving the angle of the trigone, which is kept constantly before the eye. Once within the ureter, the instrument is pushed 1 or 2 cm. (½ in.) toward the posterior vesical wall. The entrance of the catheter is appreciated by the sudden removal of all resistance; it advances as into an empty space; while, on the contrary, lateral and downward movements of the handle are resisted more and more as the instrument advances. At the end of a certain time the urine flows in a jerky stream, while, as is well known, from the bladder it would be continuous. If the catheter is passed still farther in, it changes its direction at the superior strait, and then it is time to arrest the procedure on account of its difficulty, which is especially great where the urethra is tightly fastened to the os pubis and but little dilatable, as in nulliparæ; if, however, the urethra is large and soft-walled, the catheter may be passed still farther. It should be pushed on with the great-

est gentleness as the other end is depressed as far as possible. On the other hand, this latter half of the process is as easy as the first, when one has entered a fistula in the bladder or urethra. I once was able to pass Pawlik's sound to the pelvis of the kidney, but it was not per urethram. I had introduced it into a vesicovaginal fistula which I had reason to suspect was connected with the ureter, and I was able to confirm the diagnosis.

Thus one may reach the pelvis of the kidney; the ureter is then dragged into a straight line. Ordinarily in contact with the pelvic wall, it is then pulled away to a distance of about 4.5 cm. (1¾ in.), but the cellular tissue which surrounds it will permit this degree of displacement if it is in normal

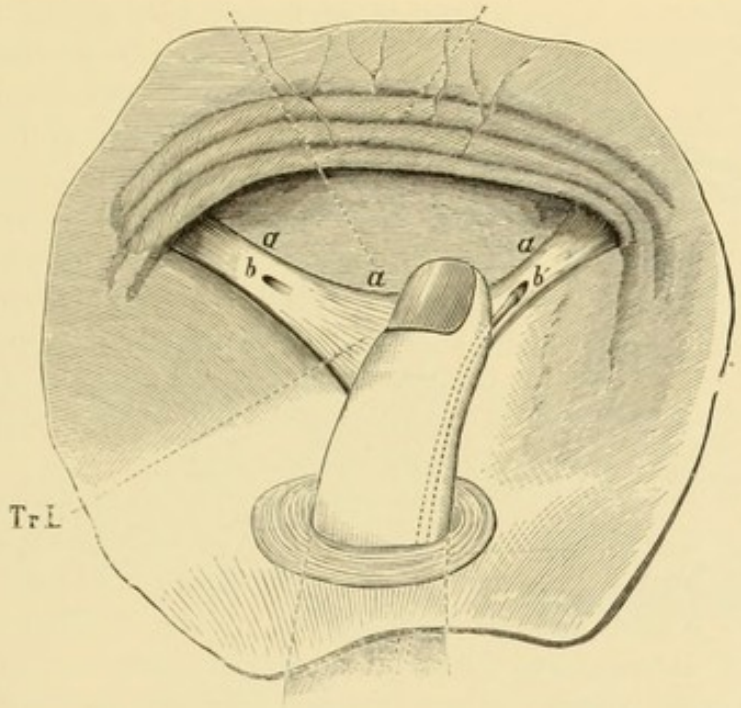


FIG. 88.—URETERAL CATHETERISM BY SIMON'S METHOD. The instrument is slid along the finger whose tip rests upon the interureteral ligament. *a,a,a*, Base of the bladder; *b,b*, orifices of the ureters; *TrL*, Lieutaud's triangle.

condition; ureteral catheterism should therefore be carried out with the utmost gentleness, especially if there is reason to suspect any inflammation about these tubes.

The only troublesome results which I have been able to verify are fever, abdominal pain, which does not last more than twenty-four hours, or a slight degree of peritonitis (in a case in which it had already been present); in the urine, furthermore, we may find blood, epithelial débris, products of traumatism of the ureter. It seems possible that there might be a ureteral fever, similar to the urethral, which would be a serious accident to follow such catheterism. We must wait till the procedure has been more frequently employed before observations become numerous.

Simon's Method.—If exploration of the ureter is considered necessary

and Pawlik's method cannot be carried out after several attempts, then Simon's method may be employed; which comprises anæsthesia, urethral dilatation, introduction of the catheter along the finger, which immediately feels the interureteral ligament. Incontinence of urine need not deter, for it seldom lasts long. This older form should be adopted where the operator has had no special training in Pawlik's method, as being the more certain of the two. Different plans have been proposed for compressing or tying the ureter from the vagina for diagnostic purposes. Narkalla has recently lauded exploratory compression by a thread passed over the ureter from the vagina. He succeeded in doing this on the cadaver ten times in thirty. According to this author the operation offers no danger, since instead of tying the thread, he merely used gentle traction upon it, to shut off the ureter temporarily. I prefer catheterism to this manœuvre.

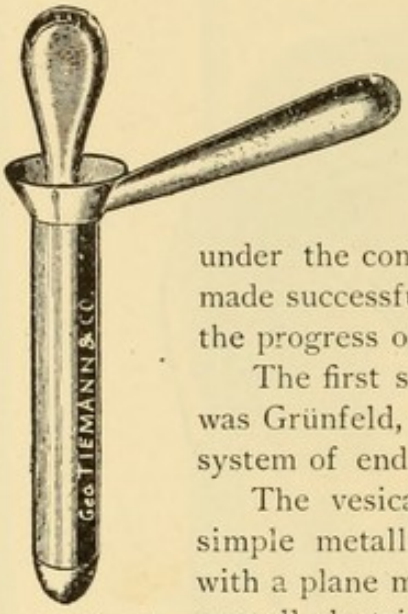


FIG. 89.—KELLY'S CYSTOSCOPE.

Endoscopy. Methods of Grünfeld, Brenner, and Howard A. Kelly.—Catheterization of the ureters has recently been attempted under the control of sight, an undertaking which has been made successful by the new illuminating apparatuses which the progress of cystoscopy has put at our disposal.

The first surgeon to attempt endoscopic catheterization was Grünfeld, of Vienna, who utilized for this purpose his system of endoscopy by external light.

The vesical endoscope of Grünfeld is composed of a simple metallic tube blackened internally and furnished with a plane mirror at its extremity. A head-mirror, with a small electric light, is the means of illumination. This arrangement gives an admirable view in natural position and size of a small portion of the vesical surface which is sufficient for the examination and catheterization of the ureters.

To point the instrument at the ureteral orifice it must be held at an angle of fifty to fifty-five degrees to the right of the median line for the left ureter and correspondingly to the left for that of the right side. The point of the instrument must also be depressed three to four centimetres in the bladder and the other end raised gently toward the pubis. This exposes to view the little orifice of the ureter from which flows an intermittent jet of urine, normal in color or colored with blood or pus according to the condition of the kidneys.

The exploration of the ureter by Grünfeld's method is done with a fine catheter whose tip is movable, at the will of the operator, by an arrangement similar to that of the curette of Leroy d'Etiolles. This catheter is introduced into the bladder parallel to the endoscopic tube. Its movable extremity is placed at a right angle and is engaged in the ureteral opening under control of the eye. As soon as it has been introduced the catheter is

straightened, the cystoscope withdrawn, and the catheter pushed in as far as desired.

The ureter may be emptied by catheterization in the same way with a small sound whose end is directed toward the ureteral orifice with the index finger previously introduced into the vagina.

Since the invention of Nitze's cystoscope, all authors who have used this or similar instruments observed the ureteral orifices and drew useful conclusions concerning diseases of the bladder and kidneys; but it was not until 1889 that it was made applicable for catheterization of the ureters, by an important modification which he made in the cystoscope of Seiter. This

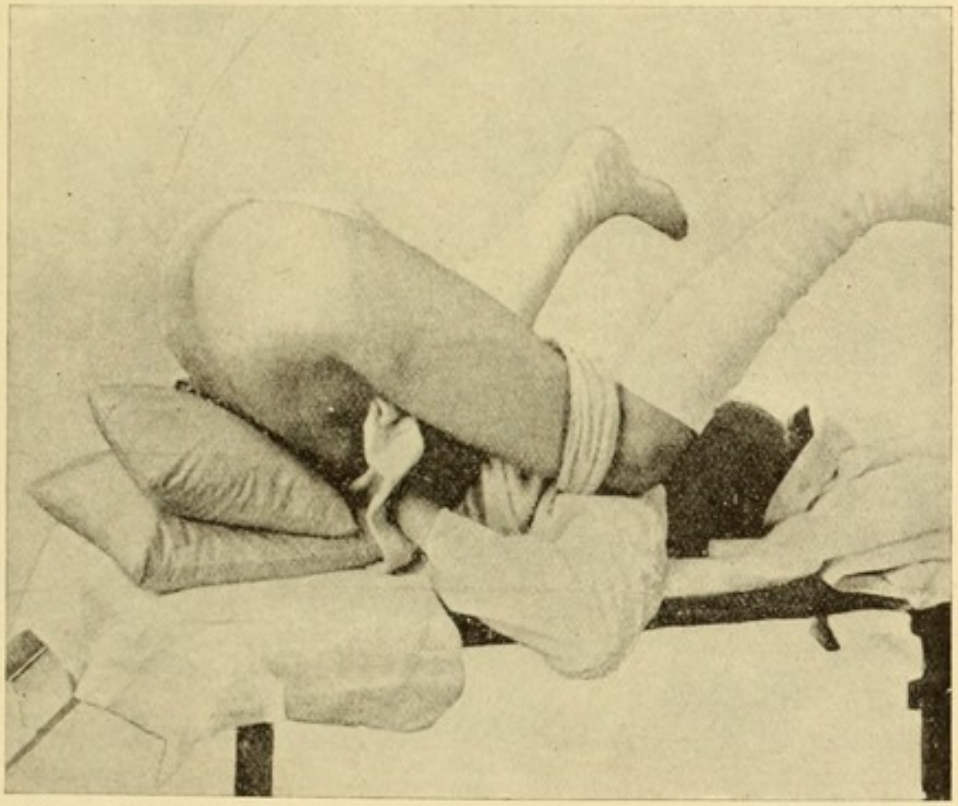


FIG. 90.—HIPS IN EXTREME ELEVATION FOR CYSTOSCOPIC EXAMINATION AND CATHETERIZATION OF URETERS.

modification consists in adding to the tube of the cystoscope a small canal which opens directly below the objective and in which is made to glide a fine sound whose tip is clearly seen in the field of the instrument. This arrangement makes the catheterization of the ureters very easy, even in man.

Howard A. Kelly, of Baltimore, practises catheterization of the ureters in the following manner: The patient is placed in the dorso-sacral position, with the hips preferably raised by pads (Fig. 90) or better, in the genu-pectoral position. The cystoscope (Fig. 89) is introduced into the illuminated vesical cavity, and tipped toward the vesical orifice of the ureter which is to be examined, and into this is introduced either a metallic explorer or a sound.

[None of the methods other than Kelly's are entirely satisfactory for

general use, but by means of his simple plan of direct inspection any gynæcologist possessing ordinary skill should after a little practice be able to locate and catheterize either ureter with ease.

The instruments required are a catheter, conical urethral dilators, specula, head-mirror, a good lamp or electric light, long slender forceps, suction apparatus for completely emptying the bladder, and ureteral catheter. The dilators and specula are numbered from 5 to 20, according to their calibre in millimetres. For general purposes four specula, Nos. 8, 10, 12, and 14, and dilators from 7 to 14 are sufficient. A good light is indispensable. An

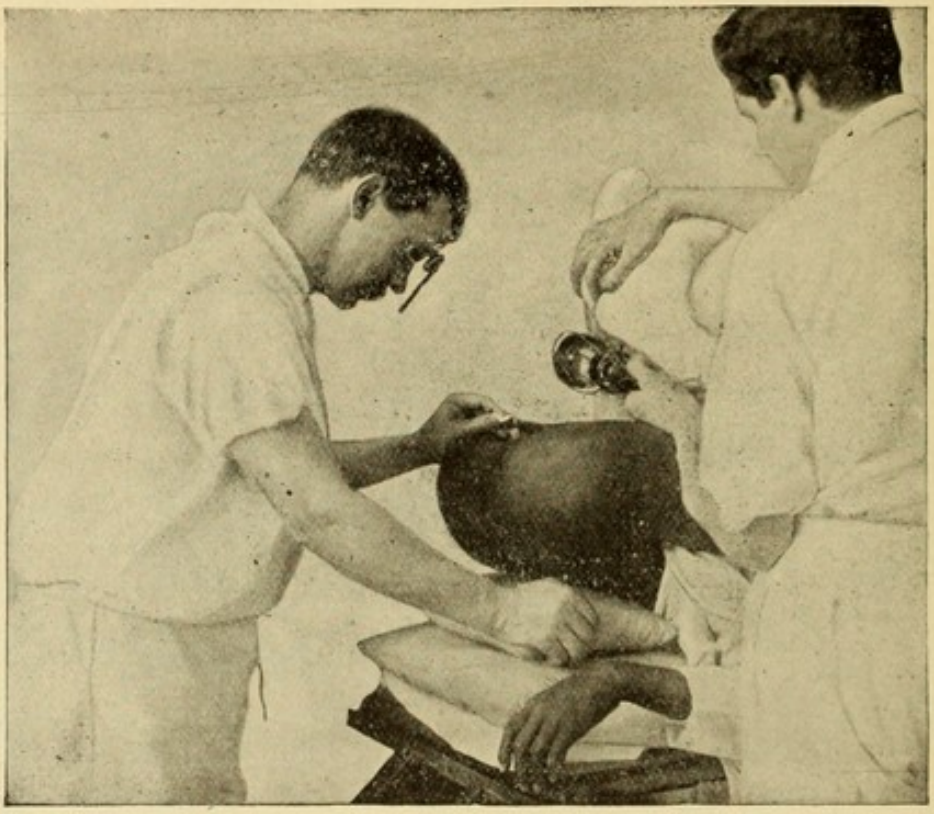


Fig. 91.—Direct Inspection of Bladder by Reflected Light. Hips in moderate elevation.

Argand burner suffices, but the electric light is best because of the small angle at which it can be used.

The method is as follows: The vulvar orifice, especially the urethra, is carefully cleansed with a warm boric-acid solution and cotton, to obviate risk of infection of the urinary tract, which might easily be brought about by successively introducing instruments through an unclean urethral orifice into the bladder. The conical dilator is then introduced until the urethral meatus is dilated up to No. 10 or 12. This can be accomplished in nearly all cases with but little pain by applying a cotton-wrapped applicator saturated with five-per-cent solution of cocaine to the urethra for five minutes before dilating. The bladder is now catheterized, a pledget of sterilized cotton placed over the urethra to protect it from contamination during the change in position, and the patient placed in the knee-chest posture. The speculum with

the obturator held firmly in place is then introduced into the urethra by a motion describing a slight curve around the under surface of the symphysis. Upon withdrawing the obturator the bladder becomes distended with air and by properly directing the reflected light all parts of its interior are accessible to direct inspection. By slightly depressing the handle of the speculum the region of the interureteric ligament comes into view, often marked by a

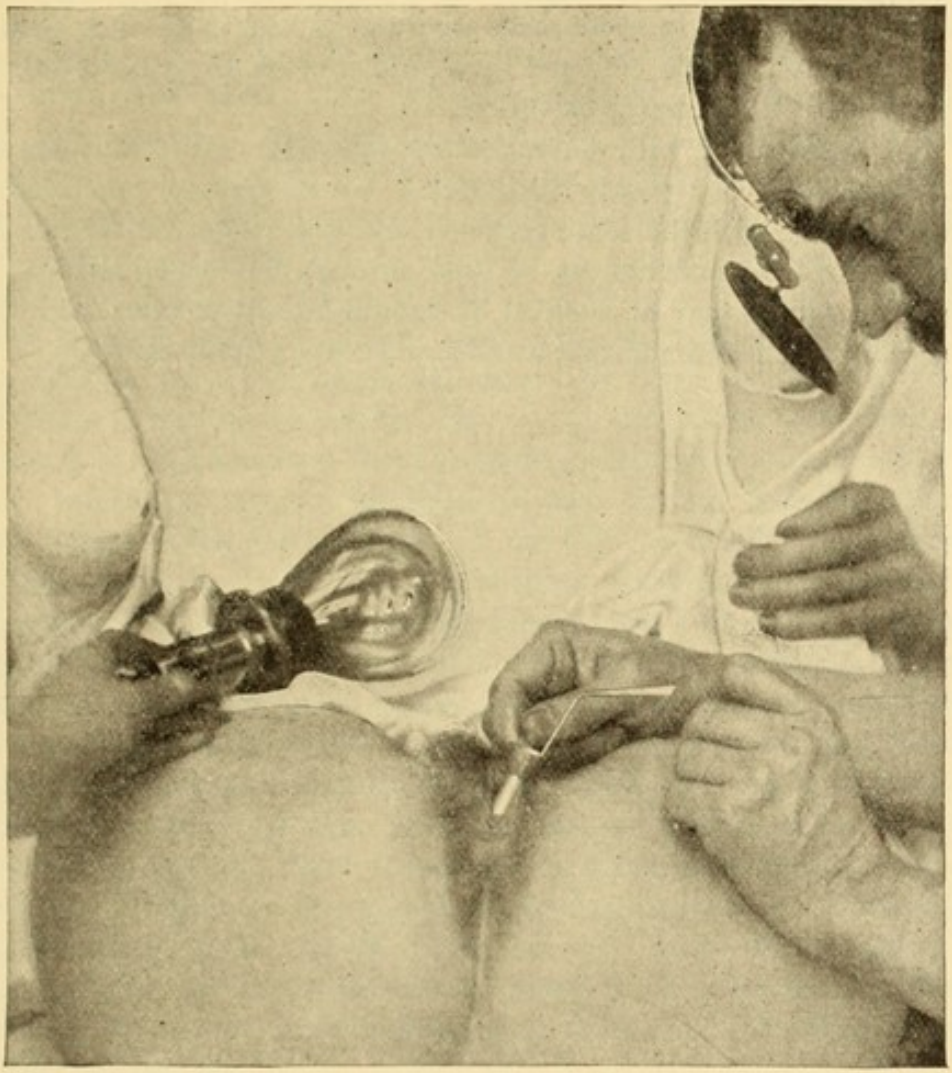


FIG. 92.—SPECULUM INCLINED 30° TO LEFT, EXPOSING RIGHT URETER.

slightly elevated transverse fold or a slight difference in color. By then turning the speculum thirty degrees to one side and looking carefully, the urethral orifice may usually be seen. Sometimes it appears as a dimple, or a little pit, or, in inflammatory cases, as a round hole in a cushioned eminence; at other times as a ∧ with the point directed outward, or as a fine crack in the mucosa, or may be found only by noting the escape of a jet of urine or by a slight difference in color, the mucosa being usually of a slightly deeper rose around the ureter. As a result of the foreshortening of the base of the bladder the ureteral orifice always appears to lie much nearer the ure-

thra than one expects. When the orifice is found, the catheter can easily be passed in from two to six centimetres and the urine collected, or a bougie may be passed for purposes of diagnosis or to define the position of the ureter during a hysterectomy or other operation.

Instead of employing the knee-chest position the patient may be on her back with the hips sharply elevated, residual urine being removed with the suction apparatus or cotton pledgets. Ureteral catheterization may also be satisfactorily performed in some cases with the patient in the left semiprone position, the pelvis being elevated by a pillow, or by an expert even, in the dorsal position without pelvic elevation.

By this examination with distended bladder, diagnosis and treatment of vesical disorders is very greatly facilitated. Direct applications to localized areas can be made with the same certainty and ease as on the surface of the body and various instruments can be used through the larger specula. Unpleasant after-effects may be avoided by careful attention to an aseptic technique, and by a gentle touch that avoids unnecessary traumatism.]

CHAPTER V.

THE PATHOLOGY AND ETIOLOGY OF METRITIS.

Definition.—According to its etymology, metritis is inflammation of the uterus, and I shall hold to this general definition although it might call for a long commentary. But it is enough that I am understood, and the word has a decided clinical value. The generic term inflammation is applicable to all morbid states in which the anatomical substratum is reduced by irritative lesions without resulting in the formation of specific neoplasms. How numerous and varied these lesions may be we shall soon discover. But they are all to be grouped under the same head because of the infectious nature of their origin as well as by their defensive character and limited evolution. When there is mucous or parenchymatous proliferation, the entire process takes place as circumscribed local irritation, coming to a focus either externally or internally, with no tendency to pass certain bounds; this distinguishes inflammation from neoplasms properly so called. Do there exist, aside from metritis, "morbid states without neoplasm" which need to be distinguished? Basing their opinion upon dogmatic ideas and a narrow conception of inflammation, the ancient authors did not hesitate to reject from the class of metritis all states which did not fall under the fourfold division of "tumor, rubor, calor, dolor." Granulations, ulcerations, and leucorrhœa belonged in consequence to other diseases. There are traces of this scholastic prejudice to be found even up to the modern writers, Alph. Guérin and Courty. Does not the latter author devote separate chapters to fluxion (inflammation), congestion, engorgement, œdema, hypertrophy, subinvolution, and granulation and ulceration of the cervix? It is only necessary to run the eye along his tables, so laboriously prepared with the view of differential diagnosis of the various morbid entities, to be at once convinced of the folly of parallel tabulations.

A very necessary distinction is the following: the idea of the lesion must not be confounded with the disease. This is what the various authors wish to indicate by the use of the terms idiopathic and symptomatic metritis; ill-chosen language which we will not adopt. The word metritis should remain a clinical and not a pathological term. It is thus that we shall study the malady, and its pathology is but the supplement thereto. Because there are lesions of endometritis with a fibroma, or of metritis with carcinoma, shall we therefore describe a myomatous and a carcinomatous metritis? That would have but one effect—confusion.

Our distinctions are certainly somewhat artificial, because they must be

sharply defined and there is nothing absolute in nature; they are none the less indispensable, and quite justifiable if one is careful to explain upon what criterion they are founded. I have already said that ours is clinical; it is the only one which gives personality to a disease. I cannot leave the subject without a few words on pseudometritis, the so-called symptomatic metritis. Inflammatory changes in the uterine mucous membrane are almost constant with fibromata, and to this fact we may undoubtedly ascribe the bleeding. Wyder's monograph on the subject is very complete. The irritation in these cases travels by continuity step by step. In the same manner, but in a reverse direction, it can follow reflex congestions, which predispose to infection, after disease of the adnexa. This pseudometritis, as I have termed it, has been classified by Czempin under different heads according to the point of origin as follows:

1. Chronic oöphoritis, of one or both sides, with or without participation of the tubes.

2. Exudative parametritis with exacerbations.

3. Pelvic peritonitis after removal of ovaries or tubes, starting in cicatrices of the broad ligaments.

4. Tumors of slow growth in the adnexa (pyosalpinx, sarcoma, and carcinoma of the ovary).

The peculiar characteristic of pseudometritis is, that the inflammation of the uterine mucous membrane is merely an epiphenomenon of tardy development and not appearing at the first onset, which becomes evident only after the appearance of disease in the adnexa or the pelvic peritoneum.

Brennecke, even before Czempin, had described a hyperplastic ovarian metritis, occurring chiefly at the menopause, marked by continued or typical hemorrhages, and equivalent to the hyperplastic form upon which Olshausen insisted.

Döderlein and Pfannenstiel have recently held that fungous endometritis is not of infectious origin and that it is always connected with trouble of the ovarian functions. Treub and Lehmal also deny the inflammatory character of this variety of endometritis, and propose to remove it from the group of metritis and to describe it separately under the name of hypertrophy of the uterine mucosa.

Classification.—Turning now to the study of metritis proper, and its various forms, if we consult the authors we shall find the most widely different starting-points for classification; they take the progress of the disease and term it acute and chronic; or its location, and describe cervical and corporeal endometritis, parenchymatous and idiometritis; or from its cause, it is puerperal, post-puerperal, gonorrhœal, traumatic, etc.; or from its pathology, it is styled granular, fungous, ulcerating, etc. For our purpose these schemes all have the defect of being as systematic and artificial as Linnæus' classification of plants. They are founded upon some character, arbitrarily chosen, whose value is not so great that all authors should be fairly dominated by

it. But in order to reach a classification as natural as possible, following in disease the definite rules propounded by Jussieu for botany, we have a guide that we can follow—the clinic. Truly, if lesions were always circumscribed, and if to such definite lesions a particular group of symptoms always corresponded, then we should have in the anatomical method the most logical



FIG. 93.—NORMAL MUCOUS MEMBRANE OF THE BODY OF THE UTERUS,[1] SLIGHTLY ENLARGED.

To the naked eye the uterine mucous membrane differs from the cervical in being smoother. Under the microscope it is seen to consist of collections of embryonal cells and tubular glands. These embryonic connective tissues are essentially homogeneous, rich in round and fusiform cells, which are found scattered through the muscular base of the membrane, along the vessels and glands, and here and there in the thickness of the tissues; both forms, especially the round cells, are characterized by their single large nucleus surrounded by a thin layer of protoplasm. The tubular glands cross the interglandular tissue almost perpendicularly, and at the muscular layer are branched, piercing the thin layer between the connective-tissue bands which separate the muscular bundles. The limit between muscle and membrane is sharply cut throughout. The surface of the mucous membrane is covered with a single layer of ciliated cylindrical epithelium. The mucous membrane of the body is further distinguished by the wealth of its arterial supply and the poverty of its venous. The arterioles pierce the layer perpendicularly, give off many little branches which enter the glands, then recurve and cross immediately below the epithelial investment, forming an irregular plexus of large capillaries, whence the veins originate.

1, Intraglandular tissue composed of round cells with large nuclei; 2, surface epithelium with vibrating ciliæ; 3, tubular glands slightly sinuous; 4, a bifurcated gland; 5, transverse sections of same glands.

system possible; but while this condition does not exist, the anatomical basis lacks all precision and serves but for illusions.

I propose, therefore, to classify metritis according to the prevailing clinical symptom which may be deduced from its course, or may stand in marked

[1] In order to estimate tissue changes correctly, we must know the normal histology of the part, and I have therefore prefixed to figures of morbid tissues one which presents the healthy condition; this is indispensable for comparison.

predominance in the order of its symptoms. We have, accordingly, the following varieties:

1. Acute inflammatory,
2. Hemorrhagic,
3. Catarrhal,
4. Chronic painful.

These epithets shall have only a taxonomic or classifying value henceforth, and any other adjective will be used, when necessary, to give them a purely descriptive force.

Pathology.—For the methodical description of the lesions found in metritis, it is necessary to depart from the clinical arrangement and follow the

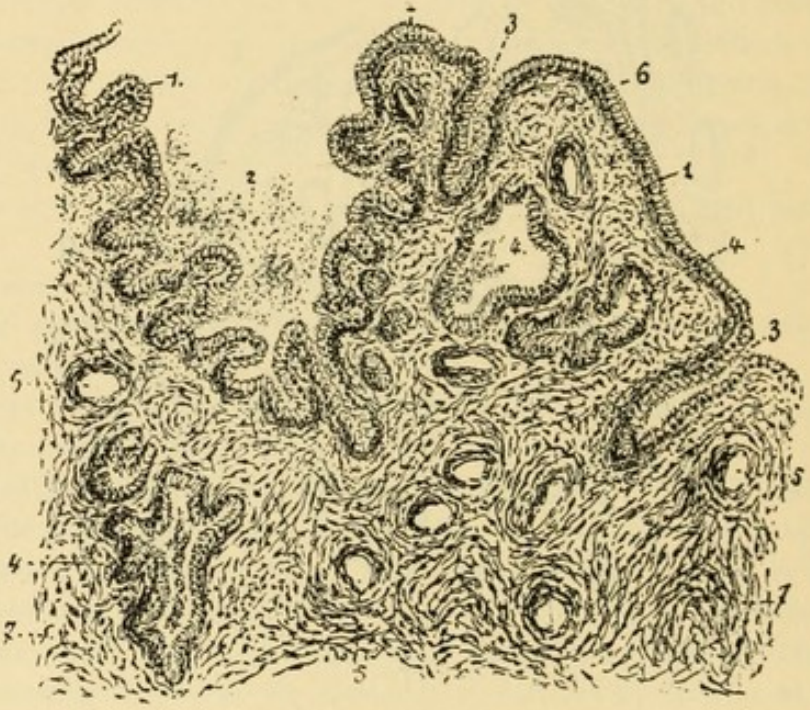


FIG. 94.—NORMAL MUCOUS MEMBRANE OF THE CERVIX. × 100 diameters.

The mucous membrane of the cervix is very firm and presents a number of branching folds (arbor vitæ). The interglandular tissue, which has in the body of the organ the nature of granulation tissue, is here of a connective-tissue type, the fusiform and stellate cells predominating. There is not the same clear limit between membrane and muscular coat; and one can follow the glands deeply inward among the connective-tissue bands which separate the muscular bundles. Consequently the mucous membrane in section has a partly reticulated, partly fasciculated appearance. The cervical membrane possesses, moreover, many vascular papillæ. Cylindrical ciliated epithelium invests the glands in the adult, and in the child extends to the external os. In the adult, especially after pregnancy, the flat vaginal epithelium rises higher and lies more or less within the cervix. Between the superficial cylindrical epithelium and the glands, cup-shaped and colloid cells are here and there present.

The vessels (Moericke) pass into the mucous membrane perpendicularly and have very thick walls, dividing progressively into a capillary plexus, which is less developed than in the body. Sometimes the capillaries lie very superficially under the epithelium, reuniting to form veins, which at once leave the mucous membrane. The glands and ovula Nabothi are surrounded by the vessels.

1, Layer of ciliated columnar epithelium; 2, mucus secreted upon the surface; 3, mouth of a gland; 4, glands slightly dilated; 5, vessels; 6, tissue forming papillary projections composed of small cells; 7, deeper tissue in denser bundles.

topographical order, first considering lesions of the body and then those of the cervix.

In most of the treatises on metritis the division is still maintained of acute and chronic parenchymatous, and internal (or mucous, *i.e.*, endometritis), and both the pathology and clinical study of the disease are arranged accordingly. I have said that I do not adopt this plan clinically, but yet I

take advantage of it for the study of the lesions. As de Sinéty so justly remarks: "How shall we imagine that the mucous membrane presents the lesions of an acute disease without participation of the tissues below? Or how shall we suppose that the glands are involved without observing at the same time that there is an alteration in their lymphatic sheaths which communicate freely with the lymph spaces of the parenchyma?"

I shall first describe the lesions of acute metritis throughout all the uterine tissues and then those of the chronic form.

Acute Metritis.—The descriptions which have been given of the parenchymatous lesions of acute metritis all suffer from one defect: non-puerperal

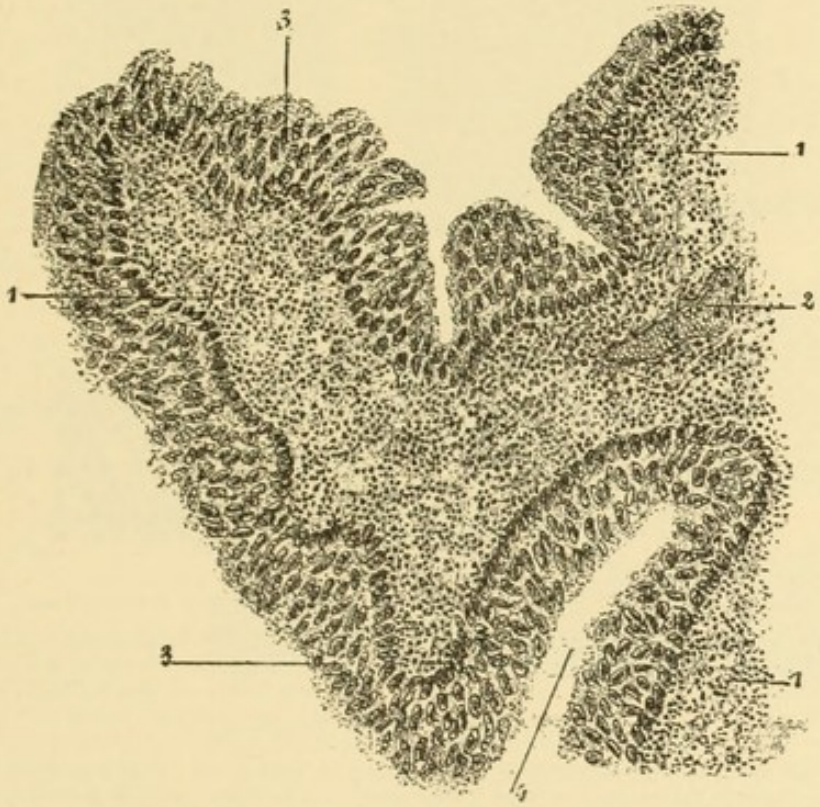


FIG. 95.—NORMAL MUCOUS MEMBRANE OF THE CERVIX. Portion of preceding figure × 300. 1, Very embryonal connective tissue, composed of round cells with large nuclei; 2, vessels (specimen injected); 3, ciliated epithelium of the surface; 4, glands cut transversely, showing lining of ciliated epithelium.

metritis is not fatal and does not justify hysterectomy, and hence descriptions of lesions of the uterine mucous membrane and parenchyma, based on the autopsy of women dying in the puerperal state, are not comparable to those which should be found in acute inflammation of the non-gravid uterus. We ought to free our minds of this ancient idea of Chomel's, who described all the accidents of septicæmia after parturition as puerperal metritis. When a woman succumbs to such accidents, there is certainly present a septic inflammation of the entire uterine tissue, but this is merely an additional circumstance which defines the general septic condition which proves fatal. The pathologist alone has the right to speak of a septic puerperal metritis,

marked in life by vague resemblance to acute metritis. This transposition of terms has been so often repeated since Aran that it has become trite.

These authors note the increase in volume, the softening of the tissue, the red color mottled with yellow, the vascular dilatation, and the shedding of the mucous membrane. Finally, to complete the cycle of acute inflammation with pus formation, most authors blindly repeat a number of ancient observations which are all exposed to hostile criticism. Their pretended

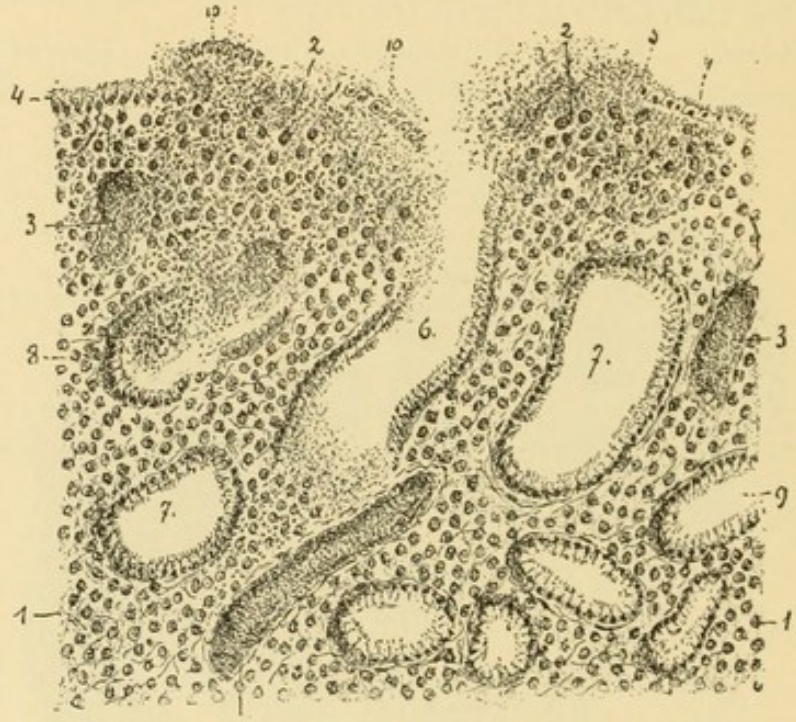


FIG. 96.—NORMAL MUCOUS MEMBRANE OF THE UTERUS DURING MENSTRUATION.

A preparation of the layer removed by curette during menstruation. The figure reproduces the upper third of the membrane. There are small extravasations here and there; in the deeper parts is almost normal interglandular tissue, the glands being somewhat more sinuous than usual. The blood-vessels are full; the upper layers are partly normal, partly infiltrated with blood cells; the epithelium, for the most part preserved, is here and there raised from its seat and covered with altered blood cells; hemorrhage into the glands in places; no appearance anywhere of the fatty degeneration described by certain authors (Williams, Kundrat, Engelmann). It is very likely that sometimes during menstruation part of the mucous membrane is destroyed (Leopold, Wyder), and that there is no such desquamation at other times (Moericke). This figure shows that the different changes may be simultaneous, and that there is great diversity in the process.

1, Normal uterine tissue formed of numerous rounded embryonal cells; 2, same, infiltrated with blood corpuscles to a considerable depth; 3, dilated vessels, full of blood; 4, intact uterine mucosa; 5, place where it has become detached; 6, longitudinal section of a gland; the epithelium near its mouth has disappeared; 7, dilated glands; 8, gland whose lining epithelium has become detached; 9, normal deep glands; 10, mucous membrane raised by infiltration of blood.

uterine abscesses are either collections of pus in the neighborhood, as in pyosalpinx, or suppuration in a degenerated myoma, neither of which bear any relation to metritis. Of the two cases reported by Schröder, one, post partum, seems to be a simple parametritis; the other, opened by the rectum after uterine sounding, was probably suppuration of the tubes. This latter explanation must be given also to the case of Hérvey de Chégoin, so often cited.

A. Martin has related a case which was suppuration of a myoma but

which exactly simulated uterine abscess. J. B. Kirkpatrick has lately published a case under the name of uterine abscess in which the cavity of Retzius was invaded and the pus appeared at the umbilicus—probably a parametritis.

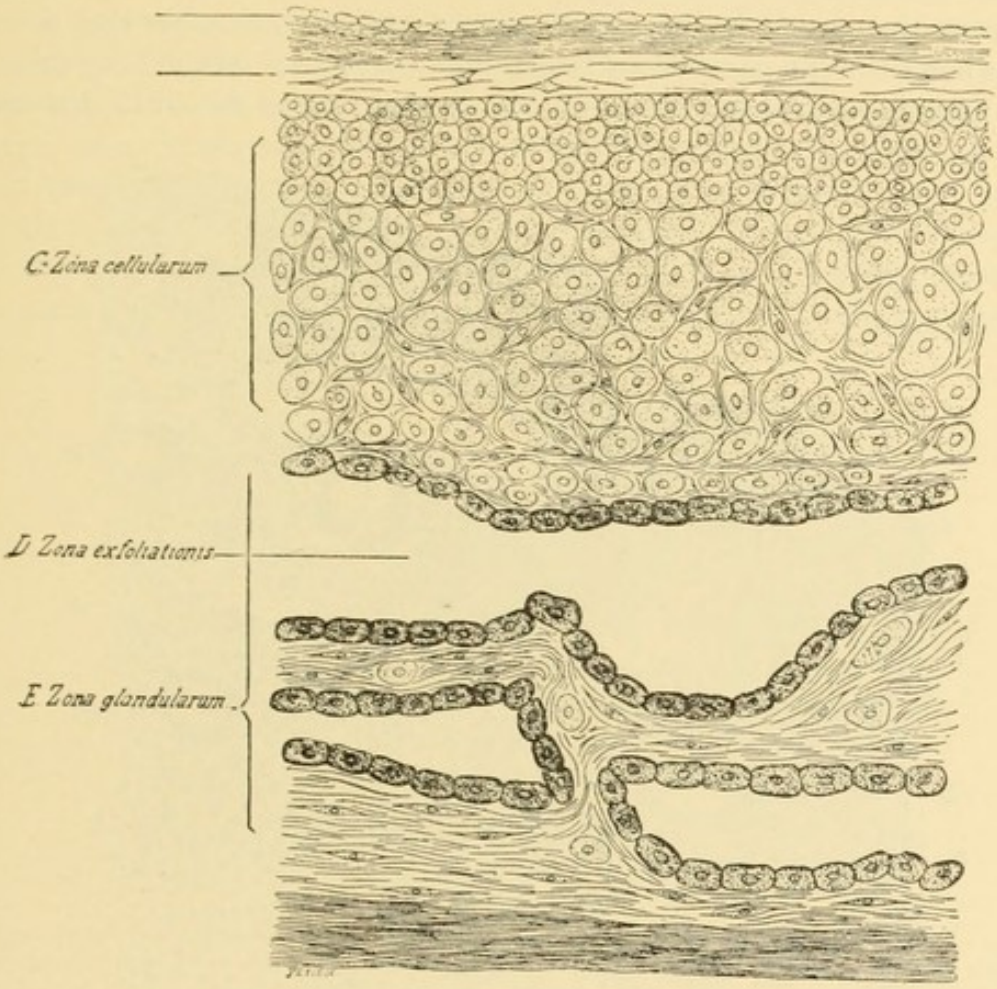


FIG. 97.—NORMAL PLACENTA (FRIEDLÄNDER, WYDER).

The figure is largely diagrammatic, for the sake of clearness. It represents the placenta at the end of pregnancy. This membrane is the product of two factors, viz., proliferation of the uterine mucous membrane in all its elements, and compression of this hypertrophied mass by the enlarging ovum. There are thus two layers, the cellular (zona cellularum) and the glandular (zona glandularum). The former lies close to the fœtal membranes (amnion and chorion), and is made up of cells which measure 2 μ to 61 μ in diameter; superiorly they are round, but below they become fusiform. Intercellular tissue is altogether lacking, or present as a trace merely. The glandular layer shows a plexus of flattened alveoli, not very long or wide, not communicating with each other freely, empty or filled with granular matter. The layers which separate these alveoli are formed of connective tissue, richly supplied with vessels and infiltrated with lymph cells. They are covered on the internal surface by epithelium; in places pavement, in others cylindrical.

The zona exfoliationis, or separating line between the two layers, is produced almost always in the cellular layer (Friedländer) and but seldom in the glandular; the opposite is the case according to Langhaus, Hüstner, and Leopold. The above figure, after Friedländer, is modified according to the views of his opponents, who seem to be correct. The glandular cavities thus opened by placental separation furnish the regenerated epithelium of gland and mucous membrane after parturition.

Surely, if one would assert that suppuration of the uterine wall is possible, we should agree with him; but that it occurs as part of the clinical picture we call metritis—that we deny.

Our most trustworthy source of information as to the acute lesions of

the mucous membrane is found in examination of the membrane of membranous dysmenorrhœa. The mucous membrane is abnormal both in softness and thickness; the microscope shows no change in the glands but a peculiar alteration in the interglandular tissue; the cells being far more numerous than usual and so tightly packed against each other that there is almost none of the homogeneous intercellular substance left. They preserve their normal volume, and differ in that respect, and in the small amount of

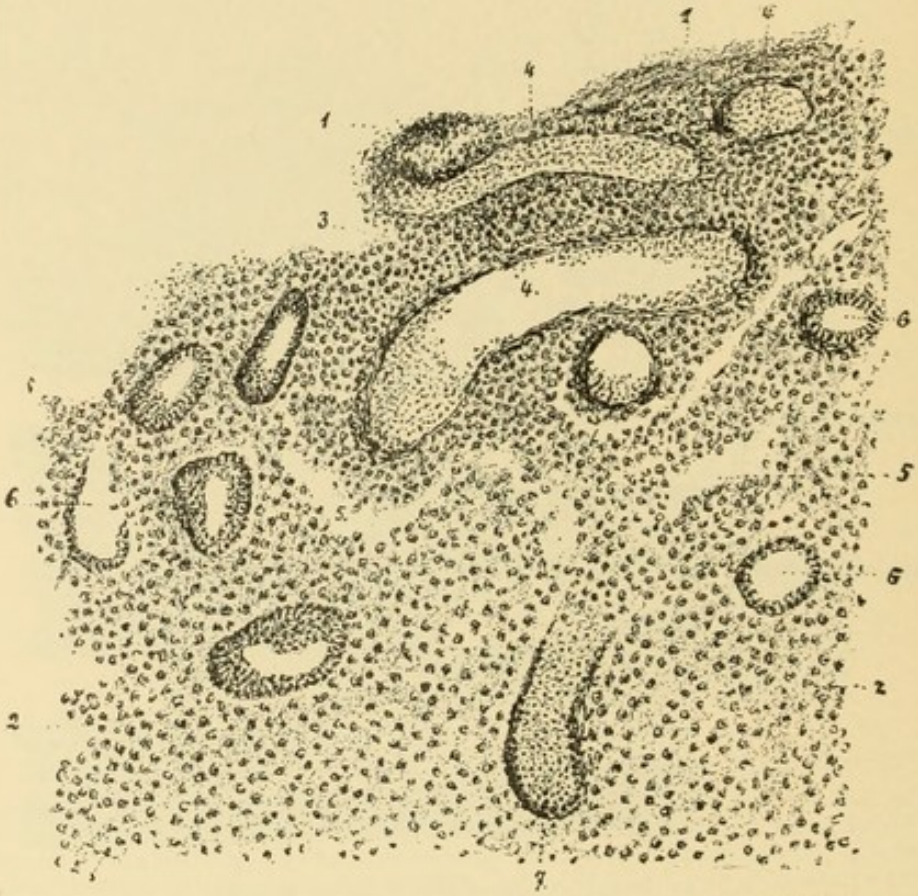


FIG. 98.—ACUTE ENDOMETRITIS. Slightly enlarged view of entire mucosa. 1, Superficial layer formed of more or less altered tissue, infiltrated with coagulated blood; 2, round-celled embryonal tissue; 3, zone in which these cells are especially numerous; 4, large dilated and varicose vessels gorged with blood; 5, lymph spaces; 6, transverse sections of glands; 7, glandular cul-de-sac.

their protoplasm, from the cells of the placenta. In other words, we have to do (Fig. 99) with an acute interstitial inflammation.

Massin has examined the uterine mucosa of women who have died of acute infectious diseases (typhoid fever, recurrent typhus, pneumonia, dysentery). The lesions which he found were those of a parenchymatous and interstitial inflammation of the mucous membrane and of an interstitial inflammation of the muscular layer. The glands showed a cloudy swelling, granular disintegration and desquamation of the epithelium, and the presence of blood corpuscles within their cavities. The interglandular tissue was infiltrated with small round cells, the vessels gorged with blood; here and there were seen hemorrhagic foci of varying size.

Chronic Metritis.—The parenchymatous lesions of chronic metritis are particularly characterized by a hypertrophy of the connective tissue, causing a general enlargement of the organ, which, however, does not exceed the size of a fist. This increase in volume may be absent altogether, and then we have a decrease in the size of the organ. Theoretically there are two stages, according to Scanzoni: the one of infiltration and the other of induration. The first of these corresponds to an active or passive congestion of the uterus, where the vessels are so dilated that the wall of the organ has an almost areolar aspect. There are great numbers of embryonal nuclei throughout the thickness of the tissue. The predominating change is hypertrophy of the connective tissue, but authors are not agreed as to the participation of the muscular tissue in this hypertrophy. Finn, of St. Petersburg, admits the



FIG. 99.—ACUTE ENDOMETRITIS; MEMBRANOUS DYSMENORRHŒA. Highly magnified. Fragment of membrane corresponding to surface of mucosa. 1, Cylindrical epithelium which has become slightly vesicular and has lost its ciliæ; 2, point showing change and proliferation of epithelial cells; 3, tissue of mucosa infiltrated with many rounded embryonal elements in process of multiplication; 4, diffuse hemorrhagic foci.

hypertrophy but denies the importance of the fatty degeneration described by others. De Sinéty has discovered in one case a considerable dilatation of the normal lymph spaces, and hyperplasia of the perivascular connective tissue which diminishes the calibre of the vessels and gives rise to a special form of sclerosis. The muscular tissue does not seem to be involved.

When the uterine parenchyma has thus been the seat of profound and lasting inflammatory processes, it is unusual not to have with it evidences of perimetritis, adhesions in Douglas' pouch with displacement of the organ, and traces of salpingitis and inflammation about the tubes and ovaries. The uterine mucous membrane is always involved to a greater or less extent.

In many cases of endometritis of the uterus and the cervix, independent of parturition or occurring in aged women who have had children long before, Cornil has found hypertrophy of the uterine wall due entirely to a new formation of adult connective tissue between the muscular trabeculæ. To the

naked eye the muscular tissue is then of a pale red color, presenting a series of opaque lines which are thickened and sclerotic arterioles in a state of atheromatous degeneration. Under the microscope this thickening of the vessel wall is found to be considerable, the elastic elements are increased and present also numerous cells in fatty degeneration. The connective-tissue sclerosis corresponds to that of the arterial and venous coats, and is not so much a cicatricial contraction of the connective tissue as a permanent

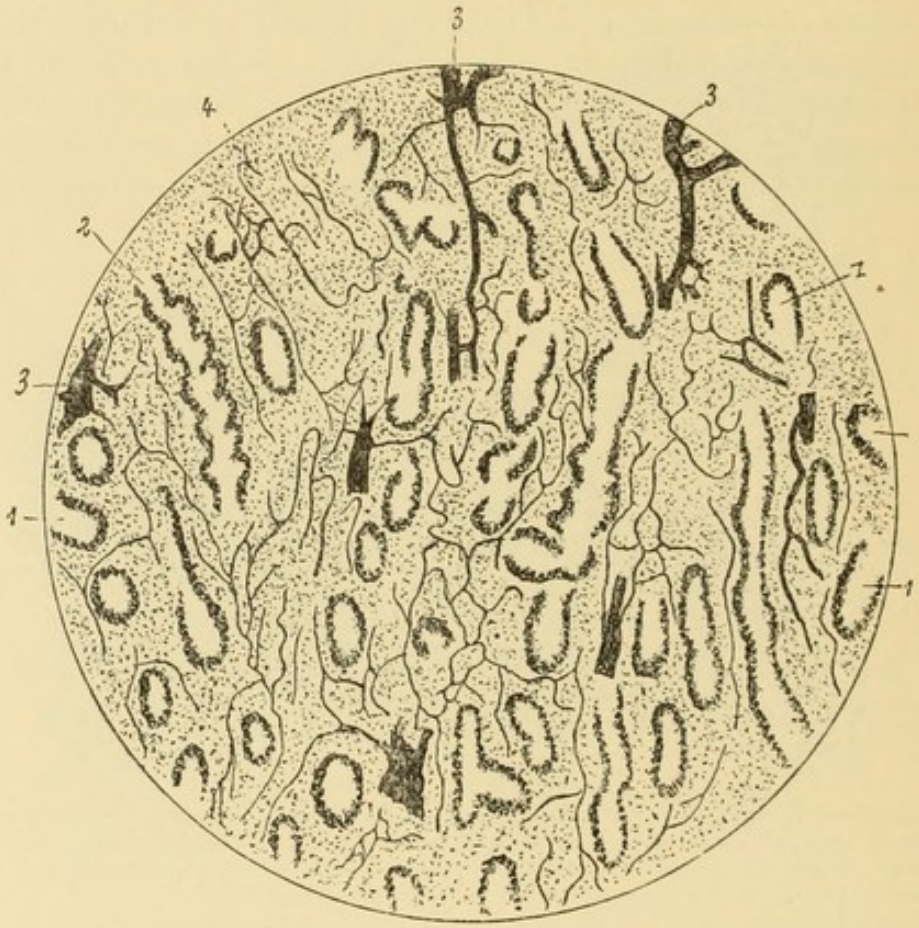


FIG. 100.—SLIGHT CHRONIC ENDOMETRITIS. The interglandular vessels are dilated and appear varicose. Photograph of a section injected with gelatin and stained with soluble Prussian blue. 1, Nearly normal glands; 2, same deformed, and of corkscrew shape; 3, dilated and varicose vessels; 4, fine capillary network.

augmentation of its volume. The microscopic and histological lesions of the mucous membrane under chronic inflammation are to-day perfectly understood, thanks to the operations which permit the study of so many fresh specimens of this disorder.

I cannot better describe the usual appearance of a uterine mucous membrane thus altered than by reproducing the words of Cornil in his recently published "Leçons"; his description applies especially to chronic glandular endometritis, the more common form:

"The mucous membrane does not present its normal whitish color, smooth surface, and peculiar rigidity; it is bloated, pulpy, soft, and both in aspect and consistence resembles currant jelly; the discoloration is in places very

marked and may have the appearance of a layer of blood interspersed with dark clots. This softened layer, formed by the inflamed mucous membrane, is easily displaced by the scalpel, readily elevated or torn by gentle traction. There is present an intense congestion throughout the organ, between the muscular fibres, but this is most pronounced on the deep surface of the mucous membrane. On a section of the organ, if made with a very sharp knife, it is difficult to distinguish muscle from mucous membrane, the two having a similar appearance. However, the mucous membrane is easily

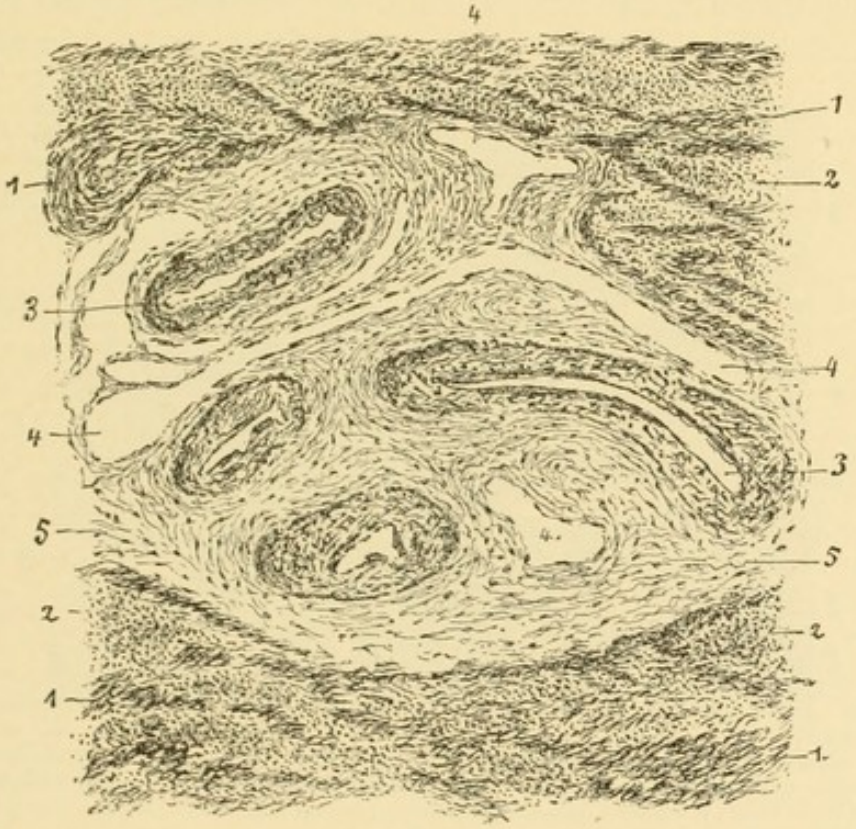


FIG. 101.—CHRONIC INTERSTITIAL ENDOMETRITIS. Hypertrophy and sclerosis of the perivascular connective tissue. 1, Smooth muscle fibres in longitudinal bundles; 2, same in transverse section; 3, vessels diminished in calibre and with thick walls; 4, dilated lymphatics; 5, hypertrophied connective tissue around blood-vessels.

scraped off with the curette, which cannot penetrate the muscular layer unless it is much softened by inflammation, which is very unusual.

"Hardened in alcohol, to fix the different elements, and cut in microscopic section, it is easily seen that the mucous layer is abnormally thick. When stained by picrocarmine this thickening is very plain to the naked eye. The mucous membrane then has a slightly yellow tinge, which distinguishes it from the redder muscular tissue. It is, moreover, more transparent, especially in its deeper portions, where the microscope reveals the presence of glands. To appreciate these details by the naked eye it is enough to examine a section stained by picrocarmine, holding it against the light; the mucous membrane is seen to be 2 to 5 mm., even 1 cm. thick at times, whereas its usual thickness is but 1 mm. Its surface, instead of being

smooth, is fungous, presenting alternate projections and depressions of a flabby appearance. These fungosities have received the name of villi, vegetations, etc., and the disease has been therefore termed villous, fungous, granulating, or vegetating metritis. These vegetations are at times very large, of a round and elongated form, and may become veritable polypi, sessile or pedicled. In other cases there are small cysts, of the size of a pin's head, resembling the ovules of Naboth, so common in the cervix and about the os externum, and having the same glandular origin; but they differ from these in the quality of the fluid contained. It is more thin and serous, less

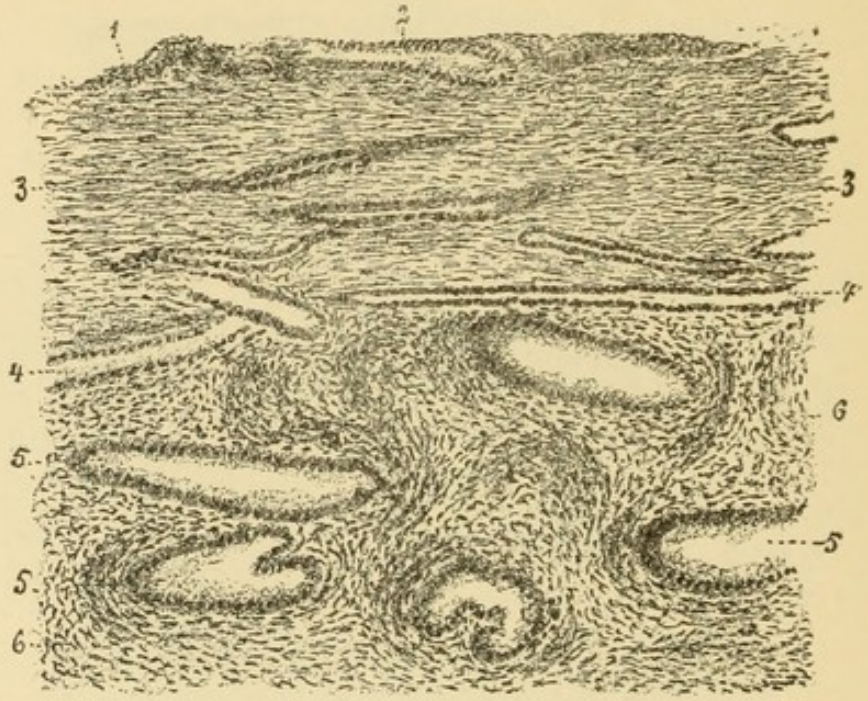


FIG. 102.—CHRONIC INTERSTITIAL ENDEMETRITIS; PARTIAL ATROPHY OF GLANDS. Section perpendicular to surface of mucous membrane of body of uterus. 1, Surface of mucous membrane denuded of epithelium and covered with a layer of coagulated blood; 2, atrophied gland which almost projects; 3, fibrous tissue with long parallel nuclei; 4, glands undergoing atrophy, very long and contracted; 5, glands of normal size, more deeply situated; 6, tissue consisting of rounded and ovoid cellular elements embedded in a homogeneous substance.

consistent and colloid, than the contents of the Nabothian ovules of the cervix. These small cysts of the body of the uterus are seen more often in aged patients than in the young.

"Such is the macroscopic appearance of the uterine mucous membrane after chronic inflammation."

In the histology of the subject there are three distinct types, often clearly presented in different subjects or at times combined in one. In this description I follow Wyder's recent work.

Chronic Interstitial Metritis.—The interglandular tissue which we have seen gorged with cells in the acute form so that it resembles granulation tissue, is transformed into true cicatricial tissue in which the number of cellular elements steadily increases. The glands undergo the opposite alteration, being strangled in places and transformed into cysts, or so compressed

in their whole extent that they atrophy, and thus we may have a few glands scattered through the connective tissue (Fig. 101), altered into cysts in places (Fig. 104, *A*) or totally destroyed (Fig. 104, *B*).

In cases in which the atrophy is very marked the muscular layer is covered by only a very thin layer of sclerosed connective tissue and this in turn by epithelium. Under the surface still covered by pavement epithelium one sees the mucous membrane traversed by these fibrous layers, which frequently interlace to form a meshwork, generally filled with a homogeneous substance, though the deeper portion of the tissue may be full of round cells packed close together. Nearer the surface the interglandular tissue has a more

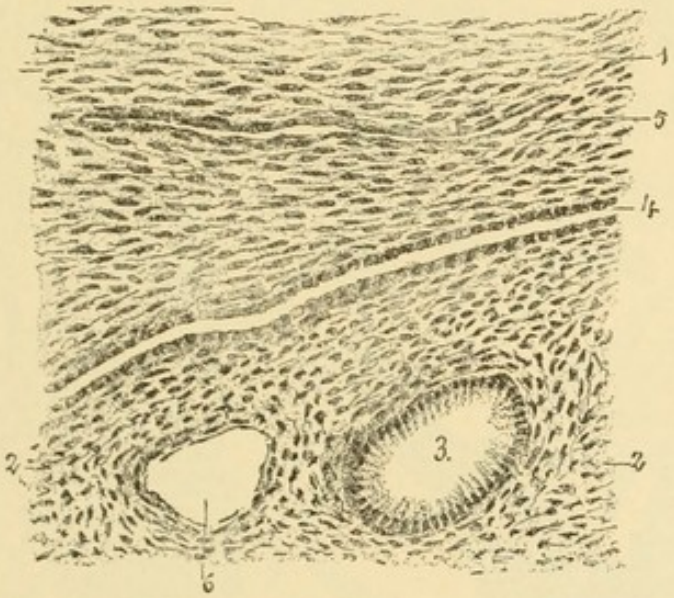


FIG. 103.—CHRONIC INTERSTITIAL ENDOMETRITIS. Varying degrees of atrophy of glands (× 500). 1, Tissue composed of fusiform cells, corresponding to the surface of the uterine mucous membrane; 2, tissue composed of smaller ovoid cells; 3, very long gland undergoing atrophy—the epithelium has become cuboidal; 5, slit near surface, the site of a gland which has disappeared; 6, large lymphatic cavity.

regular arrangement, being composed of a series of layers of cells and their parallel prolongations. The section may contain only very few glands.

At many points (Fig. 104) there are cystic cavities, lined with cuboidal epithelium and surrounded by bands of connective tissue with fusiform cells. At places there are evidently no glands present, and the mucous membrane is represented by a homogeneous connective tissue which possesses no cells and is arranged in many bundles, the whole being clearly marked off by a sharp line from the muscular tissue. Near the surface this formation is smooth in places and at others arranged in large flat villous projections. There are present, therefore, all the signs of advanced connective-tissue sclerosis.

Chronic Glandular Metritis.—Ruge, and after him Wyder, recognized two forms of glandular endometritis, the hypertrophic and the hyperplastic. In the first, the epithelial proliferation takes place without multiplication of the glands themselves. Instead of being a series of straight tubes, the

glands are then of irregular form, frequently twisted and arranged spirally. In the hyperplastic form there is an increase in the number of the glands. Cornil has discovered karyokinetic figures in the epithelium lining the glands (Fig. 107) in such cases. He is of opinion that this may be normally present after menstruation, as it is a feature of physiological repair in gland cells.

Fig. 109 presents a form of combined hypertrophy and hyperplasia which is more common than is usually supposed. The glandular tissue is abso-

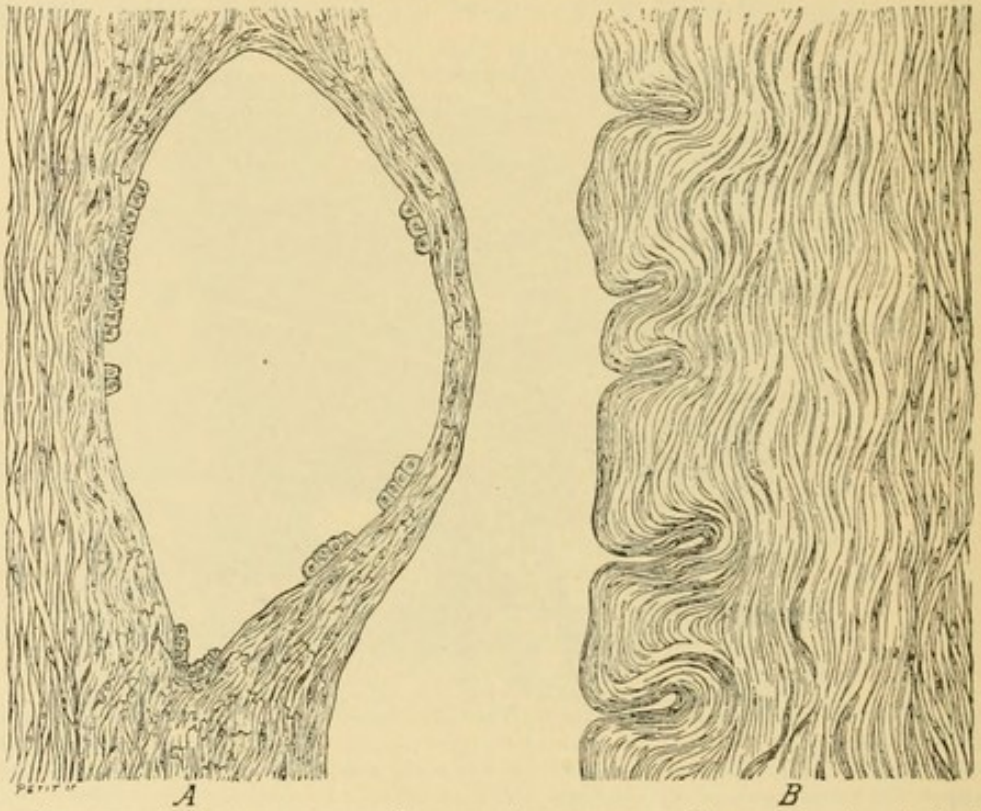


FIG. 104.—INTERSTITIAL ENDOMETRITIS WITH COMPLETE ATROPHY OF THE GLANDS (WYDER). *A*, Cystic formation, last trace of glands. *B*, All vestige of gland tissue disappeared.

lutely normal in structure, but the glands themselves are much distorted and have lateral prolongations.

Chronic Polypoid Endometritis.—This form is marked by an enormous development of the mucous membrane, which has a fungous appearance and may be bristling with small and soft polypi. Récamier was the first to give a good description of the macroscopic appearance in this form, and Olshausen has lately studied the subject anew. It is a mixture, histologically, of interstitial and glandular changes with marked cystic degeneration. On the surface the naked eye discovers small vesicles of 1 mm. diameter, transparent and a little elevated; and these under the microscope (Fig. 114) are plainly degenerated glands lined with cuboidal epithelium. They are separated by bands of connective tissue; in the superficial layers the glands are widely dilated, and more deeply they appear normal but are bent aside, parallel or oblique to the muscular fibres.

The glandular culs-de-sac pass beyond their usual limit in the depth of the mucous membrane and sink in between the subjacent muscular fibres according to Cornil. This is a remarkable instance of what the older anatomists called "glandular heterotopy" occurring with a simple inflammation having no tendency to become malignant. In this invasion of the muscular tissue a certain amount of their investing connective tissue accompanies the glands. The interglandular structure is very rich in vessels.

At the points which correspond to glandular dilatations there are enclosed numbers of spindle-shaped cells, whose prolongations give the part a

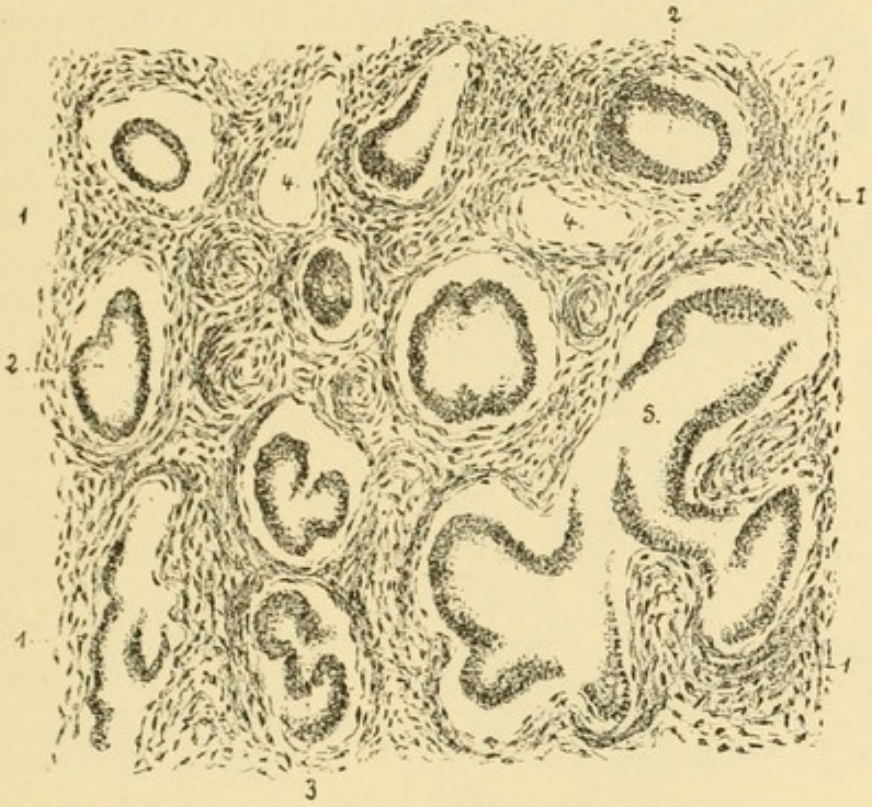


FIG. 105.—INTERSTITIAL ENDOMETRITIS. Detachment of the epithelial lining in rings. × 100. 1, Periglandular tissue of small elongated fusiform cells; 2, contracted glandular cavity; 3, shred of epithe' um bent upon itself; 4, glandular cavity whose epithelium has disappeared, lined by small, flat cells; 5, large dilated and winding glandular cavity containing fragments of detached epithelium.

striated appearance, or, at other times, the tissue has very few cellular elements; this latter arrangement is especially noticed about the blood-vessels. Lying deeply about the intact glands among the cysts there is found a homogeneous substance, replacing the proper interglandular tissue, which is full of round cells pressed closely together (Fig. 114). De Sinéty has given an excellent description of the lesions of endometritis, although a post-mortem examination was made on but one case. He specially studied the vegetations and excrescences which are to be observed upon the mucous membrane, and which he removed for the purpose by a Récamier's curette; but he laid less emphasis upon alterations in the membrane itself. He describes three kinds of vegetation: the glandular, formed by enlarged and distorted glands,

with thickening of the connective tissue; the embryonal, formed of embryonic tissue and a few dilated vessels; and the vascular, composed of vessels often widely dilated.

Certain authors discuss a diphtheritic metritis, which it were better to call gangrenous, since the false membrane is merely the product of a partial mortification. This is a simple nosological error which has crept into the group, so well-defined clinically, of inflammations of the uterus; whereas it is but a simple accident which may happen in the uterus or elsewhere, in certain peculiar conditions either general or local. Thus diphtheritic metritis has been seen to follow tamponade with perchloride of iron, and to occur after enucleation of a fibroma, or in the course of a septicæmia in an old woman who had a phlegmon upon the lower extremity. Cornil has also

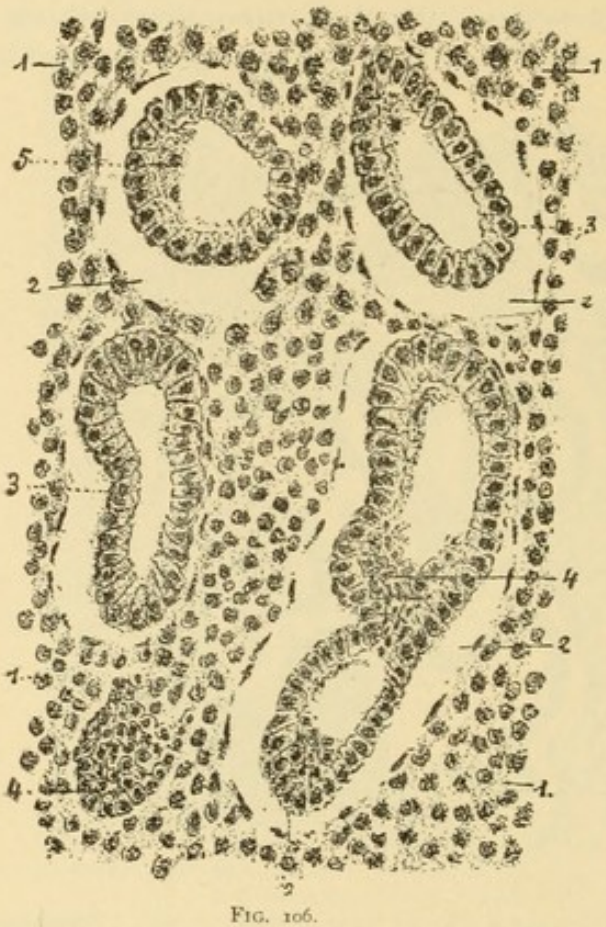


Fig. 106.

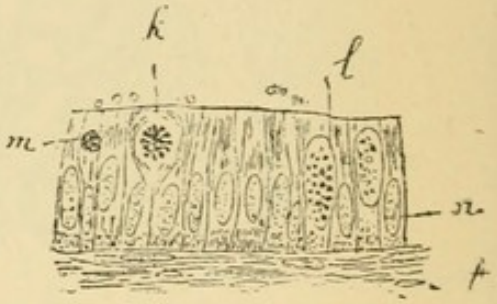


Fig. 107.

Fig. 106.—Interstitial Endometritis; Detachment of the Epithelial Linings. (Part of Fig. 116 × 500.) 1, Periglandular tissue containing a large number of rounded embryonal cells; 2, cavities produced by the contraction of the epithelial rings and lined by flat cells; 3, epithelial layer separated from the wall and formed of cylindrical cells; 4, glandular wall cut obliquely; 5, white corpuscles which have passed by diapedesis into the cavity of the gland.

Fig. 107.—Epithelial Investment of a Gland from the Body of the Uterus (Cornil). × 350. Reichert's apochromat. with 00.4. *l*, Nucleus with enlarging granules and filaments of nuclein; *k*, nucleus showing the beginning karyokinesis, with "star" arrangement of nuclein; *m*, small, round wandering cell between the cylindrical cells.

observed certain details of high interest in which the only change visible is extreme enlargement, and the glands in longitudinal or cross section present a single flat layer of cylindrical cells, usually on their internal aspect. Where there are many layers superimposed the details are difficult to grasp, but sections sufficiently thin, if well examined, disclose only a single series of cells. The vibratile cilia which are found upon normal glandular epithelium are in great part preserved, and this retention of cilia in a gland so modified by chronic inflammation is a remarkable fact. At the same time,

it is not always easy to find these cilia; it is necessary to use for that purpose excellent objectives and tissue absolutely fresh. To demonstrate them the material must be taken as it comes from the surgeon's hands at the ope-

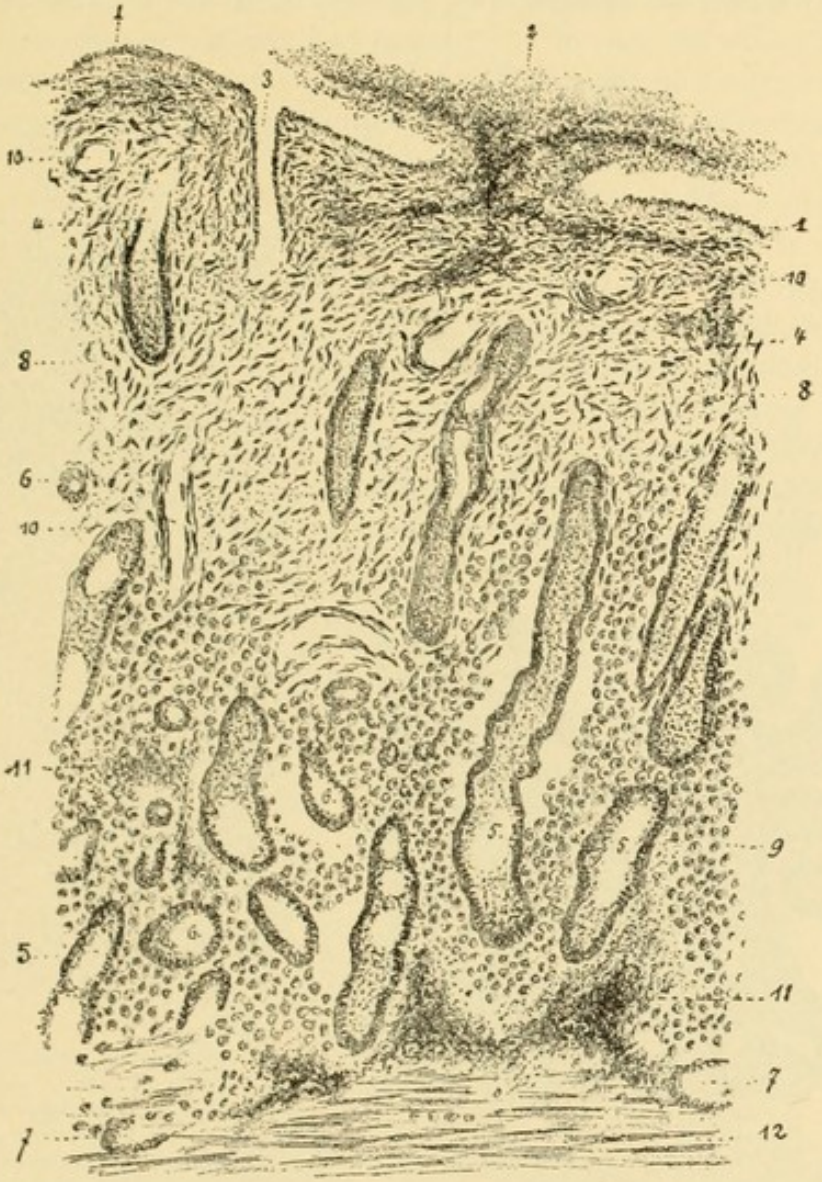


FIG. 108.—GLANDULAR ENDOMETRITIS. (Section perpendicular to the surface of the mucous membrane. × 60.) 1, Free surface of the mucosa still covered by its epithelium; 2, blood clot projecting from the surface at a point where the epithelium has disappeared; 3, mouth of gland; 4, surface glands slightly enlarged; 5, longitudinal sections of deeper glands, tortuous and dilated; 6, transverse sections of glands; 7, glands projecting into the muscular layer; 8, tissue of the superficial layer of the mucous membrane, formed of small elongated cells; 9, deeper tissue, formed of rounded embryonal cells; 10, vessels cut longitudinally and transversely; 11, blood extravasated into the deep tissue and around the glandular cul-de-sacs; 12, smooth uterine muscle fibres.

ration and placed directly in some hardening fluid, preferably ninety per cent alcohol. In preparations even of irreproachable freshness the cilia may seem to have disappeared; then there is seen upon the surface of the cell a delicate layer of mucus, sometimes clear and homogeneous, at others as if formed of little spheroid bodies, or somewhat striated, composed of an ag-

glomeration of the cilia. The cells which fill the alveoli, often completely, are identical with those found normally in the uterine glands, cylindrical or modified, ovoid or even mucous.

The only difference presented by portions of tissue scraped off with the curette and entire sections of the uterus, is found in the difficulty of recognizing the relations of the first; and therefore it is better to study sections made perpendicularly to the surface in material provided by hysterectomy.

Finally, there is a histological variety of endometritis which does not deserve the dignity of being placed in a separate class, and yet should be mentioned, and that is post-abortum endometritis. According to Schröder it is almost always an interstitial form of metritis which occurs after abortion, the glands taking part only very late in the disease. But the feature which distinguishes such metritis anatomically is the persistence of the decidua (vera or serotina) which undergoes a partial retrograde metamorphosis; if this persistence is partial, we find little islands of decidua, more or less prominent, about which there is a very active proliferation of small cells (Fig. 115). This inflammatory modification of the mucous membrane, adds Schröder, differs essentially from retention of the placenta, which is often described under the inappropriate name of endometritis post abortum, and which is only a hemorrhage post abortum due to incomplete contraction of the uterus and its vessels.

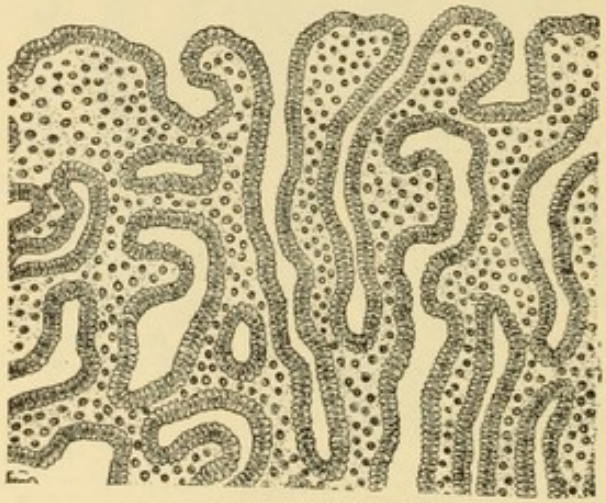


FIG. 109.—GLANDULAR ENDOMETRITIS OF THE UTERINE BODY (WYDER). Slightly enlarged.

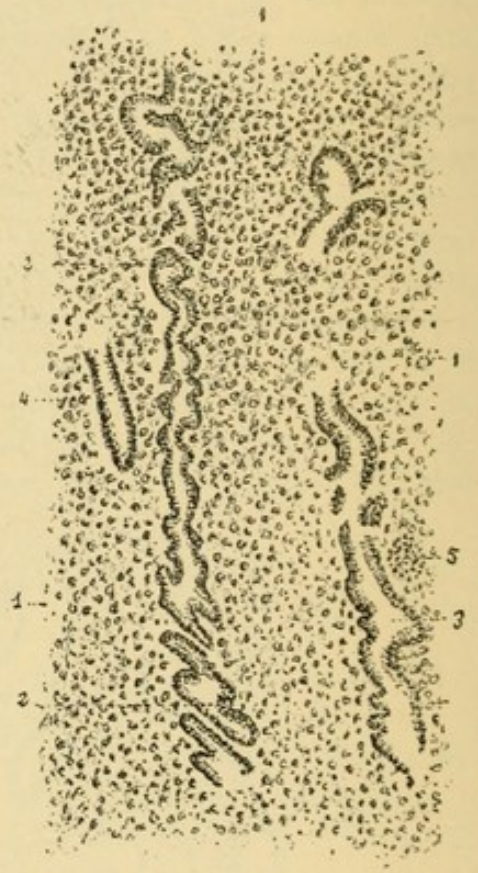


FIG. 110.—GLANDULAR ENDOMETRITIS. Corkscrew deformity of glands. 1, Embryonal periglandular tissue; 2, gland which is very long and which has become tortuous throughout its entire length; 3, dilatation of certain glands; 4, gland which has preserved its normal calibre.

Lesions of the Cervix.—Anatomically it is incorrect to speak of metritis of the body as distinct from metritis of the cervix, for these two portions of

the uterus are never completely independent; most frequently the lesions are synchronous and undergo a parallel evolution. However, there is often a more decided localization of the disease in one or the other of these different parts; and as the cervix is the more exposed to traumatism, cervical

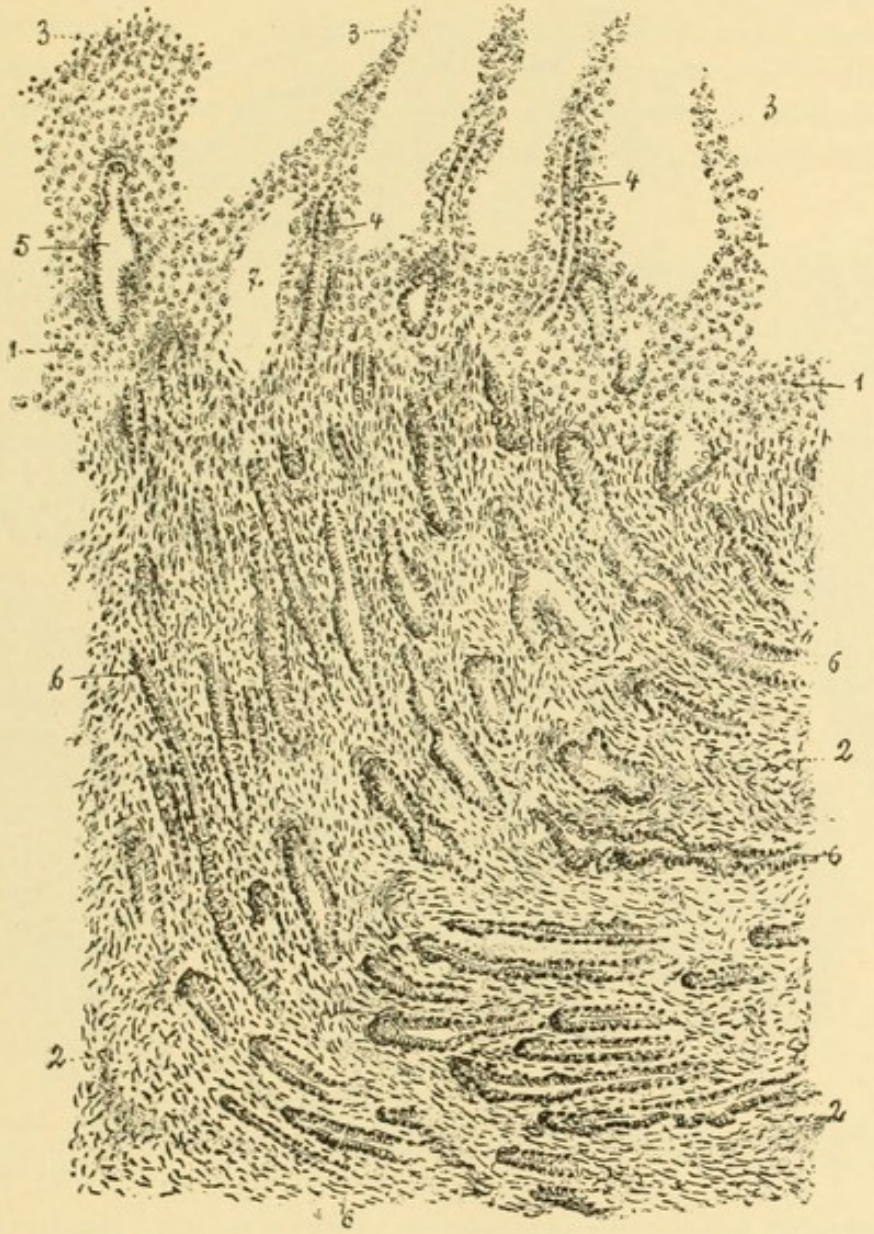


FIG. 111.—POLYPOID ENDOMETRITIS. Section of fungosities of surface of mucosa. 1, Tissue of small, rounded granular cells; 2, deeper tissue of cells which are usually elongated; 3, surface villosities hanging loosely in the uterine cavity and denuded of epithelium; 4, atrophied glands; 5, gland maintaining its normal dimensions; 6, glands which are lengthened and with hardly visible lumen.

metritis predominates. If the mucous membrane of the cervix is thoroughly diseased, the process is carried step by step into the fibrous and muscular portions, and thus a veritable parenchymatous metritis occurs with every inflammation of the cervix if of long duration. Cornil expressly describes a parenchymatous metritis which may be partial. For example, the lesions

are at times restricted to the cervix in the ectropion of the part caused both by thickening of the mucous membrane, turned outward into the vagina, and by thickening of the connective tissue beneath the mucous membrane and between the muscular fibres. In this connective tissue lesions of recent in-

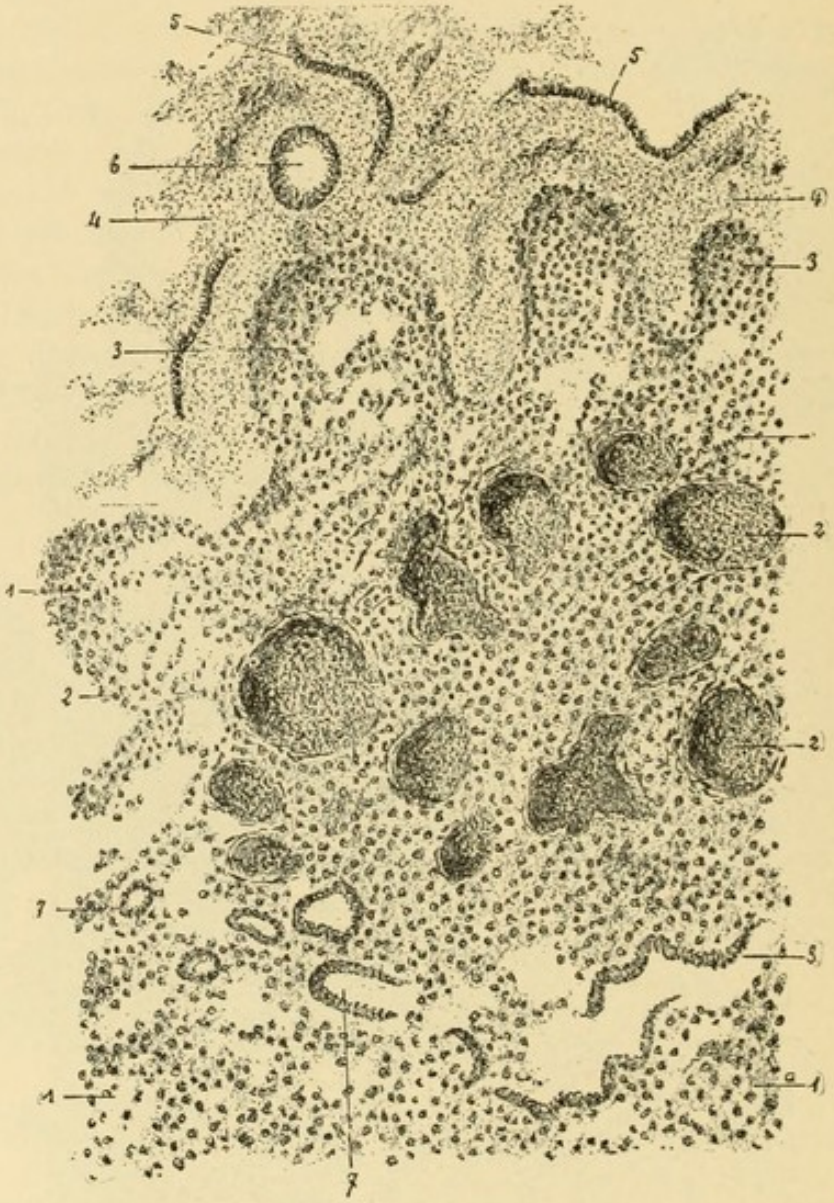


FIG. 112.—POLYPOID ENDOMETRITIS WITH HEMORRHAGES. Transverse section of a fragment of mucous membrane. 1, Tissue infiltrated with embryonal cells and extravasated blood corpuscles; 2, large dilated capillaries filled with blood; 3, embryonal papillæ corresponding to the surface of the mucosa and denuded of their epithelial layer; 4, layer of coagulated blood upon the surface; 5, fragments of detached epithelium surrounded by the blood clot; 6, complete ring of epithelium; 7, remains of glands; 8, fragments of epithelium surrounded by embryonal cells.

flammation can often be demonstrated, by thickness of the trabeculæ and of the interposed flat cells.

The neck of the uterus may present special and very diverse lesions in metritis; there may be lacerations, ectropion, hypertrophy, congestion, varix, granulations, folliculitis, erosions, ulcerations, cysts, and ovules of Naboth,

etc., etc. When this part of the uterus is accessible to the view, the macroscopic description should enter into the clinical demonstration; but it is necessary also to make the exact nature of the disease clear by the resources of histology.

Ovules of Naboth, Granulations, Folliculitis.—The Nabothian glands, so called, are small cysts; granulations and folliculitis are small ulcerations (I will explain the value of the word farther on), scattered over the surface of the uterine neck. The one or the other of these resemble an eruption, and authors have been led to identify them with those of the external integu-



FIG. 113.—POLYPOID ENDOMETRITIS. × 500. 1, Connective tissue rich in elongated or rounded cellular elements; 2, hypertrophied glandular cavities lined with cylindrical epithelium; 3, point at which this epithelium has proliferated, 4, lining with oval nuclei; 5, cuboid cells with large rounded nuclei.

ment, erythema, eczema, herpes, acne, pemphigus, etc., but the parallel is purely arbitrary, built upon theoretical views and lacking all serious foundation.

Erosions, Ulcerations.—The cervix may present, near the external os, a red and rough aspect without protuberances or depressions; this is erosion, properly so termed. It may be observed in acute vaginitis with abundant secretion, or after contact with a foreign body (pessaries); under the microscope it is seen that there is a simple substitution of flat normal vaginal epithelium for the proper cylindrical. Fischel has shown that there is often,

in the infant at birth, a pseudo-erosion of the external os, the epithelium being then cylindrical over a certain zone externally. Later on this epithe-

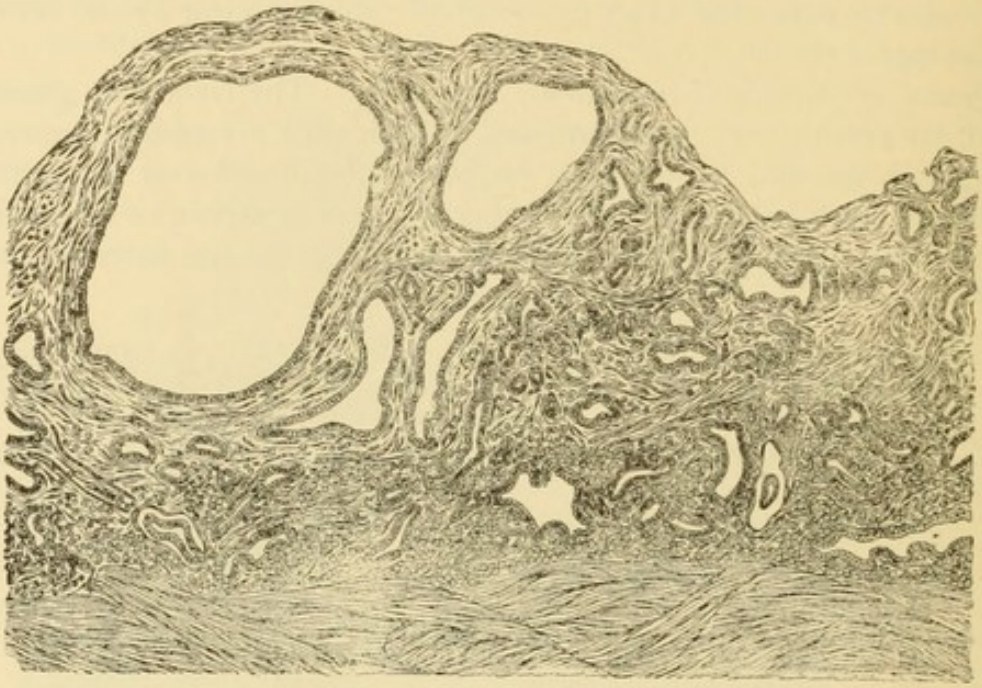


Fig. 114.—Polypoid Endometritis (Wyder).

lium is invested by stratified pavement cells; but when these desquamate, the original appearance is restored. Should there thus be a congenital predisposition to erosions it would be a curious fact. The observations of Klotz seem to favor this view. According to him there are patients who

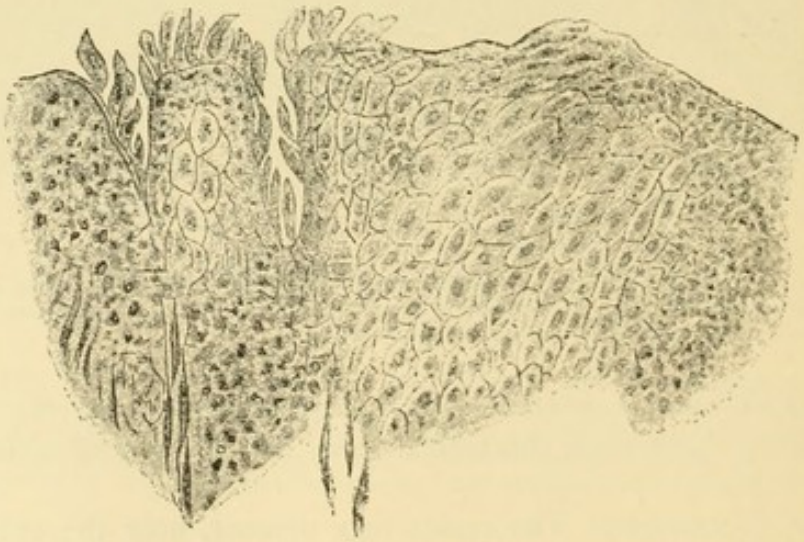


Fig. 115.—Endometritis Post Abortum, showing Islands of Decidua about which is an Active Proliferation of Cells.

suffer from erosion or ulceration under the influence of the lightest inflammation, while others, though there be a severe cervical catarrh, never present such changes.

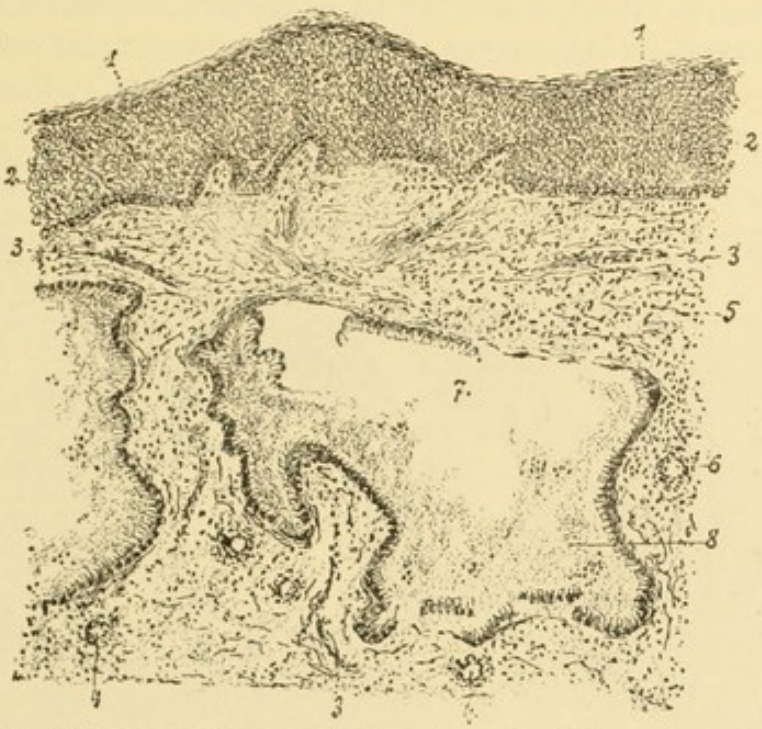


FIG. 116.—OVULES OF NABOTH. Section perpendicular to the surface of the cervix near the outer border. 1, Layer of stratified squamous epithelium; 2, mucous membrane; 3, vessels cut longitudinally; 4, vessels cut transversely; 5, connective tissue with numerous cellular elements; 6, small centre of accumulation of embryonal cells around a blood-vessel; 7, interior of a cyst (ovule of Naboth) formed from a dilated gland whose lining epithelium is partially detached; 8, colloid material poured out into its interior and containing masses of white corpuscles and of epithelial cells.

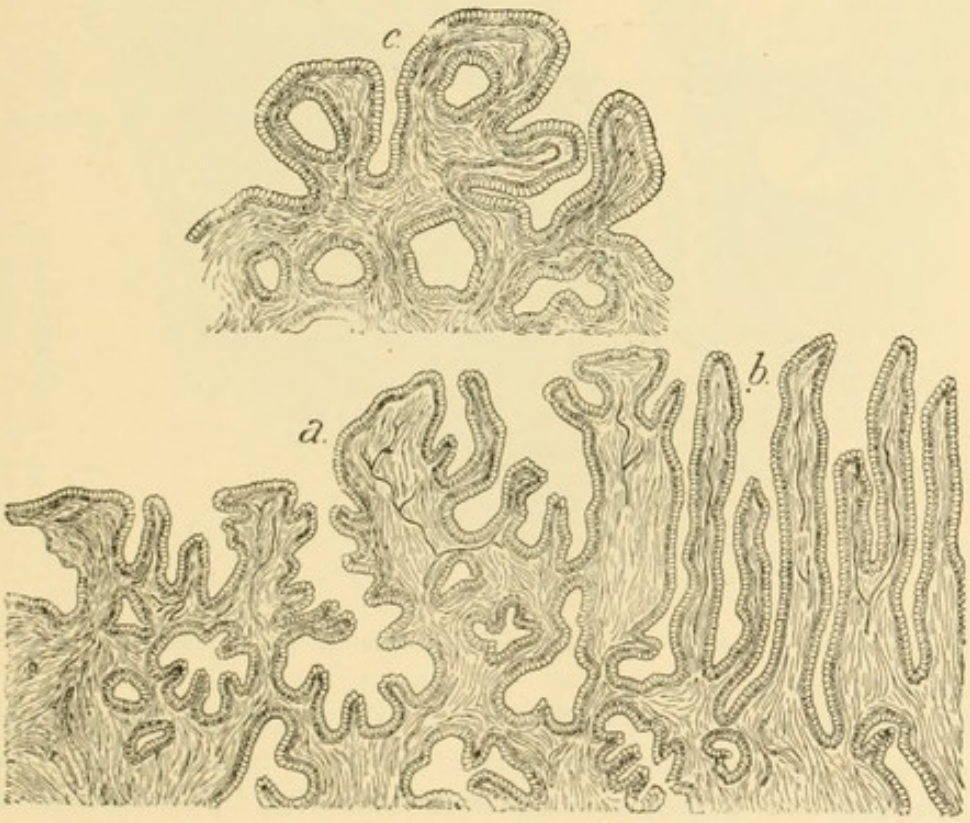


FIG. 117.—*a*, *b*, Simple papillary erosion; *c*, follicular. Slightly enlarged.

This author, moreover, insists on the anatomical differences of the individual as regards the adult and the virginal conditions of the cervix and the line of demarcation between the two kinds of epithelium. It would seem,

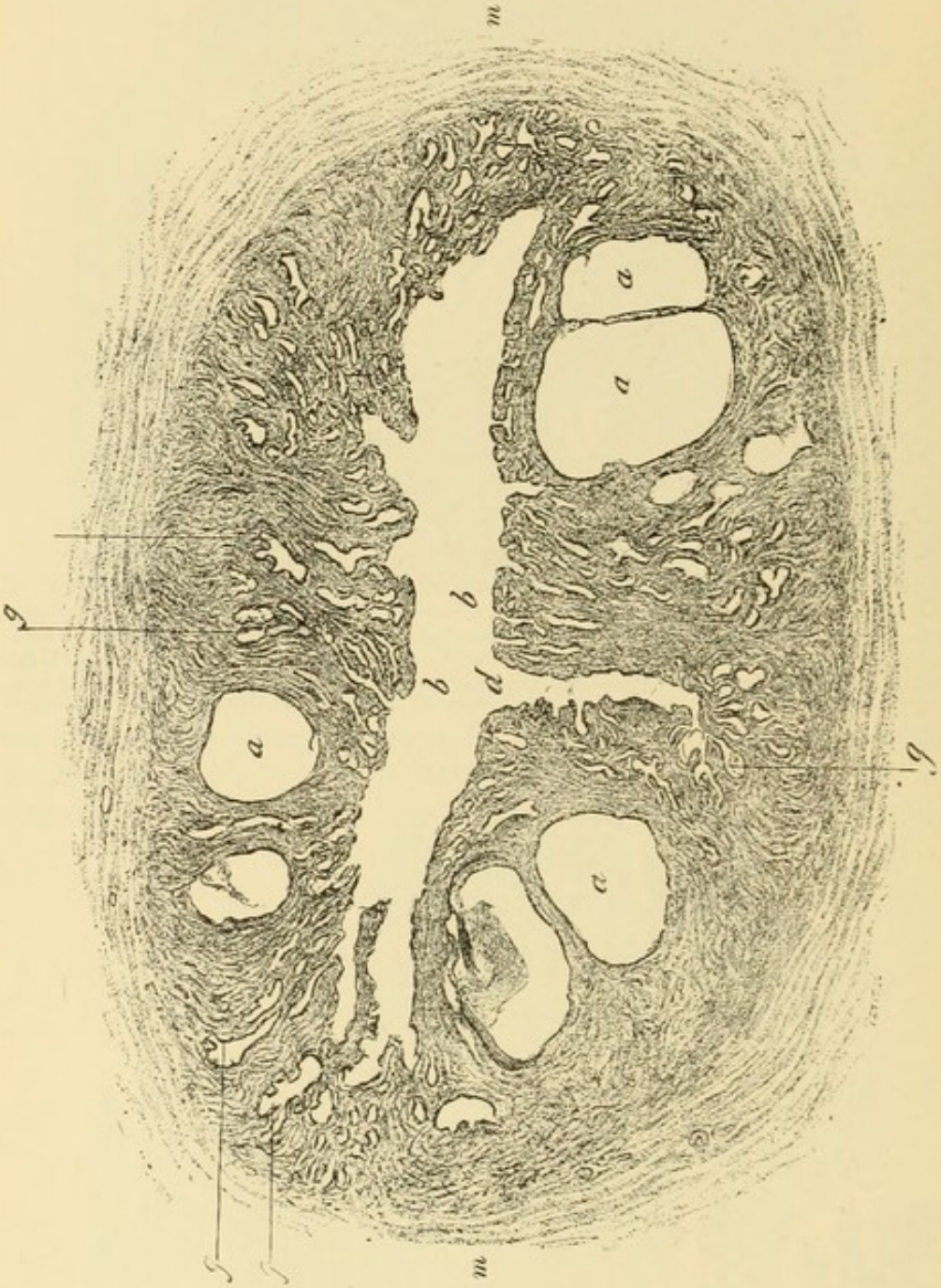


FIG. 118.—TRANSVERSE SECTION THROUGH THE UPPER PART OF THE CERVIX, SHOWING THE ENTIRE MUCOUS MEMBRANE (CORNIL). × 12 diam. The central cavity is the cervical canal. *b*, *b*, Internal surface of mucous membrane, presenting small folds, superficial glandular depressions, and large incisions of the arbor-vitæ (*d*); *a*, *a*, deep glands; *a*, *a*, ovules of Naboth; *m*, *m*, muscular tissue of the uterine wall.

then, that certain women are especially exposed, by a congenital idiosyncrasy, to cervical metritis.

Ulceration [erosion] is a term applied to still another kind of appearance, namely, where the entire circumference of the os, or only a part of it, seems to be depressed over a circumscribed area, presenting a circular edge and a smooth, red surface or one covered with villi. Gynæcologists have always

regarded this condition as an actual loss of substance with destruction of the tissue, giving it the name of ulceration of the cervix, and some of them singularly magnify its importance.

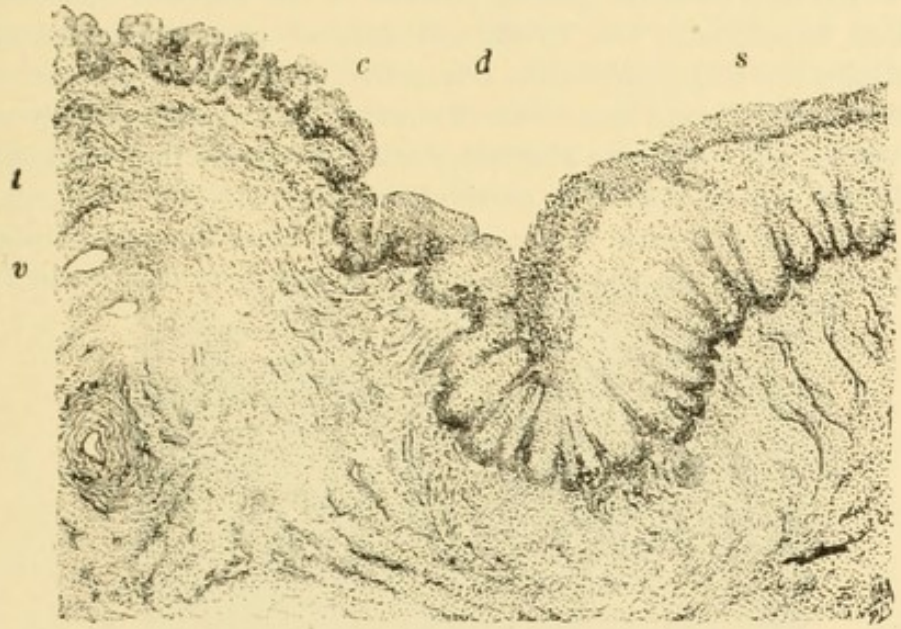


FIG. 119.—SECTION OF THE MUCOUS MEMBRANE OF THE VAGINAL PORTION IN A CASE OF CHRONIC INFLAMMATION (CORNIL). × 40 diam. *e*, Papillæ covered with a single layer of cylindrical epithelium; *c*, epithelium begins to be squamous; *d*, thickening of the squamous epithelium; *s*, superficial corneous layer; *m*, mucous membrane much thickened; *p*, papillæ; *t*, *t*, connective tissue; *v*, vessels.

Tyler Smith, and more recently Roser, see in this lesion only a kind of hernia of the mucous membrane within the cervix, which is comparable, according to Roser, with the similar condition observed in the lids during

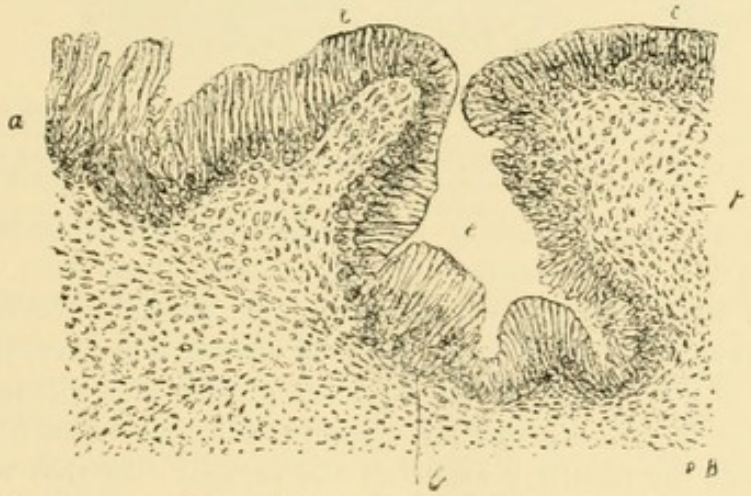


FIG. 120.—A PORTION OF THE MUCOUS MEMBRANE OF THE PREVIOUS FIGURE MORE HIGHLY MAGNIFIED (CORNIL). × 200 diam. *a*, Thickness of the superficial epithelial layer, formed of cylindrical cells much elongated; *e*, interpapillary depression; *t*, connective tissue.

conjunctivitis. This author distinguishes a traumatic or cicatricial ectropion, due to laceration of the cervix, and an inflammatory, due to hernia of

the mucous membrane. Assuredly a certain portion of the intracervical mucous membrane does make such a descent when it is swollen so that it passes out of the external os and appears upon the external surface of the part. It would thus form the greater portion of the exposed ulcerated surface in deep laceration. But in the majority of cases the external os is closed and does not allow more than a very thin edge of the internal mucous membrane to protrude, and when the ulceration has invaded a large part of the convexity of the cervix we absolutely must recognize that the ulceration has taken place *in situ*, upon that particular surface.

What is the exact nature of the alteration? Does the ancient notion of ulceration correspond exactly to an anatomical reality or only to an appear-

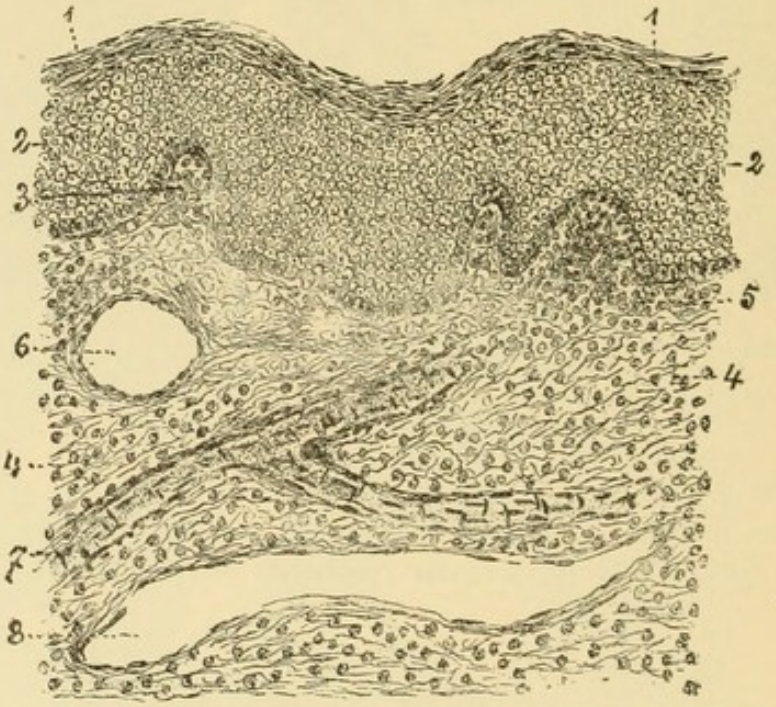


FIG. 121.—CERVICAL METRITIS, Hypertrophy of the corneous epithelial layer. 1, Corneous layer of flat cells; 2, mucous membrane doubled in thickness; 3, papilla; 4, connective tissue rich in cells; 5, embryonal inflammatory centre; 6, vessel surrounded by a zone of proliferating cells; 7, large branching capillary; 8, dilated lymph space.

ance? The authoritative work of Ruge and Veit, verified in France by De Sinéty, clears up this question. These authors affirm that there is no destruction of tissue, but a new formation; that while the cylindrical epithelium replaces, at the level of the external ulcerated surface, the pavement epithelium, it is the product of the adjacent glands, and the interglandular substance between the depressions assumes the appearance of stakes in a palisade, whence the papillary aspect of the surface. So that when a bilateral laceration permits, by this new glandular formation, a large display externally, the mucosa projects like a lining of crimson velvet in a sleeve. It is certain that laceration forms ulceration, but it is exaggeration to say, with Bouilly, that there is no true ulceration without laceration due to childbirth. At other times the glands become cystic and form little projections on the

bottom of the ulcerated [eroded] surface, which thus has the so-called follicular appearance (more evident in section than to direct inspection) (Fig. 117, *c*). These cysts may form a semi-detached mass on the surface of the part, as mucous polypi (Fig. 124). They are small, of a red color, semi-transparent or purplish, hanging by pedicles more or less free in the cavity, and projecting from the external os; in general resembling the mucous polypi of the nose, only far more vascular. (It is a mistake to describe mucous polypi of the uterus in a separate chapter, since pathologically, clinically, and therapeutically they belong to hemorrhagic metritis.) When

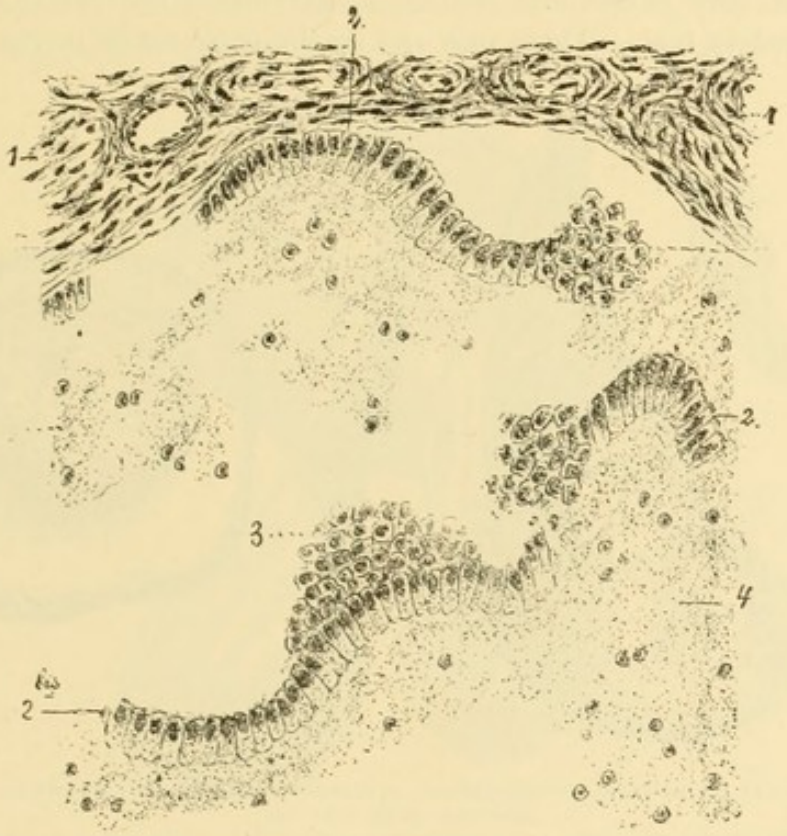


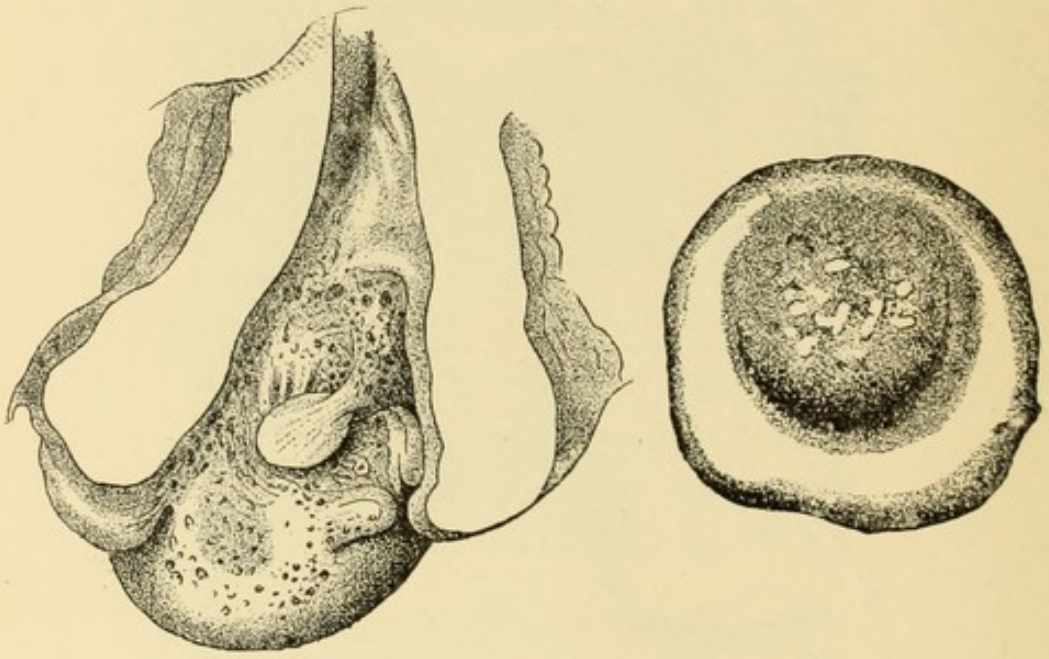
FIG. 122.—CERVICAL METRITIS. Dilated gland filled with colloid material. × 500. 1, Connective tissue with altered cells; 2, cylindrical epithelium still adherent to the gland wall; (2 bis.), detached fragment of epithelium; 3, modification of epithelium, which is proliferating and becoming polyhedral in the deep layer; 4, colloid material surrounding lymphatic elements; 5, small lymph space.

this cystic transformation of the glands takes place throughout the cervix, it can produce, by penetrating and dilating its substance, an elongation by follicular hypertrophy (Fig. 123, *a*). Finally, the glandular vegetation and the cystic formation may produce within the cavity of a partly opened cervix small vesicular projections which I compare to an almond (Fig. 123, *b*). The theory of Ruge and Veit, true in most of these cases, is not, however, so absolute as its authors have declared. Fischel has objected to their exclusiveness and shown that there is at times an actual loss of substance, an ulceration in the proper sense of the word.

The epithelium in such cases is desquamated, and the mucous mem-

brane is renewed by inflammatory granulations which start from the papillæ. Döderlein has verified the reality of these two processes, that of pseudo-ulceration and that of the real form.

Laceration of the cervix is an accident of common occurrence after parturition. It has been observed after abortion at the second month, when the elasticity of the fœtus would seem to make it unlikely on *a priori* grounds; but that the cervix should be lacerated, it is enough that it should be insufficiently softened and dilated. According to Mundé's statistics, cervical tears occur most frequently at the first delivery, though it is possible that both cervix and perineum, left intact by former childbirths, should ultimately tear. There may not be the least notch in the cervix of a



a *b*

FIG. 123.—FOLLICULAR HYPERTROPHY OF THE CERVIX. *a*, Anterior lip, internal surface displayed by an incision; *b*, same, anterior lip, front view.

woman who has had children, and yet a considerable laceration may occur. The pathological importance of cervical laceration has been brought into relief, and certainly exaggerated, by Emmet, who goes so far as to say: "The half of all uterine affections in women who have had children depend upon laceration of the cervix."

Pallen estimates the proportionate frequency of the accident as 40 per 100; while according to Goodell it is 1 in 6. Mundé, in 2,500 women who had been delivered, found 612 lacerations (25 per cent), but only 280 (11.02 per cent) were sufficiently deep to have any pathological importance; the others cicatrized or gave rise to but little complaint. The degrees and varieties of laceration are very variable; we can distinguish unilateral, bilateral, anterior, posterior, and stellate lacerations. The bilateral form is the most frequent; then comes the unilateral, then the stellate, the multiple,

the posterior, and, finally, at the end of the series, the anterior. The unilateral has been most often observed on the left side; due without doubt to the frequency of the left anterior occipito-iliac presentation, the tear being made by the occiput. When the laceration is deep and partly healed over, there is a feeling of a smooth line along the cervix, sloping toward its surface; sometimes, in the vaginal cul-de-sac, at the base of the broad ligament, there is felt a small hard nodule, probably due to the same traumatism.

In the stellate form the clefts are usually less deep. Finally, one obtains the impression of a laceration in some cases in which I believe nothing of the kind has occurred; I mean those cases in which the cervix is gaping and the finger finds no rent whatever in its circumference. Defenders

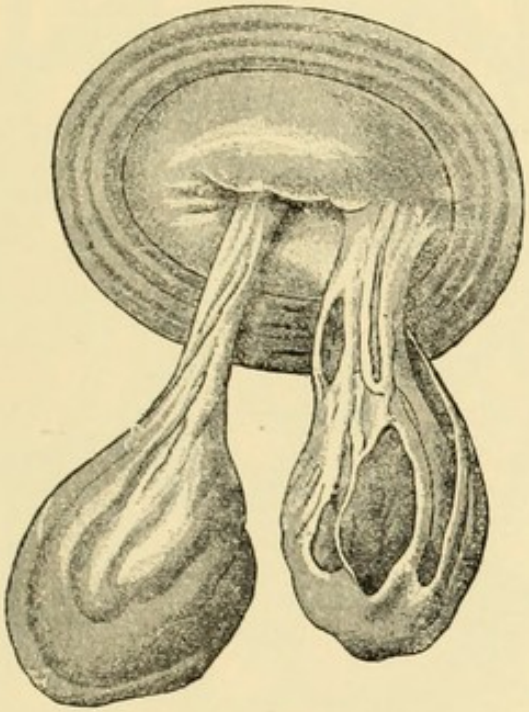


FIG. 124.—MUCOUS POLYPI FROM THE INTERIOR OF THE CERVIX AND UPON THE SURFACE, FROM FOLLICULAR HYPERTROPHY.

of the pathogenic influence of lacerations have not been wanting who have seen in such cases a tear in the internal mucous coat—an endotrachelian laceration—which has produced a subinvolution of the part and consequent patency of the cervical canal. According to Mundé this variety should be considered as a subinvolution of the cervix with paralysis of its muscular fibres. For ease of description it has been proposed to divide lacerations according to their depth in three degrees; the first, but slightly cleaving the cervix; the second, dividing it through most of its length; and the third, which goes down to the vaginal cul-de-sac or even beyond. It is possible for the laceration to be free from any accompanying ulceration, and for its whole surface to be covered with squamous epithelium like the rest of the cervix. This cicatrizing of the torn portion without reunion of the lips

is particularly observed after surgical division of the cervix followed by vigorous antisepsis. When it occurs after parturition, we can therefore conclude that the wound has wholly escaped infection. In the opposite case ulceration is produced; and then, the deeper the laceration and the more the lips are everted the greater is the ectropion. This exposes the mucous membrane to all causes of vaginal irritation, friction, secretions, contact of air, etc., and is doubtless an efficient cause of the morbid processes styled

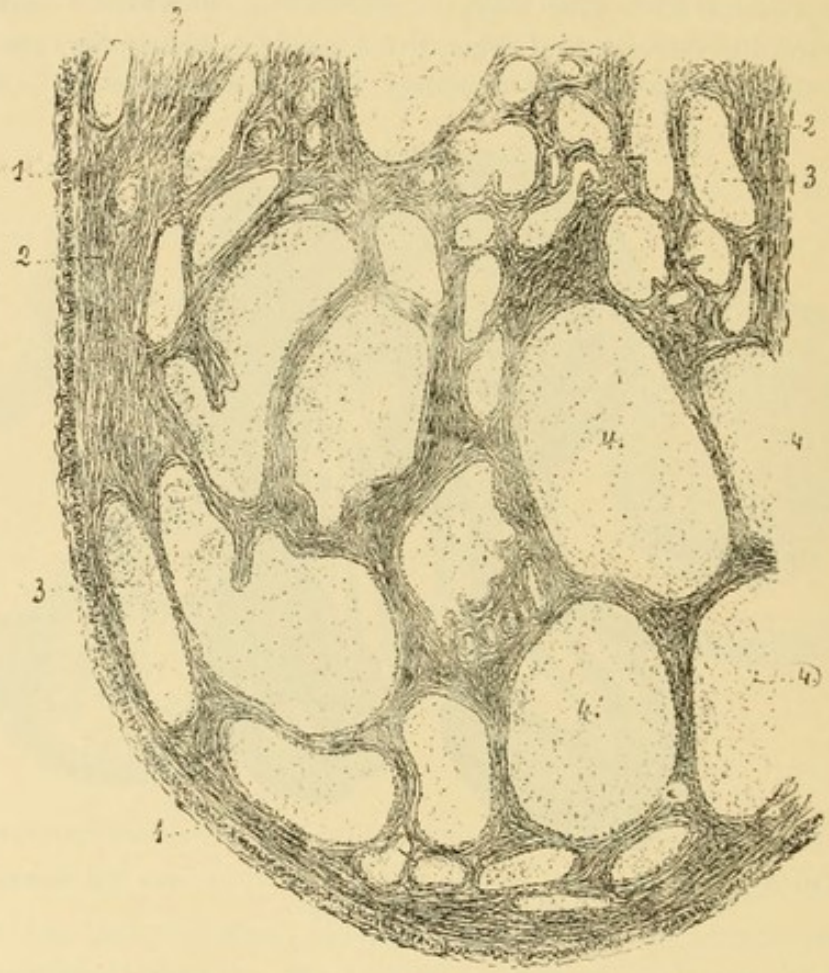


FIG. 125.—MUCOUS POLYPUS OF THE CERVIX. Transverse section perpendicular to the surface; slightly enlarged. 1, Layer of squamous epithelium; 2, fibrous tissue with smooth muscle elements; 3, glands more or less dilated, and cystic in some places; 4, colloid contents of the dilated cavities.

ulceration. The cystic and papilliform changes may then be so far developed and so largely displayed that the everted lips have the appearance of a fungus of malignant character.

At the same time there are important histological alterations in the torn cervix. In the first place the work of cicatrization itself, and its consequent contraction, may have troublesome results; it compresses the glands, hastening their cystic degeneration and the hypertrophy of the tissue (cystic hyperplasia). This dense cicatricial tissue, by compressing the nerve termina-

tions, can give rise to various nerve disorders, according to Emmet and his disciples.

It is especially the pressure excited by the superior angle of the laceration, according to this gynæcologist (who has so magnified the importance of this little accident)—it is in the pressure in the superior angle, which he calls "the cicatricial plug," that the trouble has its root; and he sees a frequent cause of nervous disease in this, even in cases in which but little complaint is made of the cervical deformity. Doléris follows Emmet, insists upon the cicatricial plug, and attributes part of its formation to a parametritis following infection of the tear.

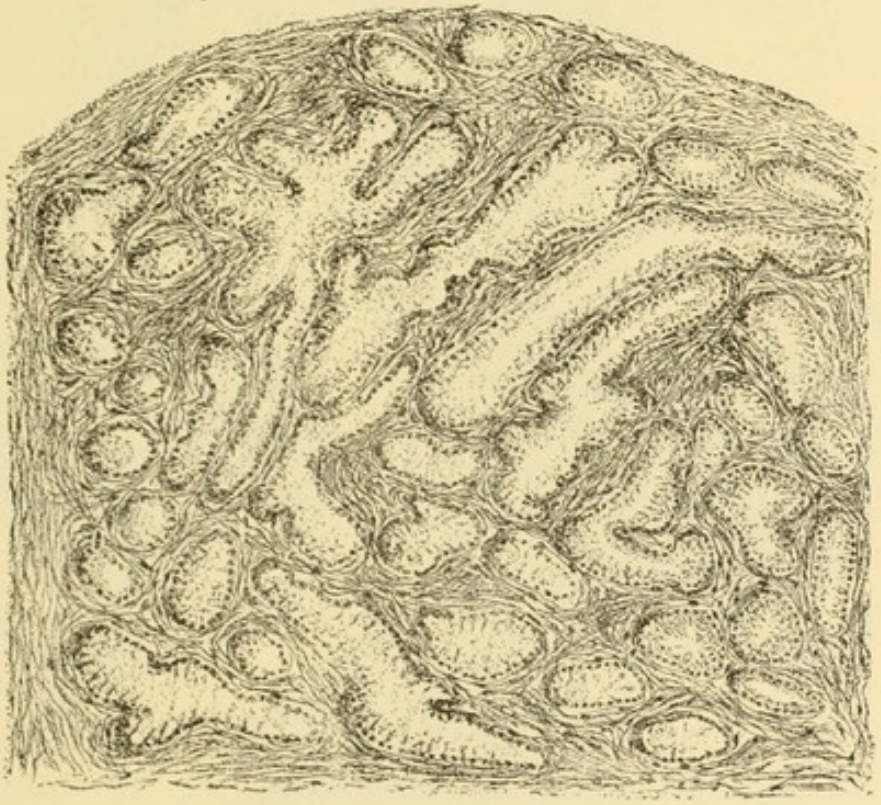


FIG. 126.—GLANDULAR POLYPUS. Stroma of fibrous tissue with elastic and smooth muscle fibres; proliferated glands cut in different directions and lined with an epithelium of poorly defined cells, and filled with granular colloid material.

Another early change in the cervix is the eversion of its lips, caused by traction of the vaginal insertion upon the divided cervix; this may reach extreme ectropion of the mucous membrane, which becomes more marked as the disease advances. Finally a third result of laceration may be arrest of post-partum involution, or passive congestion, catarrh, etc.

Pathogeny.—The majority of classic authors describe the different forms of metritis, one after the other, in complete form, and the study of causes is found distributed among many sections, as if each type differed in all parts. It seems to me that there is no interest in following this tradition. While

I have presented the anatomical and pathological studies in one paragraph, I have given in one section all the causes, and so avoid useless repetitions.

From the point of view of pathogeny one may say that all inflammations of the uterus are due to microbes; that is, of infectious origin.

The knowledge of the general bacteriology of woman dates from the work of Hausmann. Many articles have since appeared, thanks to the numerous operations which have been performed upon the uterus and ap-

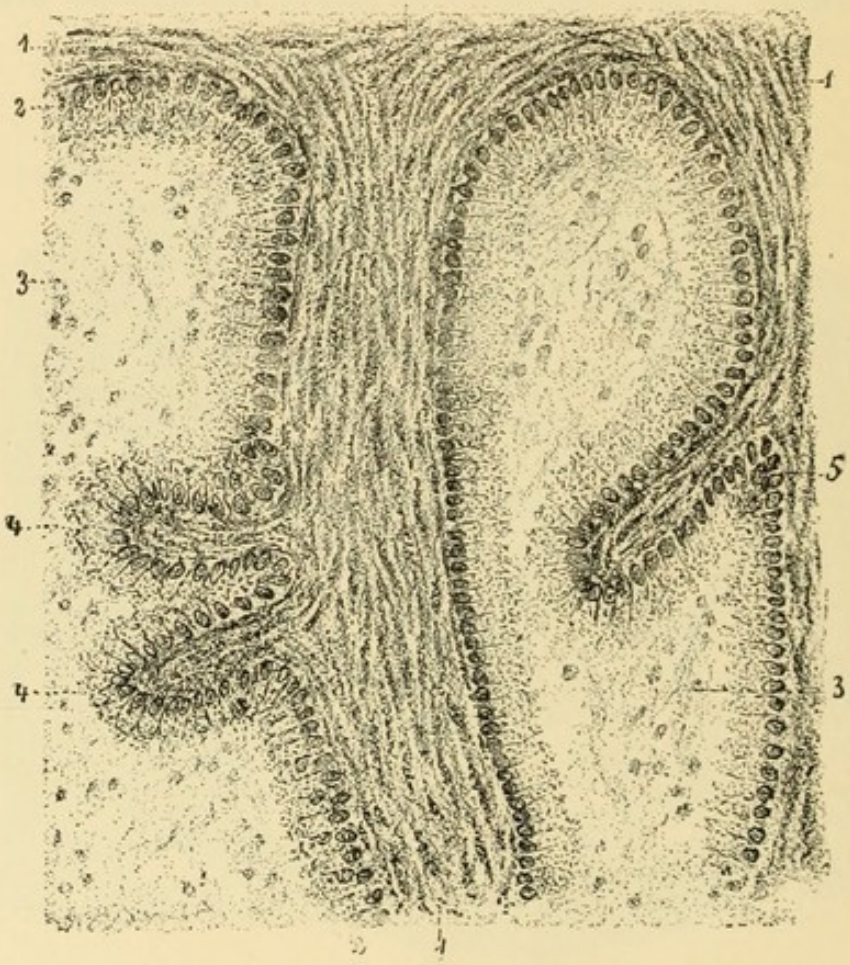


FIG. 127.—PARTITIONS OF CYSTIC CAVITIES WHOSE WALLS GIVE ORIGIN TO PAPILLARY ELEVATIONS. Portion of the preceding figure strongly magnified. 1, Fibromuscular tissue; 2, cylindrical non-ciliated epithelium, swollen and with ill-defined cellular outlines; 3, colloid material containing cellular débris; 4, papillæ projecting into the interior of the cyst; 5, point at which the proliferated cells are changed in form.

pendages. The microbic origin of uterine inflammations has been directly demonstrated, so that there now remains no doubt on the subject. This opinion, now commonly held, was long ago very categorically stated by Schröder. The most recent researches confirm this presumption, which explains without doubt the gonorrhœal origin.

The important part played by the gonococcus in the pathogenesis of the genital affections of woman has been shown by Schwarz, Steinschneider, and especially by Bumm and Wertheim. In an important set of statistics

based upon 1,000 patients in A. Martin's service, Witte found 288 cases of blennorrhagia, 65 of which were endometritis and 56 pelveoperitonitis.

Steinschneider, in his interesting studies on the seat of gonorrhœal in-

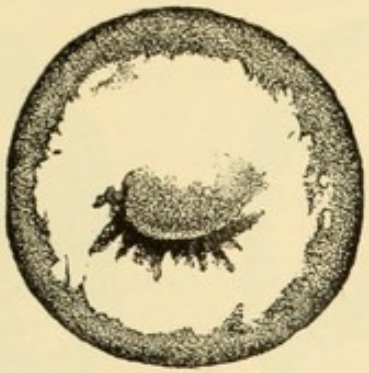


Fig. 128.—Normal Cervix in Multipara.

fection in females, demonstrated long ago that after the gonococcus had disappeared from the urethra it could still be found in the cervix or body of the uterus, as the mucous membrane there is better fitted for its culture

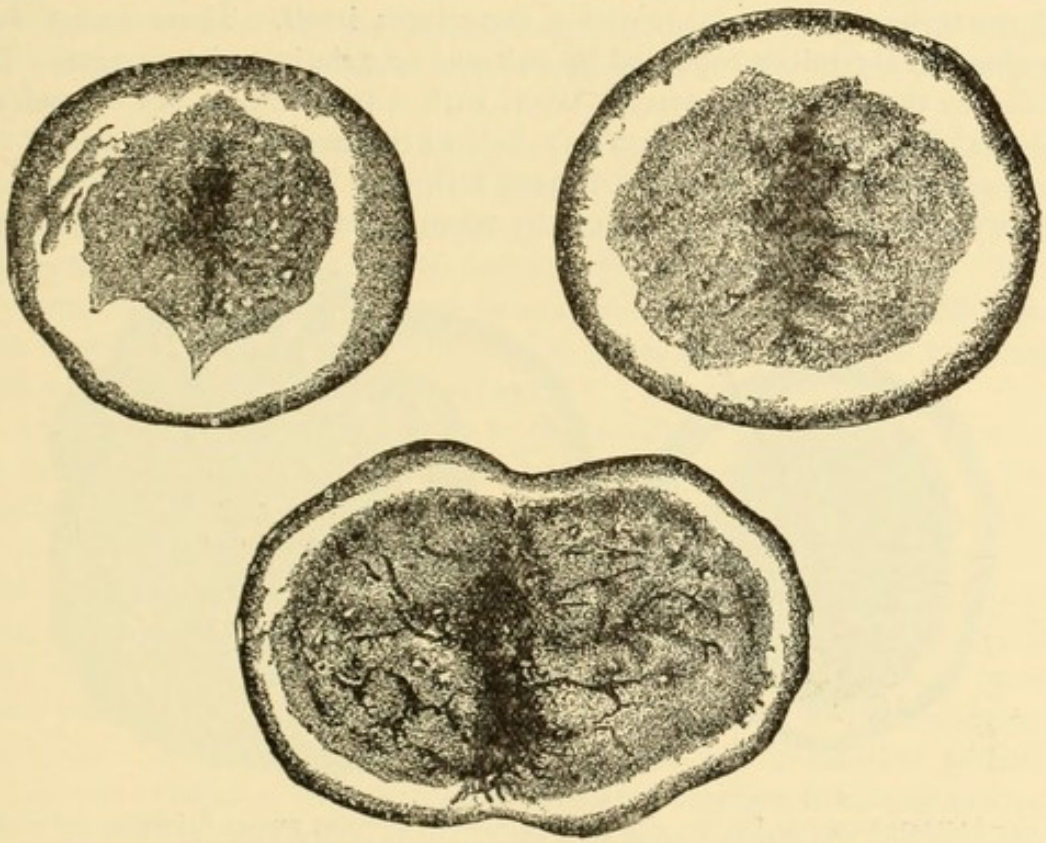


Fig. 129.—Lacerations of the Cervix. First, second, and third degrees.

than that of the vagina because of the unfavorable circumstances dependent upon the pavement of squamous epithelium of the latter and the acidity of its secretion, together with the coexistence of the numerous bacteria which dwell normally within the cavity.

The same direct demonstration is not so easily obtained for the micro-organisms of post-puerperal endometritis.

Goenner, of Basle, has found in cases of puerperal fever streptococci

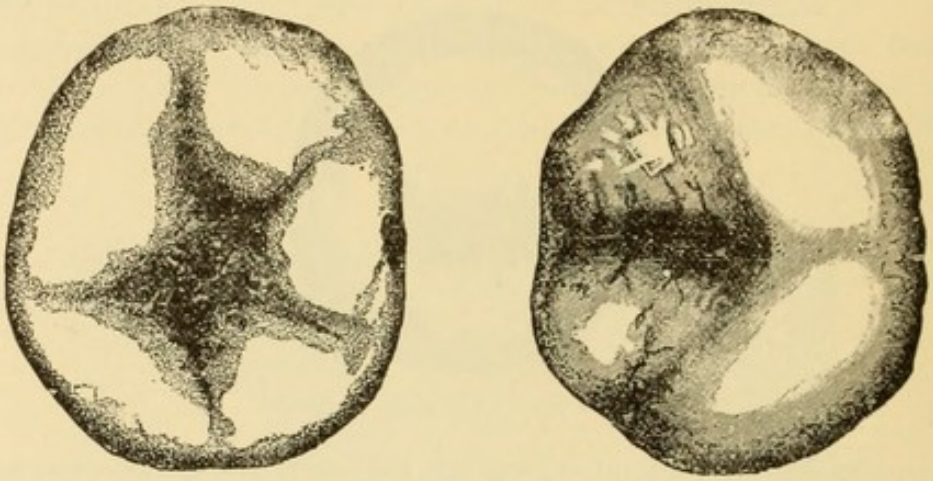
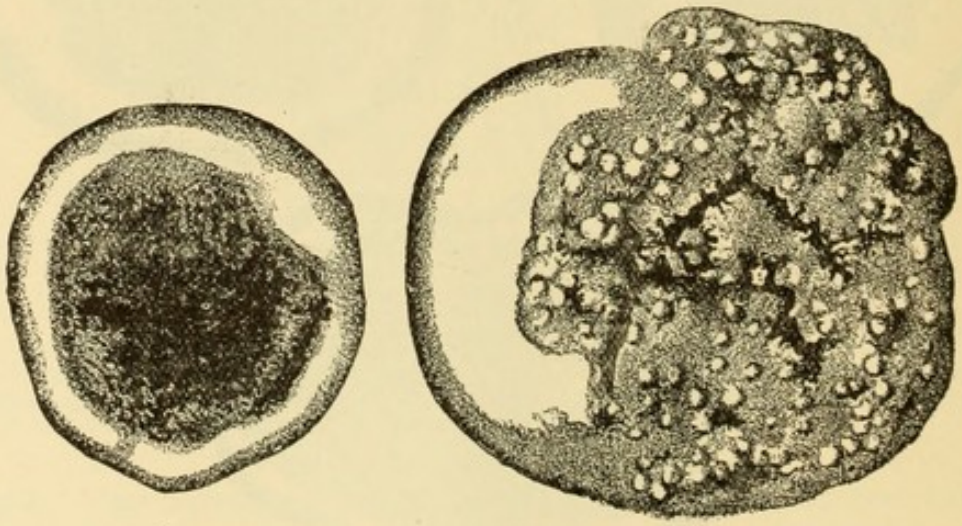


FIG. 130.—LACERATIONS OF THE CERVIX. Stellate and unilateral.

which are very easily cultivated. Döderlein has recently collected the lochia of a parturient woman from within the uterus itself. These lochia were examined by the microscope, and by cultures on gelatin and agar-agar. The result was that following normal labor, with a temperature not beyond 38° C. (98.4° F.), there were no germs; but, when there was fever, bacilli and cocci were found until the temperature fell, they being then eliminated by the very abundant secretion, especially when it was purulent. The results



A *B*

FIG. 131.—LACERATIONS OF THE CERVIX. *A*, Submucous laceration producing gaping; *B*, follicular and papillary hypertrophy following a laceration and simulating epithelioma.

of the pathological labor, and also, without doubt, of the consecutive metritis, are thus due to the pathogenic influence of the streptococcus pyogenes. Döderlein thought that these germs were carried from the vagina into the uterus by the exploratory finger or instrument.

According to Doléris, Pasteur was the first to demonstrate by the study of the lochia of parturient women that those of healthy women are germ-free, though bacteria swarm in the discharges of those who are sick.

Straus and Sanchez Toledo have published confirmatory experiments, but their attempts to infect the uteri of rabbits with septic lochia have failed, because of the different form of placenta and the absence in these animals of a decidua.

Péraire observed, and was able to cultivate, both bacteria and cocci found in the secretions of metritis; and the inoculation of rabbits with these produced both fever and vaginitis.

It is, then, well established that in septic metritis, or, better, in the infection of the uterine mucous membrane following labor or abortion, the cause of the accident is a proliferation of the pathogenic microbes, and the actual metritis which persists after the puerperal state is due to the persistence of these germs.

A much-discussed question is, What is the point of invasion of these microbes? Do they always come from the exterior, or may they come from within? Are they, in other words, a hetero-infection or an auto-infection? I will not enter into the long discussions recently provoked by this subject; it is enough to give briefly the conclusions which seem to me to be trustworthy.

The majority of microbes, even those which invade the internal genital organs, are normally found in the vagina. Winter has found twenty-seven different species in the genital canal. The greater number were not injurious to the woman or to animals into which they were inoculated. Witte, however, claims to have isolated five species, not before described, which were distinguished by their fatal action upon white mice; he has named them collectively bacillus murisepticus.

The presence of these microbes in the new-born several hours after birth has been proven. Their development depends upon the medium in which they are placed. Döderlein has taught that in a vagina whose secretion has the normal acid reaction no pyogenic bacteria are found, but only inoffensive micro-organisms. In vaginæ with an alkaline reaction, on the contrary, streptococci and staphylococci occur in the proportion of 9.2 in 100. The ordinary microbe of the normal vagina is a rod-shaped bacillus whose function, according to Döderlein and Stroganoff, is the secretion of lactic acid. It is to this acid that the transformation of alkaline pathological vaginal secretions to a neutral and then acid reaction is due, as the quantity of normal vaginal bacteria increases and they outnumber the pathogenic micro-organisms. The acidity of the vaginal secretion has not only a favorable influence in causing the disappearance of the pathogenic microbes, but greatly diminishes the virulence of bacteria carried from without into the vagina.

Witte has given the explanation of these facts observed by Döderlein.

According to his researches, the streptococcus cannot develop in an acid medium containing 0.07 per cent of lactic acid; the various staphylococci (aureus, citreus, albus) die in a medium whose acidity exceeds 0.5 per cent. For this reason, in order that the streptococcus or staphylococcus may develop in the vagina, it is necessary that the normal coefficient of acidity of this canal should be greatly diminished, and even then these microbes find a sufficiently acid medium to attenuate their virulence to a great extent.

New researches upon the microbic flora of the utero-vaginal canal have recently been made by Krönig and Menge, by the former in pregnant women, by the latter in those not pregnant. Their studies demonstrate that the vaginal secretions possess bactericidal properties.

Krönig inoculated the bacillus pyocyaneus in 20 pregnant women, whose vaginal secretions contained vaginal bacilli in 9 cases, short bacilli in 4, and micrococci in 7. In the first 9, no bacilli pyocyanei were found after 10 to 24 hours, or an average of 14½ hours; in the 4 women of the second class the bacillus pyocyaneus was absent from the vaginal secretions after 16 hours, and had disappeared after an average time of 20 hours in the third group. Similar experiments with the staphylococcus and the streptococcus have given analogous results; the staphylococcus had disappeared after 11 to 14 hours, the streptococcus after 6 hours on the average.

Menge has made like experiments upon non-pregnant women with the same results. He inoculated 35 women in the vagina, 23 times with pure cultures of the bacillus pyocyaneus, 30 times with pure cultures of staphylococcus aureus, 27 times with streptococcus cultures. After a longer or shorter interval the micro-organisms which had been introduced were entirely absent; the auto-asepticization of the vagina was complete in from 2½ to 70 hours after inoculation.

Menge has also made a bacteriological examination of the vaginal secretions of 50 healthy women: in 44 cases the cultures remained sterile, in 5 non-pathogenic micrococci were found, in 1 the streptococcus.

Hetero-infection, or infection by contact, or exogenous infection, is by far the more frequent; it is indeed the rule. Leopold found an enormous diminution of the death-rate in his service after he had forbidden the examination of pregnant women; that is, in spite of all antiseptic precautions the exploratory finger may be the vehicle for germs. In a normal labor the vagina should be considered as aseptic. There are no germs, as I have stated, in the lochia of a normal labor; they are not to be found in the upper portion of the vagina immediately after parturition according to Ott; and he attributes this fact to the cleansing action of the waters and the friction of the fœtal body upon the vaginal walls. Thus, if everything is favorable, with no retention of fœtal débris, with no accumulation of clots from atony of the uterus, and with no premature rupture of the membranes preventing the physiological cleansing of the genital canal, there is no chance whatever of infection. This is the explanation of the happy issue of so

many labors where no precautions have been taken, for Nature, we are accustomed to say, has provided for her own asepsis. We must, therefore, beware of useless interference or manipulation in simple cases, and abstain from meddling with antiseptic injections which may be useless, and therefore dangerous.

There is nothing specific in a bacterial infection of the uterus. It is an error long since laid aside to think that each special infection corresponds to a special pathogenic element. It is known perfectly to-day that but one and the same microbe, the streptococcus pyogenes, causes all the septic lesions of parturition, and is also produced in erysipelas and furunculosis.

Puerperal infection of the uterus, the starting-point of consecutive metritis, may then be the product of a pathogenic germ coming from various sources. It is demonstrated to-day, not only by clinical experience, but also by bacteriological observation, that the germs which cause surgical infections, boils, and erysipelas may infect the parturient woman, and be found then in her genital secretions. While I was interne at the hospital during Broca's service I had many opportunities to see small epidemics of erysipelas in the surgical wards following puerperal fever in the obstetrical wards near by. This mixed infection has been made the subject, during the last years, of very interesting works from the pathogenic point of view. Pfannenstiel studied a little epidemic in the Breslau Frauenklinic, following a general attack of tonsillar angina, and perfectly demonstrated their bacterial relationship. The streptococci of erysipelas and of suppuration are at present considered identical.

Winter's researches on this subject are very valuable, because of the ability of the author and the rich material at his disposal, thanks to the numerous hysterectomies and salpingotomies of the Berlin clinic. This fresh material removed many of the causes of error of former researches, and led him to the conclusion that in the genital canal of the female there is a zone rich in micro-organisms which I call "the dangerous zone."

The opinion of Winter that even in virgins bacteria are always found in the cervical canal has recently been strongly opposed by Stroganoff and by Witte. Stroganoff has found bacteria only in women who had submitted to some gynæcological intervention. Witte also determined that of eight women in whom he found microbes in the uterus, seven had previously undergone a local examination. It should not, therefore, be said, as Winter and so many other authors hold, that the normal limit of the bacterial region of the cervix is the os internum. This limit is the os externum. Not only does the vagina contain an abundance of germs, as Hausmann, Küstner, Lomer, and Bumm have stated, but in half the cases, according to Winter, pathogenic organisms are found; three species of staphylococci (staphylococcus pyogenes albus, aureus, citreus) and the streptococcus. The normal uterine cavity contains no microbes. This is due, according to Winter, to the fact that it lacks liquid necessary for their development; also, when once

introduced into the cavity of the uterus, the micro-organisms become fixed upon the mucous membrane as on a solid culture medium, and are probably destroyed by phagocytosis. The bacteria found in the uterus either enter from without, being introduced by copulation or by gynæcological manœuvres, or come from an endogenous infection. Witte has examined fifteen diseased uteri removed by hysterectomy, and in thirteen cases proved the presence in their cavities of pathogenic organisms (streptococci and staphylococci), either alone or associated with other bacteria; in two cases the micro-organisms had entered the tubes. This is of the utmost importance, for it proves the possibility of self-infection. It would not be easy to understand why such infection does not occur more often, in every labor in fact, during the period of rapid multiplication of the germs, but that Winter has shown by his inoculations with cultures obtained at that time that the staphylococci have lost their virulence, being domesticated, as it were, in the genital passages. We have thus an example of spontaneous attenuation which is equally remarkable and fortunate. But it is quite probable that this virulence might be rapidly regained under favoring circumstances, *e.g.*, the presence of organic débris. Thus we can understand why abortions are so dangerous from bits of retained fœtal structure, the uterine infection advancing step by step. It is equally plain how great is the risk of making uterine exploration without previous cleansing of the genital canal; even though the finger and the sound may be rendered aseptic, they may still become the vehicles of infection, for they may transport germs from the cervix into the body of the uterus. It is at the level of the internal os that the dangerous zone is found.

Certain mechanical conditions may aid in producing uterine infection. Thus Schultze thinks that in women with a patulous vulva, as is the case in many multiparæ even without perineal rupture, a slight leucorrhœal discharge may carry atmospheric germs; and in a similar way the menstrual discharge may act in women with a closed vulva. Hence the necessity, according to Schultze, of protecting the part by a pad which will filter the air.

Other germs than those usually found in the vagina or cervix may be carried by the sound into the uterine cavity. In large towns we live in the midst of bacteria. Eiselsberg has found staphylococcus pyogenes aureus in the wards of a hospital; Fürbringer demonstrated them in matter scraped from the nails; Passet found them in dish-water, and the same author encountered staphylococcus pyogenes albus in some slightly damaged beef, etc. Biondi found the same germ in normal saliva. These observations prove the many chances of infection which would indeed be almost inevitable but for the vital force of living tissue which fights against it; whatever lessens this force, therefore, opens the door to infection.

Some of the most curious examples of such action is found in what Verneuil calls latent microbism, for we do not have to do with an extinguished danger, but with an infection which does not yet exist, depending

for its development upon a transformation of its medium from physiological to pathological conditions. Auto-infection, or, as Fehling styles it, endogenous infection, is thus reduced to a question of culture media, producing virulence in an organism before inactive. Thus Chauveau restored the powers of charbon (anthrax) bacilli by cultivating them in rarefied air in blood plasma and bouillon. If this faculty of increasing the noxious powers of germs residing in the female genitalia belongs to organic débris, may it not be called forth by other means? Could not general debility of all the tissues, which reduces cellular vitality, or traumatism, with its inhibitory action (Brown-Séquard), raise the barrier of phagocytism which keeps all germs out of the body or renders them inoffensive? Perhaps we may thus explain the effect of certain diseases, as eruptive fevers, and also of venereal excess.

Gottschalk was the first to report a case of hemorrhagic metritis occurring with influenza, and two cases of non-suppurative parametritis following the same disease. Goldberg has observed the same inflammatory attack in a woman affected with scorbutus. I have seen four cases in which acute attacks of suppurative perimetro-salpingitis occurred, under the influence of an attack of grippe, in women whose appendages presented chronic lesions.

Moreover, it has been shown that the presence of one germ aids the development of another species. Thus women with gonorrhœal metritis are easily infected with septic material more or less attenuated, as staphylococci and streptococci or even tubercle bacilli. Such may be termed mixed infection. Thus the lesions of pneumonia prepare the lung for the invasion of the tubercle bacillus.

Etiology.—Passing now to the direct causes of metritis we find them associated with (1st) menstruation; (2d) copulation; (3d) parturition; (4th) traumatism.

1. *Menstruation.*—The establishment of the catamenia may be the signal for metritis to manifest itself, because of the intense congestion of a peculiarly vulnerable organ. There is generally present in such a case some malformation of the uterus which induces venous stasis; incomplete development, congenital anteflexion, a conical cervix, stenosis of the os, exposure to cold, and masturbation may be some of these primary or secondary causes. To this virginal metritis, there is, at the other pole of the woman's genital career, a corresponding metritis of the menopause, for at that time again there may be a predisposing active congestion.

Between these two extremes every menstrual period favors the development of metritis, and every extra fatigue or exposure to cold may bring it on if the uterus is malposed, if the cervix is contracted, or if there is a deep laceration from previous labor.

2. *Copulation.*—Excessive coitus, whether during menstruation or coincident with great fatigue, may provoke uterine inflammation independently of all contamination; but far more often it is a gonorrhœal infection, more

or less disregarded, which is so efficient a cause of metritis and which plays this rôle in the case of newly married women. Husbands who consider themselves cured and pay no attention to a trifling urethral discharge may thus infect the urethra, the vagina, the cervical and uterine cavities, and the tubes of the young wife.

Such a gonorrhœal infection may remain a long time latent within the cervix; then under the irritation of a rough examination, or after abortion or labor, the infection gains entrance to the body of the uterus. Noeggerath asserts that in women with gonorrhœa abortion and labor are followed by metritis and perimetritis as often as seventy-five per cent; substituting salpingitis for perimetritis, the statement is not exaggerated. It is doubtless to this cause, also, rather than to the traumatism of too frequent coitus, that we must refer the metritis of prostitutes. Abortions are frequent and unheeded among women who are beginning a debauched life, and later the inflammation of the uterus rises high enough to involve the tubes, obliterating them and causing sterility.

3. *Parturition.*—This is by far the most frequent cause. Normal labor, spontaneous and induced abortion, leave the uterus in a peculiar condition of hyperplasia and congestion which demand special hygienic conditions for their gradual removal; but these conditions are often neglected, from carelessness among the well-to-do, from necessity among the laboring classes. It is not so very long ago that celebrated obstetricians considered fifteen to twenty days' rest sufficient. Guérin justly opposed this fixed rule, advising that the patient should not be permitted to leave her bed till a week after the first menstrual period; for only by that time has the uterus regained its normal size. Without such care we see a post-puerperal engorgement intervening, which is Chomel's "post-puerperal metritis" and Simpson's "arrested involution"; the chronic metritis, uterine infarction, chronic and painful metritis of other authors.

When parturition has been abnormal, by reason of difficult delivery, and when pieces of placental detritus have remained a long time in the uterine cavity, then the organ is specially liable to inflammation. At such a time there can be no doubt that we have a local infection, and if a rigorous antiseptic treatment is not at once begun, there is reason to fear that the disease may persist in chronic form. The same is true of abortion, where, as is so frequently seen, small portions of the decidua graft themselves upon the mucous membrane and become centres of infection for it.

One condition in particular has recently been insisted upon as of great influence in establishing and prolonging metritis, and that is cervical laceration, as Emmet styles it. This American gynæcologist was the first to recognize its importance (in 1869), though Bennet had dimly foreseen it some time before. But in America there has been a disposition to exaggerate the influence of this lesion.

It seems to me that the rôle of laceration has been alternately too much

exalted and belittled. It is false to suppose that no other cause for uterine malpositions exists, or to attribute all inflammations of the organ and its adnexa to laceration alone. At present it is generally agreed that uterine displacements may give rise to nervous phenomena, but they cannot be said to cause metritis, however much they predispose thereto. This then is the limit of the influence of laceration—it may cause morbid reflexes, and predispose to cervical catarrh and prolong it. But there are many cases of retroversion without symptoms, and as many of laceration without metritis; at the same time there are lacerations which extend to the cellular tissue of the cul-de-sac, and bilateral forms with marked ectropion, which have a pathological importance that cannot be neglected.

Traumatism.—Chronic contusions, produced by a pessary that is too large or badly placed, so that it exerts strong pressure upon the uterus, may give rise to acute symptoms of metritis which disappear as soon as the instrument is removed; and of all pessaries, those with an intra-uterine stem are the most dangerous, unless carefully watched by the surgeon.

Finally, any operation whatever within the genital canal may be the starting-point of metritis (with or without parametritis and perimetritis) if strict antisepsis has not been maintained. Such accidents, so frequent that gynæcologists were justly timorous, exist no longer in the practice of those who observe the rules—which might almost be called sacred—of modern surgery; for to-day even if inflammation do occur after operations within the uterine cavity, it may, to a certain point, be kept from becoming septic, and permanent results prevented.

Very hot or cold vaginal injections have been accused of causing metritis; for my part, I lay but little stress upon them as a cause; an injection may do harm if the tube is ill-fitting or if force enough be used to injure the cervix. In prolapse, for instance, the injection tube has been passed into the cervix and serious accidents have followed; but this has nothing to do with metritis.

Other Causes.—Ought we to regard the exanthemata as a cause of metritis, as certain authors have done? It seems to me that new observations are needed upon this point. It must, however, be acknowledged that the recent work of Massin is of a nature to awaken serious attention. We cannot deny that the female genital tract may be more exposed to disease after a general affection which has enfeebled the entire organism. Certain maladies (icterus) and some poisons (phosphorus) may produce an acute fatty degeneration of the uterus; but that is a lesion, not a disease, and it is a mistake to insist upon it in connection with metritis.

The influence of diathesis has been very much exaggerated. Martineau has even classified metritis into constitutional and traumatic. According to him, constitutional metritis is partly protopathic and partly deuteropathic, arising from scrofula, arthritis, herpes, chlorosis, syphilis, or tuberculosis.

I consider it a misuse of language to describe a scrofulous or herpetic

metritis, as if they possessed clear-cut boundaries. I willingly grant that general conditions and place involved play a great rôle, if not in the production, at least in the permanence of local inflammation, particularly of metritis; and that we must carefully examine the general state of a patient before attempting treatment. But this is all that I can concede to diathesis.

CHAPTER VI.

SYMPTOMS, COURSE, AND DIAGNOSIS OF METRITIS.

After studying the diseases of the internal genital organs of the female, it is impossible not to be struck by the similarity of the rational signs obtained by questioning the patient. The symptom complex differs but little whether the case is one of chronic metritis, catarrhal endometritis, fibroma, cancer, or salpingitis. Of course I do not go so far as to say that they are identical, for if the questions are sufficiently precise, sensible differences are found in the intensity of special symptoms. But although a certain part of the picture may be particularly clear—as the hemorrhage in fibroma, leucorrhœa in cancer, nervous troubles in displacements or disease of the adnexa—it is not the less true that the chief features are the same; different states of the same plate, often retouched.

By the term "uterine syndroma" I would express the common symptomatic basis which I have found—as Beau grouped in his asystolic syndroma all the phenomena of cardiac disease when the heart arrives at its period of fatigue, whether the lesion be mitral, tricuspid, or aortic. I think I have found the same interest in the clinical synthesis which I propose; for I believe that with this sketch it will be enough for the special cases to fill in the necessary touches, so avoiding useless repetitions.

This study of the uterine syndroma naturally has its place here, as it so closely corresponds to the rational signs of metritis. The principal features of the uterine syndroma are:

Pain, leucorrhœa, dysmenorrhœa, metrorrhagia, symptoms from neighboring organs (bladder, rectum), symptoms from distant organs (digestive canal, nerves, etc.).

The pain is spontaneous; its seat is in the smaller pelvic cavity, but its focus is not always at the same level as the uterus; it is not in the hypogastric region that the patient suffers the most, but frequently in the iliac fossa, especially the left near the ovary. To explain this fact it seems reasonable to admit the presence of a slight catarrhal salpingitis with uterine inflammation. The tubes are simply prolongations of the uterus; anatomically and pathologically the two organs are the same. The term metritis should include almost always metrosalpingitis, with unequal distribution of the inflammation; that of the uterus predominating, that of the tube being not less real; as to the predominance of the left side, it is as difficult to explain as epididymitis on the same side. Another focus of pain is found in the lumbar region.

This pain is increased by all fatigue, such as the jolting of a carriage; but such mechanical influences may not produce an immediate increase; the exacerbation may come on only after the lapse of some time. Riding in the horse-cars is usually well borne, but railroad travelling is injurious because of the peculiar shaking endured. The pain is dull, persistent, giving a feeling of weight and fulness in the perineum and lower pelvis; seeming to the patient as if there were a foreign body there, tending to escape—that is, she feels her own uterus. The bent position in walking in acute cases is characteristic; instead of seating herself hurriedly, the patient does it with great care, helping herself with the support of a piece of furniture near by, like the arm of a sofa, lest she reawaken the slumbering pain. The distress is increased by pressure, especially in bimanual palpation; but one can assure himself that it is not so much the direct pressure upon the cervix which is painful, as the part is not sensitive (except in lumbo-abdominal neuralgia), but the transmitted shock to the uterus itself. Gosselin has long insisted upon this distinction.

Leucorrhœa.—This is a constant symptom. It may be more or less masked by the blood or pus present in the discharges, but it is always present; singly or in combination.

Leucorrhœa (whites, etc.) is a phenomenon so important in gynæcology that some of the older authors made it the principal disease of the uterus and grouped all the others about it. Even Courty makes leucorrhœa an entity, an idiopathic affection, in certain cases.

Leucorrhœa is a morbid alteration and exaggeration of the physiological uterine and vaginal secretions. In a state of health these parts secrete in small quantity a mucous liquid which always contains a few leucocytes, due to the destruction of the local epithelium. As soon as this has become abundant and purulent, it is morbid and constitutes a leucorrhœa.

This may be from two sources—the uterus or the vagina.

Vaginal leucorrhœa may often be found alone; it may be a discharge of very thin fluid of a milky appearance, which does not stain the linen much, or it may be charged with pus and be of a greenish-yellow color; its reaction is acid.

Leucorrhœa from the body of the uterus is of a somewhat viscid nature; that from the cervix is jelly-like and in the normal state is transparent, like the unboiled white of egg, staining the linen strongly; in disease it is of a greenish-yellow color. Its reaction is alkaline.

O. Küstner has made precise researches upon the uterine secretion, both normal and diseased. He introduced glass tubes into the uterus and then carefully closed the external os with collodion and diachylon. In this way he examined six women who were free from uterine catarrh, and found that the secretion of the uterine neck and body had the characters I have indicated. Afterward he examined women with uterine catarrh, with or without purulence, and demonstrated that most often the inflammation was present

in both cervix and body; and that isolated catarrh of the cervix was more frequent than isolated catarrh of the body of the organ. In all his cases Küstner, by the microscope, demonstrated the presence of micro-organisms in great quantity, having for the most part an oval form, and presenting four or five distinct types. The recent researches of Winter, as stated above, show that these germs are identical in form with pathogenic varieties.

The leucorrhœal secretion is seldom voided by steady flow, not that its production is not constant, but that it accumulates in the vagina and escapes a little at a time. In some cases there appear to be secretory crises, when a great quantity of fluid is discharged all at once after a strong pain; this suggests the intermitting discharge of a dropsical tube (hydrops tubæ profluens). But I have observed in many cases that this flow by jets may be present where there is no tubal collection; properly speaking, it is a phenomenon of reflex pathological hypersecretion.

Certain authors have sought for a method of diagnosis between leucorrhœa of the vagina and that from the uterus. Schultze has proposed to introduce a tampon of cotton into the vagina and leave it in contact with the cervix during twenty-four hours; then, on removing it, one can judge from the quality of the absorbed fluid whether it is from the body or the cervix.

Leucorrhœa may depend simply on a general debilitated condition, as anæmia, chlorosis, etc. This symptomatic form is so frequent that Marc d'Espine has claimed to find it in two-thirds of all women. Many workwomen in Paris have a leucorrhœal discharge, and explain it by the fact that they are accustomed to drink *café-au-lait*, and there are physicians who are able to gravely accept this grotesque explanation. Perhaps it is true that because they are able to take no better nourishment, certain women have the whites.

Metrorrhagia, Dysmenorrhœa.—Menstrual troubles may occur with uterine disease, but it must not be supposed that they are constant. Dysmenorrhœa, or painful menstruation, is often observed in metritis from the same mechanical obstacle to the flow which induces the inflammation (flexion, narrowness of the cervix, etc.). Amenorrhœa is chiefly due to anæmia; for though metritis which has lasted a long time may debilitate the patient, still its influence is indirect.

Metrorrhagia, on the contrary, is directly dependent on the uterine inflammation, and is most often seen when the mucous membrane of the body is affected in interstitial metritis (either primarily or following fibroma and carcinoma), the loss occurring during the regular periods or at other times. In the first case we speak of it as menorrhagia, in the second as metrorrhagia.

Most of the uterine diseases are an obstacle to conception; but the sterility is not absolute, for pregnancy may occur with cancer and fibroma, and the same is true of metritis. But abortion is frequent in these diseases.

Symptoms from Adjacent Organs and Reflexes.—Apart from pressure

effects, which do not enter into this general description, or properly belong to metritis, there are always symptoms from adjacent organs in all affections of the uterus. Patients complain of pain in urination, frequent micturition, or it may be of vesical tenesmus. Every disease of the uterus affects the bladder more or less, and yet the patient may not call the attention of the physician to the vesical disturbance. When it is necessary to use a catheter, cystitis may follow if antiseptic precautions are not observed.

Since patients avoid going to the water-closet, on account of the efforts involved and consequent pressure on the uterus, they defecate as little as possible and become habitually constipated.

Uterine Dyspepsia.—There is no function upon which uterine disease reflects more constantly than on the digestive, and ignorance of this fact may cause grave errors of diagnosis. Such a dyspepsia is explained by reflex action from the nervous system; to understand it, the peculiar richness of the sympathetic innervation of the uterus and stomach need only be recalled to mind. Dilatation of the stomach is very common in metritis of long duration, with all its train of symptoms so well described by Bouchard and his pupils. The subject deserves renewed study, for dilatation from uterine cause has not as yet been thoroughly described; I have already collected a number of observations upon it. But to dyspepsia, or inactive digestion, the attention of gynæcologists has for a long time been directed, though their descriptions are but brief; Bennet and Courty have mentioned it without insisting upon it. More recently important memoirs have appeared upon the subject. These patients suffer from loss of appetite, nausea, and a peculiar form of flatulence, which occurs as a chronic tympanites, so that the abdomen enlarges till the end of the disease, however much the patient may have lost flesh. This meteorism is very troublesome and interferes with abdominal palpation and bimanual exploration.

Respiratory Reflexes, Uterine Cough.—Patients with uterine disease very frequently have a dry cough, occurring singly or five at a time, even though there may be no trace of disease in the respiratory tract and the hysterical element can be eliminated. It is generally a small choking cough, but may be so metallic and sonorous that both the patient and her friends are alarmed. Aran has described this briefly; one of my pupils has devoted to it a more complete study. Its peculiarity is that there is no auscultatory symptom, that it disappears with the uterine lesion—displacement, metritis, etc.

Symptoms Referable to the Central and Peripheral Nervous System.

Neuroses and Neuralgias of Genital Origin.—We can explain the pathogeny of these reflexes by the richness of the innervation of the genital organs, which are supplied from the great sympathetic through the hypogastric plexus, and from the cord through the internal pudic (Fig. 132). Neuralgia

is very common. Intercostal neuralgia is so constant that Bassereau claimed that it was always connected with metritis. We find also faciai neuralgia, and lumbo-abdominal with radiation of the pain along the cutaneous femoral branches, particularly down the left thigh.

Simpson and Scanzoni have insisted upon sacral neuralgia, which they have made the subject of monographs under the name of coccygodynia. An attempt has been made to refer peripheral neuroses to the sensory nerves. Clifton S. Morse describes a form of asthenopia dependent upon uterine disease.

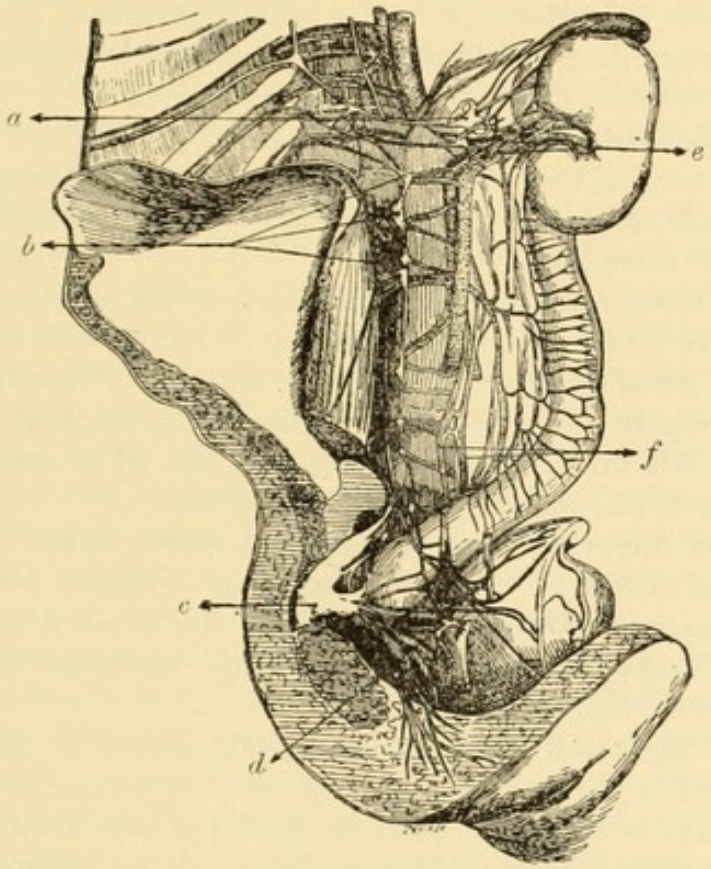


FIG. 132.—GENITAL NERVES OF THE INFANT. Right side. *a*, Right cœliac ganglion; *b*, first, second, and third lumbar ganglia; *c*, sacral ganglion; *d*, cervical ganglion; *e*, renal ganglia; *f*, hypogastric plexus.

Lastly I may mention cardiac palpitation, both reflex and due to anæmia.

I will not insist upon the general nervous troubles, which are of great diversity. The nervous symptoms cover all the forms of hysteria; not that we have a veritable hysteria, though it may rarely be present, but that alterations of the nervous system, in women, almost always take this form, especially where the uterus is the point of departure.

It is certain also that any genital disease in a woman predisposed to hysteria will produce a development of that neurosis; thus we can explain both the intensity of the symptoms caused by slight ailments, like Emmet's "cicatricial plug," and the marvellous success of certain operations. How can we defend the diagnosis of hysteria when we read observations like that

of Mundé, of an attack of sciatica or catalepsy produced simply by pressure upon the cicatrix of a laceration, all such attacks disappearing after operation? One might almost believe in a special pathology for the hysterical, and special chances of successful treatment, and expect unhoped-for results with means which remain useless where the nervous system is not hypersensitive.

There is another consequence of uterine disease which is often seen with metritis, displacement, etc., which may last through many years. This is a peculiar asthenia, an excessive depression of the nervous system which renders the patient incapable of all effort, although there is no loss of muscular strength or other deviation from health corresponding to this languor. This must certainly be attributed to morbid reflex action.

Finally we shall see, in studying displacements of the uterus and diseases of the adnexa, that there are grave nervous troubles present at times, like chorea, epilepsy, etc., which depend directly upon them and which are curable at the same time.

General Condition.—The pain which prevents exercise, the dyspepsia which impairs alimentation, the condition of the nervous system which has a depressing influence upon nutrition, all combine to alter the patient's general health rapidly, to give her an habitual chloro-anæmic color, a muddy complexion, dark circles under the eyes, and the air of suffering, which together complete the picture of the facies uterina.

It is this combination of rational signs which makes up the syndroma common to all diseases of the internal genital organs, but which is most marked in cases of metritis. The study of the physical signs, revealed by direct examination, permits now the precise statement of the characters proper to uterine inflammation.

Physical Signs.—By touch, which should always be practised with bimanual palpation, we find the cervix increased in volume and altered in consistence, except in those rare cases in which the body alone is involved. It is larger and more open than normal, with a velvety or greasy feel when its surface is ulcerated; and in places there is the sensation of a number of little hard grains, which are glandular cysts. The finger discovers, moreover, the lacerations upon which I have dwelt in the section on pathology. If this examination is not painful, the ballottement of the uterus, performed by giving a rocking motion to the cervix, hurts severely, and Gosselin lays much stress upon the clinical importance of the fact. Touch also informs us whether the cul-de-sac is free; the uterus being then perfectly movable.

The first examination with the speculum should be made by preference with Brewer's bivalve or with two single blades of Simon, in the lithotomy position. It discloses a very large cervix, of altered form, which at times fills the depths of the vagina: in nulliparæ, instead of being conical, as it should be, it is cylindrical; in a woman who has had children, it is often swollen, and if there has been a laceration, it may be peculiarly figured and

of various forms. The color varies between bright red and violet. A discharge of viscid mucus, at times very purulent or mixed with bloody threads, escapes from the cervix; by the repeated gentle pressure of the speculum it seems to be milked from the organ. The surface of the part presents an eroded aspect, the apparent loss of substance being at times small and disseminated over the surface (the folliculitis of authors), resembling a slight vesication (erosion), or deep, smooth and polished, or granular (ulceration); at times yellowish grains indicate the superficial cysts called Naboth's ovules. Lacerations are often less perceptible to the sight at the bottom of the speculum than to the touch, and the ulcerated surface is far less displayed by a cylindrical speculum than by a bivalve.

To separate the lips and see into the cavity of the cervix, one can use Courty's forceps or two tenacula. Rectal is a useful addition to vaginal touch, but it may be negative in simple metritis.

The use of the uterine sound demonstrates in most cases an increase in the depth of the uterine cavity which may reach as high as 8 cm. (3½ in.). When the sound passes deeply in, there may be another explanation for it than metritis. When the uterus is displaced to one side (which often happens in deep laceration, where it is bent toward the torn side), the sound does not measure the exact height of the organ, but that of a line obliquely directed toward the cornu opposite the side to which the uterus is bent—thus there is an apparent elongation which does not really exist. To rectify the error when there is reason to suspect its presence, the uterus can be raised by bimanual palpation or the patient may be placed in the genu-pectoral position, which straightens the uterus considerably.

The sound often causes pain, but it is an exaggeration to say with Veit that one can thus determine the exact point where the inflammation is most marked. In reality it is often the movement of the organ as a whole, rather than the friction of the mucous membrane, that causes the pain. The escape of blood as soon as the sound has passed is a sure indication of altered mucous membrane: if there are fungosities present they can usually be felt by the sound.

The Different Forms of Metritis.

Acute Form.—At the beginning of a metritis there is often a chill with fever. Such acute phenomena are at times present in the course of a chronic metritis as the result of some special fatigue or at the menstrual epoch. However, it may be, when the metritis takes this form either acutely or gradually, direct exploration reveals the peculiar sensitiveness of the organ, the heat of the vagina, where the finger perceives a throbbing at times, the redness and swelling of the external os—in one word, all the classic signs of inflammation. They usually disappear very quickly, but may return if there is a renewal of the cause.

Catarrhal Form.—In this form two features predominate, namely, the erosion of the cervix and the leucorrhœal discharge. I have already described the appearance of the eroded cervix and do not need to repeat it.

This form is observed most often in young women and is accompanied with reflex nervous symptoms (palpitation, dyspepsia, etc.) which I have already enumerated. The principal portion involved is the region of the cervix; it is the cervical catarrh of authors. I believe it a mistake to describe it as a circumscribed lesion, for there is always a concomitant alteration in the mucous membrane of the uterine body, and in therapeutics of the part this must not be neglected, or our treatment will disappoint us.

Hemorrhagic Form.—Here, to the contrary, it is the uterine body which especially suffers, while the cervix may remain comparatively healthy. We meet with this form chiefly in young girls at the establishment of menstruation and in women near the menopause; it is also the form most common after abortion, when the almost invisible particles of the decidua graft themselves on the mucosa and set up a lasting inflammation. Early abortions are often unrecognized and their pathogenic influence is felt more frequently than is supposed.

In the catarrhal and hemorrhagic forms which have lasted a long time, we observe those profound alterations of the mucous membrane of a vegetating, fungous nature which we call polypi. This exuberant proliferation of the interstitial and glandular elements may also be found on the cervix; it then appears externally and constitutes a new symptom, but that fact does not warrant us in giving the affection a new name. Mucous polypi and follicular hypertrophy of the cervix are lesions of metritis and should be described with it both anatomically and clinically. I have already described their histological nature above. The appearance of these polypi recalls that of the nasal variety: they are red or violet in color, of the size of a hazelnut, sometimes furnished with a pedicle, sometimes sessile. It is easy to recognize them by touch or speculum.

Follicular hypertrophy of the cervix is due to a glandular vegetation in the thickness of one of the lips, which thus presents a hypertrophic elongation and a soft consistence, is marked by many fissures, and can be brought down to the vulvar orifice or even lower.

The polypi give rise to frequent serious bleeding; the elongation is an accompaniment of the catarrh.

The hemorrhagic form may cause almost continual losses through many months, with very short intervals; some women are thus brought to an extreme degree of anæmia. The discharge of the blood occurs most often without colic; the patients complain only of more or less intense lumbar pain, and present various neuralgic points.

Chronic Painful Form (Chronic Metritis, Engorgement, Uterine Infarction).—I have called this the painful form, for the pain and its consequent weakness are the chief features.

It is absolutely false to represent chronic metritis as the sequel and residue of an acute attack. It is far more correct to say that it is the result of an infection which has developed slowly, slumbering a long time after the infecting cause has disappeared; a state of things which Verneuil has described as latent microbism. Such a case has an insidious course, deceiving respites, and unnoticed exacerbations; so that there are many points in an old focus of osteitis which clinically resemble a case of chronic metritis, for in the intervals between exacerbations, both the one and the other are more of an infirmity than a disease.

Sometimes the case is one of localized puerperal infection, of a very slow course. The delay in the normal involution, the engorgement as certain authors say, is characterized by an abnormal volume of the uterus, a feeling of weight, pain in the loins, discomfort in standing or walking, and dysmenorrhœa. These first symptoms may be unnoticed during the early months; the woman feels ill after some unusual fatigue, attributes to this cause all her trouble, and forgets the already distant labor or abortion. Later on the pain becomes more severe, and enforces more or less complete repose. The local examination reveals a different condition according as it is made during the exacerbations or at other times. In the former case we have the signs already described with acute metritis. At other times we find the cervix somewhat swollen, hard, perhaps sclerosed, often of very irregular form, due to old lacerations, of an almost wooden consistence in places, and at other points feeling as if covered with small nodosities like grains of shot (glandular cysts). The speculum discloses this granular appearance and a variable congestion which often has a very characteristic coppery look. If there are lacerations, one can observe the ectropion of the mucous membrane, but there is seldom any such fungosity of the ulcerated surface as in the catarrhal form; it is far more likely to be smooth as in a cicatrizing ulcer. Touch often reveals an accompanying displacement; but the sound does not give any marked increase in the depth of the organ.

There is one variety of chronic painful metritis which deserves a special description; it is that which passes under the name of membranous dysmenorrhœa, exfoliating endometritis, or decidua menstrualis. The capital symptom is the painful extrusion at the menstrual period of all or a part of the uterine mucous membrane; this presents the histological alterations of acute inflammation (acute endometritis, Fig. 99). These patients may suffer very little between their periods, though indubitable signs of metritis are present, such as leucorrhœa. Many authors, however, have overlooked this source of the disease and made it a distinct variety of metritis. Others, as Schröder, have seen the relation: he says in one place, "Chronic catarrh is found so often that it may be considered as the cause of the disease." If the origin of the affection be sought, we find almost always that it followed labor or abortion, more rarely that it appeared at the establishment of menstruation (the importance of these phases of the genital life in the development

of metritis is well known). This disease may then be described as a chronic metritis with acute exacerbations and inflammatory desquamation of the mucous membrane at the time of the regular period. Therefore it enters clinically into the chronic form, and anatomically belongs to the acute. At times the membrane is passed in shreds; at other times the sac is complete, and the form of the uterine cavity can be recognized, the internal surface being grooved in little furrows, the external being irregular and jagged. This membrane must not be confounded with the product of an abortion, where an attentive examination (especially after short immersion in picric acid) reveals the chorionic villi. On the other hand, the presence or absence of cells of the decidua is not pathognomonic.

This special manifestation of chronic metritis lasts until the menopause, unless energetic treatment is begun; it may accompany menorrhagia. Although it usually produces sterility, pregnancy may occur, with a return of the disease after labor.

Course, Prognosis.—All the forms of metritis are rebellious; the mucous membrane, the muscular tissue, the parenchyma, become involved in turn; then follow uterine sclerosis, cyst formation, etc. Sometimes the sequel is the morbid condition which we know as chronic metritis, for every case which is not rapidly cured tends to become chronic. Scanzoni asserts that he has never seen a case of chronic metritis cured, but he does not distinguish clearly enough between that and salpingitis.

Does metritis predispose to cancer? We have seen that a number of foreign authors do not hesitate to say that the combination of cervical catarrh and a laceration offers favorable conditions for the appearance of carcinoma (epithelioma). An inflammation of the mucous membrane of long duration, when it takes the glandular form, may lead to the formation of adenoma; now, when the epithelial vegetation passes the limit of the cul-de-sac, the typical adenoma becomes atypical, and by a progressive transition an actual cancer of the cervix is produced.

Diagnosis.—The causes of error may come from exaggeration of one symptom, or from neglect of concomitant signs.

The increase in size alone, or with the dyspeptic symptoms, may simulate beginning pregnancy, especially if there is amenorrhœa; the question can be determined by waiting or by careful examination, avoiding the use of the sound.

The abundance of the leucorrhœa with the cervical laceration may give the idea of cancer; the characters of the one and the other are, however, very different. In cancer the discharge is not muco-purulent and viscid, but serous, of a reddish color, having a peculiar stale smell: the ulceration is seamed, sown with yellow points, and bounded by hard borders when it is not of a cauliflower form; it destroys the supporting tissues so that there is a marked loss of substance, which is never found in the pseudo-ulceration of metritis. The hard and nodular swelling of the cervix, due to the devel-

opment of sclerosis and cysts together, gives to the finger the feeling of cancer, it is true; but puncture of the cysts and incision of the cervix to remove the congestion will make the diagnosis very clear. If necessary, a small section may be cut from the part and examined by the microscope.

Strong regular pains, a very tenacious discharge of fetid muco-pus mixed with blood, a great increase in the size of the organ, and the examination of pieces removed by the curette, confirm the diagnosis of carcinoma of the uterine body.

The metrorrhagia produced by an early abortion must not be confounded with hemorrhagic metritis; the study of the matters expelled and the patient's antecedents should enable us to decide.

Fibrinous polypi, or better placental, are nothing but the débris of the placenta or chorionic villi which have remained planted upon the uterine mucous membrane, and which may continue their obscure life there through many weeks or even months after labor or abortion. The patient's own story, and the examination of pieces scraped away with the blunt curette, will soon show what is the origin of the little tumor.

Fibrous polypi, if intra-uterine, may give rise to a symptom-complex like that of metritis with abundant hemorrhage. Examination by bimanual palpation, the uterine sound, and, if necessary, dilatation of the cervix, should prevent error here.

Salpingitis, as I have said, often coexists with metritis. The diagnosis consists in deciding which of the two lesions predominates, and gives, therefore, its character to the malady. Bimanual palpation, perhaps with the aid of anæsthesia, should be employed to discover the condition of the adnexa. If they are not augmented in volume but only a little painful on palpation, while the uterus presents the objective signs which have described, the diagnosis is clearly metritis.

I have described the existence of metritis symptomatic of primitive and non-inflammatory disease of the adnexa; by that I mean that a lesion of a tube, an ovary, or a broad ligament may be reflected in the uterus. It is difficult to say in what way the uterine mucous membrane becomes affected, but we cannot deny that it does alter. A small ovarian tumor has been the starting-point for profuse bleeding, with hyperplastic endometritis which was confirmed by autopsy. Brennecke and Löhlein, who reported cases of this kind, thought that reflex hyperæmia caused by the ovarian irritation was sufficient to produce the mucous hyperplasia. It must be acknowledged that this state of permanent congestion creates a peculiar morbid receptivity, owing to which the numerous causes of infection—germs dwelling within the vagina and germs from without—are able to exercise their evil influence and overcome an organization already enfeebled by inflammation.

As regards diagnosis, there are two well-established facts which the clinician must not forget:

1. There is but a narrow limit between inflammations of the uterus and

of the adnexa; we should always seek for the latter, therefore, because whether it be protopathic or deuteropathic, its existence may become very important in consideration of operative interference.

2. Alterations in the ovaries, whether inflammatory or not, may simulate metritis by their reflection upon the uterine mucous membrane; the alteration, at first simply congestive, tends to transform itself into a veritable inflammatory lesion.

Cystitis may occur with inflammation of the uterus or resemble it by the pain which it causes. The same is true of proctitis with tenesmus and a glairy secretion (anal leucorrhœa), which we see at times appearing with an acute metritis with which it is connected. In such a case we must be careful not to see the effect and overlook the cause. I have seen a sphincteralgia in one case, which yielded to the cure of a catarrhal metritis. Very exceptionally a rectal disease provokes symptoms of pseudo-metritis. I have published a case of rectal polypus which for a long time gave rise to signs which were thought to be due to metritis. Rectal touch enabled me to discover the cause of the disease and cure it by removal of the polypus; the patient had mistaken for metrorrhagia a bloody discharge which really came from the rectum.

The disturbance of the general health is often so severe that it entirely masks the local lesion. The patient may complain of persistent cough, or loss of breath, or progressive emaciation, and say little about her leucorrhœa and abdominal pain. One is often inclined to think of pulmonary tuberculosis until auscultation reveals the error. With other cases it is the symptoms referable to the stomach which predominate; loss of appetite, flatulence, gurgling, with percussion and succussion, demonstrate the existence of dilatation of the stomach. It is present, but is only symptomatic of a metritis of which it is a sequence. Finally the number of young women who suffer from precordial anxiety, palpitation, and in whom the stethoscope reveals cardiac and vascular murmurs, is very large. On examining the uterus also, we very quickly recognize that we have to deal with a metritis, or, less probably, with a lesion of the adnexa.

The rule should be, therefore, to carefully examine the uterus in every woman with a chronic disease.

CHAPTER VII.

TREATMENT OF METRITIS.

THE prophylaxis of uterine inflammation made a great step forward when antisepsis was first followed in obstetrics. It is to a more or less localized and attenuated puerperal infection that the majority of cases of metritis are due.

The complete cleansing of the uterine cavity after labor and abortion of all débris of membranes and placenta has a capital importance here. In my opinion, the discussion whether expectance accomplishes more than active interference is all wrong. Budin has raised his voice too loudly against what I call the exaggerated fear of accident from the expectant plan. He bases his ideas upon statistics of all cases treated in the maternity service of la Charité during a period of three years, comprising forty-six retentions in two hundred and ten cases of abortion: did he notice that septicæmia occurred but four times, and only once with a fatal issue?

Budin combats hemorrhage by tampons, septic accidents by vaginal and intra-uterine injections of sublimate (1 : 2,000 or 1 : 3,000) or carbolic (20 or 30 : 1,000), with quinine internally. Surely one can, no doubt, thus remove the immediate trouble, but is it the same with the sequels, metritis and salpingitis? As surely not! Are the patients really cured who have escaped from death? For my part I cannot combat this therapeutic cowardice enough. If there is reason to fear that a portion of the fœtal structures has been left within the uterine cavity, no time must be lost before making exploration, thorough cleansing, and disinfecting; do not await the appearance of hemorrhages, for by that time the mucous membrane is already infected. The dull curette of Récamier, and weak injections of sublimate, are the best means at hand.

After thorough use of the curette, followed by a hæmostatic injection of perchloride of iron and antiseptic irrigation, the temperature is seen to fall one or two degrees if it has been high before; one can prevent fever and insure rapid recovery where the decomposition of the débris has not yet begun. The "écouvillon" (or scraper) which has been advocated for this purpose, is an altogether unsuitable instrument, as is shown by a case ending in death published by one of its partisans. It is evident, *a priori*, that it has not sufficient force to detach by scraping the often firmly adherent débris.

Before mentioning the special treatment suited to each case I will describe the therapy which is applicable to all alike.

It has been recommended to immobilize the abdomen with a bandage

of ticking, elastic tissue, or a band of flannel making two turns round the body, a little obliquely from above downward; this affords much comfort in walking.

All fatigue and all violent efforts must be forbidden, and the sexual relation given up.

The constipation is best combated by means of proper food (vegetables, Graham bread, prunes, etc.), mild laxatives (mineral waters, rhubarb and magnesia, etc.) and enemata, to which we can add a spoonful of glycerin. Certain patients find it well to take at meals a spoonful of white mustard in

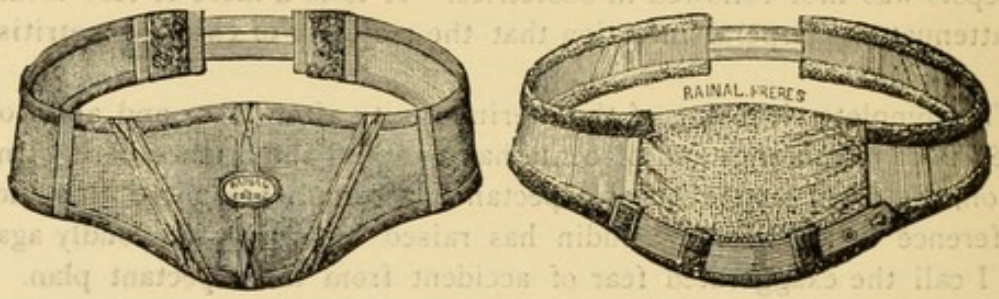


FIG. 133.—ABDOMINAL BANDAGES. *A*, Of elastic stocking tissue; *B*, of webbing for stout women who do not stand compression well.

water; this mechanically provokes hypersecretion and contraction of the intestine. Long-continued use of drastic purgatives, like aloes, podophyllin, etc., has its own inconveniences, but we have to employ them at times. It is very important to unload the large intestine and thus relieve the pelvic viscera.

The patient's general condition must be kept up by tonics which are suited to her; for women who are of a lymphatic temperament, cod-liver oil and phosphates; for the arthritic, preparations of arsenic; for almost all, iron, with quinine and rhubarb, may be administered with success. Lastly hydrotherapy is a powerful auxiliary, especially where the metritis has produced anæmia and nervous symptoms, as it so often does.

There is no other disease in which mineral waters have been so strongly recommended. They certainly have a good effect on the general state, and indirectly on the local. I think that the chief indication is to take care of the patient's general condition and of the reflex disturbances of the chief organs which may be produced by the uterine disease. If the patient is very anæmic, we prescribe in preference ferruginous waters, or sulphur and arsenical with sea-bathing; for dyspeptics, alkaline waters and gentle purgatives; for the nervous, indifferent waters, but a spa which is pleasantly situated and on high ground. Finally, springs charged with chloride of sodium have an incontestable action, not only on the scrofulous and lymphatic constitutions, but also on all visceral congestion, and may be of real benefit in the beginning of certain forms of chronic metritis in which the engorgement of the body predominates without great alteration in the cervix.

Special Treatment of each Form.

In acute metritis the rest in bed must be absolute: sitz baths are prescribed with the introduction, while in the bath, of a small speculum, which allows the water to reach the cervix; and repeated mild purgatives should be given. If the pain is very severe, it may be calmed by laudanum in the vaginal douche or by opium suppositories. The daily application of a glycerin tampon, which is left in place twelve hours, is an excellent antiphlogistic; the glycerin, having an affinity for water, causes considerable flow of serum. The patient can be taught how to introduce the tampon herself, with the aid of a cylindrical speculum which she guides by a long handle; the speculum is then withdrawn, leaving the tampon in place.



Fig. 134.—Bath Speculum.

Hot vaginal douches (45° to 50° C.) kept up for a long time are of great service. This therapeutic measure, advised by Sédillot and Trousseau, generalized anew by Emmet and other American and English gynæcologists, is capable of many applications, but it is well to give precise directions for its employment.

The injection, or better the irrigation or hot douche, should be taken by the patient lying at the edge of the bed, her legs supported on either side by a table or chair, and the pelvis a little elevated. For greater convenience a basin or a piece of rubber tissue should be placed under the buttocks, folded along the edge into a gutter and leading into a pail below (Fig. 58). The vessel containing the water should hold not less than three litres (Fig. 2); it is filled with water at 45° C. (115° F.) (there is always a loss of two degrees in passing through the apparatus), and raised about one meter above the patient. The vaginal tube is then gently pushed up as far as the cervix. It is well before beginning the injection to cover the vulva and perineum with vaselin; the action of the hot water is then less disagreeable. From three to ten litres may be used at one time and the douche repeated twice a day; after each, it is well to pass two fingers into the vagina and depress the fourchette strongly to allow the escape of the accumulated water; then a glycerin tampon may be introduced and the patient ordered to rest an hour in bed. That the acute stage may not be too prolonged, we may have recourse to scarification—local blood-letting. The scarificator (Fig. 135) can be used for this purpose, but there is no need for a special instrument. An ordinary bistoury, round which is rolled a band of diachylon that leaves only about one centimetre of the blade free, will do as well.

After the vagina has been well irrigated, a cylindrical speculum is passed in and the cervix displayed; then it is pierced in a dozen different points without going far beyond the external os. To render the little operation antiseptic and aid the flow of blood, a continuous irrigation of warm carbolic

solution (1 : 100) is kept up. This is very easy to do with the little funnel which I have adapted to the speculum (Fig. 72). When the blood has flowed long enough, the speculum is removed, the vagina emptied, and a tampon of iodoform gauze placed upon the cervix, which stops the bleeding.

This method is much better than the use of leeches, does not require anæsthesia, being painless, and may be repeated as often (every other day) as deemed necessary.

Exfoliative metritis or membranous dysmenorrhœa is both anatomically and clinically an acute metritis, or better the acute stage of a chronic metritis. Generally every other treatment than curetting fails. This means, on the other hand, gives excellent results. It should be followed by an injec-

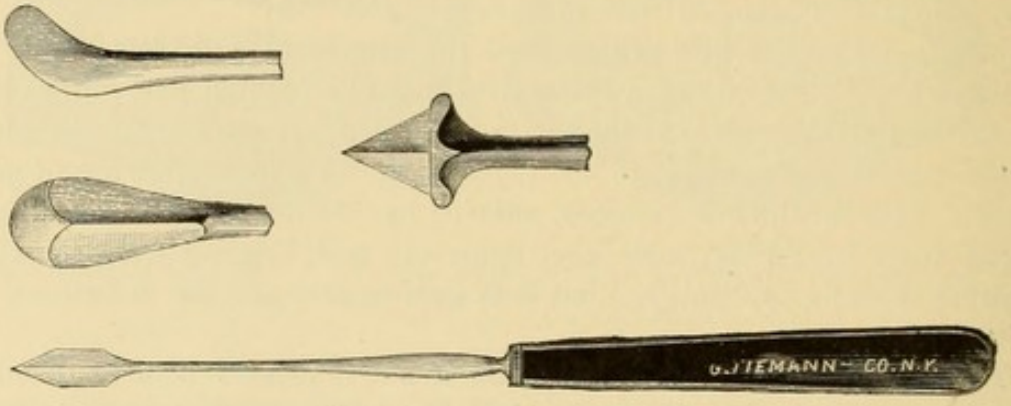


FIG. 135.—CERVICAL SCARIFICATORS.

tion of tincture of iodine. If there is at the same time stenosis of the cervix, both that and the pain are treated at once by dilatation with laminaria tents or the steel dilator.

Landowski has published cases successfully treated by the galvanocautery; the method is a good one, but I consider the curette more expeditious.

Acute gonorrhœal metritis should be energetically treated by antiseptic and slightly caustic vaginal and intra-uterine injections. Alph. Guérin has described the good effects of an intra-uterine injection of a weak solution of nitrate of silver (gm. 0.05 to gm. 30 of water). Fritsch has recently recommended the use of chloride of zinc, 1 : 100, for the vagina; more concentrated for intra-uterine cauterization. Both the vaginitis and the endometritis, which depend upon each other, may be treated together. We may find in any case that the inflammation has already disappeared from the vagina and taken refuge in the uterine cavity or the urethra; it is in this latter place that we seek the last traces by which to characterize the nature of the uterine affection. For the vaginitis and the urethritis injections of bichloride have always given excellent results, joined with the use of crayons of iodoform. Acute gonorrhœal metritis should not be treated by curettage, which is liable to increase the infection; it is better to employ intra-uterine cauterization with nitrate of silver or chloride of zinc (1 : 20), and to

use intra-uterine injections of potassium permanganate (2 : 1,000) by means of a double-current catheter.

Catarrhal Metritis.—The general treatment already described should be most carefully followed; this is the form in which chloro-anæmia very rapidly appears, and the general treatment must aid the local as much as possible.

This is also the form in which it is most necessary to maintain entire cleanliness and rigorous antisepsis of the vagina; thus one acts indirectly, it is true, but very efficaciously, upon the cervix, which is often the part most deeply affected. By advising the patient to rest in bed after the morning injection, and to take the evening one in bed without rising afterward, a certain quantity of the medicated liquid is kept in the upper part of the canal, making a kind of local bath which is of excellent effect. The 1 : 3,000 solution of sublimate is the best for injecting, but it must not be continued for too long a time, because of the danger of mercurial poisoning. Other good injections may be made by adding to a pint of water a tablespoonful of powdered tannin, or two of boric acid, or a dessertspoonful of alum in powder.

To cure metritis completely it is necessary to attack the interior of the organ. The three principal procedures of intra-uterine medication are: antisepsis, cauterization, and curetting, employed together or singly. To these it is often necessary to add surgical treatment for the cervical erosions and lacerations which play so important a part in the catarrhal form of the disease.

I will follow this order in the description of the different therapeutic measures.

Cleansing of the Uterus.

(*a*) *Intra-uterine Irrigation.*—Large injections of some feeble antiseptic must not be confounded with the use in smaller quantity of agents which are more powerfully caustic. Schultze has especially praised this method. He dilates the cervix with laminaria, introduces a uterine catheter, and washes the cavity with a copious injection of weak carbolic solution (1 : 50). This treatment is not enough in obstinate cases, and I think it should be reserved for those light attacks in which there is no great change in the mucous membrane, for there it is useful. The injection may be given every day through a two-way catheter; if there is any difficulty in introducing it, the cervix should be dilated by tent or instrument; a half-litre is used at a time. When the patient does not soon recover after the employment of these simple measures, we must have recourse to cauterization and the curette.

(*b*) *Drainage.*—Fehling employs glass drains pierced with holes; Ahlfeld, hollow cylinders of rubber; and Schwartz wicks of spun glass which act by capillarity. It does not seem as if these devices had given as good results in the hands of others as their authors and their pupils have obtained. I believe that the presence of a foreign body in the uterus would be more likely to keep up the metritis than to cure it. It is otherwise with the capillary drainage of a piece of iodoform gauze described in the next paragraph.

(*c*) *Tampons.*—Fritsch, since 1882, has employed the following measure in gonorrhœal metritis: he passes into the uterus a strip of iodoform gauze 75 cm. in length and 2 to 3 cm. broad, packing it into the cavity "as one fills a hollow tooth"; then he removes it and repeats the manœuvre, thus thoroughly cleaning the uterus. After this he introduces another, allows it to remain twenty-four to forty-eight hours, and if it produces colic it is removed by pulling the end which hangs out of the vulva. As is easily seen, this procedure has for its object both the cleansing and the antisepsis of the uterine cavity. But it seems to me much less active than curetting

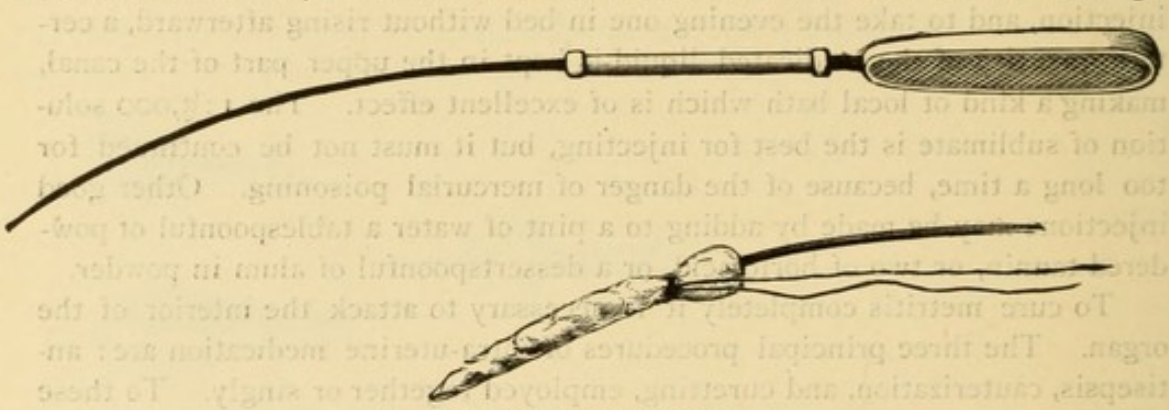


FIG. 136.—SLIDE APPLICATOR.

followed by cauterization, and I reserve the uterine tampon for energetic disinfection when it is necessary (as in cancer of the body, sloughing fibroma, etc.), or I employ it as a hæmostatic after enucleation of fibromata.

(*d*) *Sweeping with a Tampon and Scraping.*—Many gynæcologists content themselves with dilating the cervix and cleansing the uterine cavity by means of a pledget of absorbent cotton rolled on a handle. This is very simple, and the cotton will be securely held on the handle if the end of it is a little irregular; a sound with no terminal enlargement is all that is required (Fig. 136). It is easy to make pledgets of tapering form, so that they can be passed into a cervix but little dilated. It is well to soak these in a 1 : 1,000 solution of bichloride, or carbolic 1 : 50, to gently squeeze the excess out before introducing them, and then to turn them about within the uterine cavity so that the walls of the organ shall be thoroughly wiped clean. The last tampon may carry the caustic.

Doléris prefers to this simple means the employment of a scraper like that used in cleaning bottles (Fig. 137); the instrument, designed to brush the interior of the uterine cavity, is rendered aseptic by immersion in 1 : 100 sublimate solution, and then introduced by a spiral motion, which is kept up in different directions until it is removed. Both the scraper and the tampon may be charged with various medicating solutions. Doléris thinks that by using scrapers with harder or softer bristles, he can effect both a cleansing and a scraping of the mucous membrane, with destruction of it if necessary. That this is an illusion will be clear to all those who are accus

tomed to use the blunt curette, and know the amount of force necessary to remove the membrane with a dull instrument; it seems to me impossible by simple friction of the mucous membrane with a brush to destroy its elements.

The instrument is, therefore, illusory, and, like the tampon, cannot be successful as a means of either cleansing or medicating the uterus. From this double point of view, it is not much superior to the tampon, which I employ almost wholly for the cervical cavity, preferring to clean the uterus by irrigation.

There are cases, especially in nulliparæ, in which the cervix is full of mucopus, but the external os is narrow and prevents the escape of the secretion. It is better then, instead of dilating, which would require to be repeated,

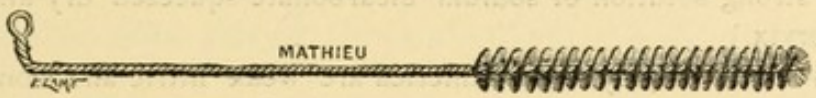


FIG. 137.—DOLÉRIS' ÉCOUVILLON.

to make a small crucial incision of the orifice; this may be done with scissors curved on the flat or a probe-pointed bistoury, and the cut should be about 1 cm. in depth. This will make applications to the interior of the cervix easy, as well as complete examination of the part and the decision of the question whether a more energetic treatment is necessary: the small incisions heal very quickly.

Intra-uterine Cauterization.—The employment of solid caustics—such as Becquerel and Rodier's medicated crayons, Courty's pencils of nitrate of silver left in the uterine cavity, which Spiegelberg removes with a catheter and a metallic thread: the uterine pistol of E. Martin (senior), imitated by Storer; and the porte-caustic of Dittel—all have the common defect that they blindly leave in the uterus a caustic with an action either too strong or too feeble. The direct momentary application of the agent by a porte-caustic is preferable: but beforehand the cavity should be thoroughly cleaned by irrigations or tampons.

Dumontpallier, as Polaillon had already done, introduces into the cavity a pencil of Canquoin's paste (chloride of zinc 1 gr. to 2 or 3 grs. of rye meal). He produces thus a destruction of the tissues which certainly may pass beyond the mucous membrane and, I think, obliterate the orifice of the Fallopian tube and cause contraction of the cervical canal. I have twice been obliged to remove the appendages and once to perform vaginal hysterectomy for accidents following this treatment.

Galvano-cautery has been used by Spiegelberg for a long time, and advised anew by Apostoli. It seems both less easy and less sure to me; for it may cause sterility by lining the interior of the uterus with cicatricial tissue.

Liquid or sirupy caustics are easily applied with a thin pledget of cotton

wrapped on a handle or special sound. The method has been employed by many authors since Miller and Playfair recommended it.

Rheinstädter and Broese have recently advised anew the use of chloride of zinc, dissolved in its own weight of water, as an intra-uterine caustic, applied with the cotton-wrapped applicator. This method, according to Broese, never produces contraction of the cervix, and may be repeated every week or twice a week, without confining the patient to the house. The uterus does not need to be held, and the caustic is rapidly passed in through a cervix dilated enough beforehand to prevent any difficulty in penetrating into the cavity. The contact is prolonged only one minute, and any drops which might attack the vagina are to be carefully wiped off. [In using any strong intra-uterine caustic it is advisable to protect the vagina by thin tampons soaked in a strong solution of sodium bicarbonate squeezed dry and packed about the cervix.]

Caustics much employed in America are weak nitric and concentrated carbolic acids. The cervix must be previously dilated, and certain precautions taken, or the applicator reaches the uterine cavity after most of the caustic has been squeezed out, or its strong action at the level of the cervix may cause subsequent stenosis. After such a cauterization it is necessary to cleanse the uterine cavity with great care.

Peaslee has invented a speculum designed to protect the cervix from the action of the caustic, but it is not convenient in use; a simple tube of glass, such as Woodberry of Washington employs, would be better. For the same purpose, Joseph Hoffmann wraps the end of a slender syringe tube, pierced with many holes, with cotton, and then, introducing it to the fundus, forces the fluid out by the gentle play of the piston, thus affecting only the mucosa of the cavity.

I do not employ these methods. In spite of all precautions, it is difficult, whatever may be said, to avoid contraction of the cervix after cauterizing the entire extent of its orifice. But this is not the principal objection which could be made; for unless each cauterization is preceded by a dilatation, or the intervals are employed in tamponing to retain the dilatation, one cannot be sure of penetrating well into the cavity and reaching the fundus. Thus there is a part of the diseased membrane which is never touched; while the cervical portion is too strongly cauterized, the action is *nil* above. The first cauterizations by means of injections were made a long time ago by Lisfranc and Vidal. Then followed much discussion as to the possibility of the fluid passing into the Fallopian tubes. This possibility is easily demonstrated upon the cadaver, under conditions not found in the living, but practically is very rare if two things are provided for: the canula must *not* fill the cervical canal, so that there may be plenty of room left about it for the fluid to pass out again; and no great force must be used, nor should the jet be directed in the axis of the uterus. With these precautions the injection may be made in safety; both are realized in syringes of different models.

particularly Braun's, which is made of hard rubber and may be used, therefore, with any fluid, as it does not become altered. The operation is a benign one; though we must not forget certain unfortunate cases, in some of whom there have been abnormal anatomical conditions (dilated tubes), and in others an imperfect operative technique.

Many fluids are used; the best being tincture of iodine, glycerin and creosote, and perchloride of iron. It is enough to inject about three grams, which equals the contents of Braun's syringe (Fig. 138). I use the tinc-

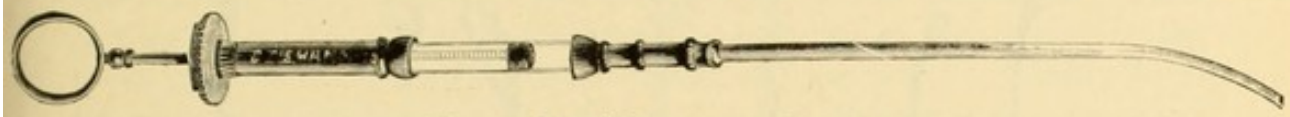


Fig. 138.—Braun's Intra-uterine Syringe.

ture of iodine a great deal, but only after a preliminary curetting several days before, followed by injection of perchloride of iron. I begin the iodine injections five days after the operation, and in very intense cases of catarrh I have done it every second day through two weeks.

I prefer the tincture of iodine in a solution of creosote (from the beech) in glycerin, 1 : 3 and 1 : 10, as Doléris recommends. The canula is introduced through a speculum, the axis of the uterus having been ascertained beforehand. If there is any difficulty, the cervix should be held firm with a bullet forceps, and gentle traction made on the lip opposite to the flexion, the vaginal walls being kept apart by the valves of the speculum. As the canula is slowly withdrawn from the fundus toward the cervix, the injection is performed with but little force. There is ordinarily no need to dilate the cervix, unless the canula cannot be freely moved about so as to effect the rapid outflow of the fluid. During the intra-uterine injection, the vagina is to be copiously irrigated to prevent cauterization of its walls.

I have seen acute pain, vomiting, and fainting follow such an injection, but never any serious accident.

The objection has been made to tincture of iodine that it causes precipitation of albumin, and the formation of coagula within the cavity of the uterus. This is an error which Nott's experience has refuted. The iodine simply makes a layer of very fine precipitation upon the mucous membrane, and its antiseptic action is thus prolonged for some time. The essential oils and aromatics, like creosote, etc., have a very fugitive action; and iodoform would be dangerous from the effects due to its absorption.

The uterine curette, which was invented by Récamier and fell into discredit, has again come into favor since the use of antiseptics in gynæcology. To-day, in France as well as in other countries, it occupies an important place in the treatment of metritis.

The choice of a curette is not a matter of indifference. There are many varieties, of which the principal are—the cutting spoon of Simon (which should be reserved for excision of cancer of the cervix and uterine fungosities

very far advanced); the sharp ring curette of Sims (excellent for detaching polypi); the flexible dull curette of Thomas, much used in America; and the dull instrument of Récamier-Roux, which Martin has adopted and which I also prefer. It presents the advantage over the ring form, that it removes with it from the cavity the greater part of what has been detached (Fig. 139).

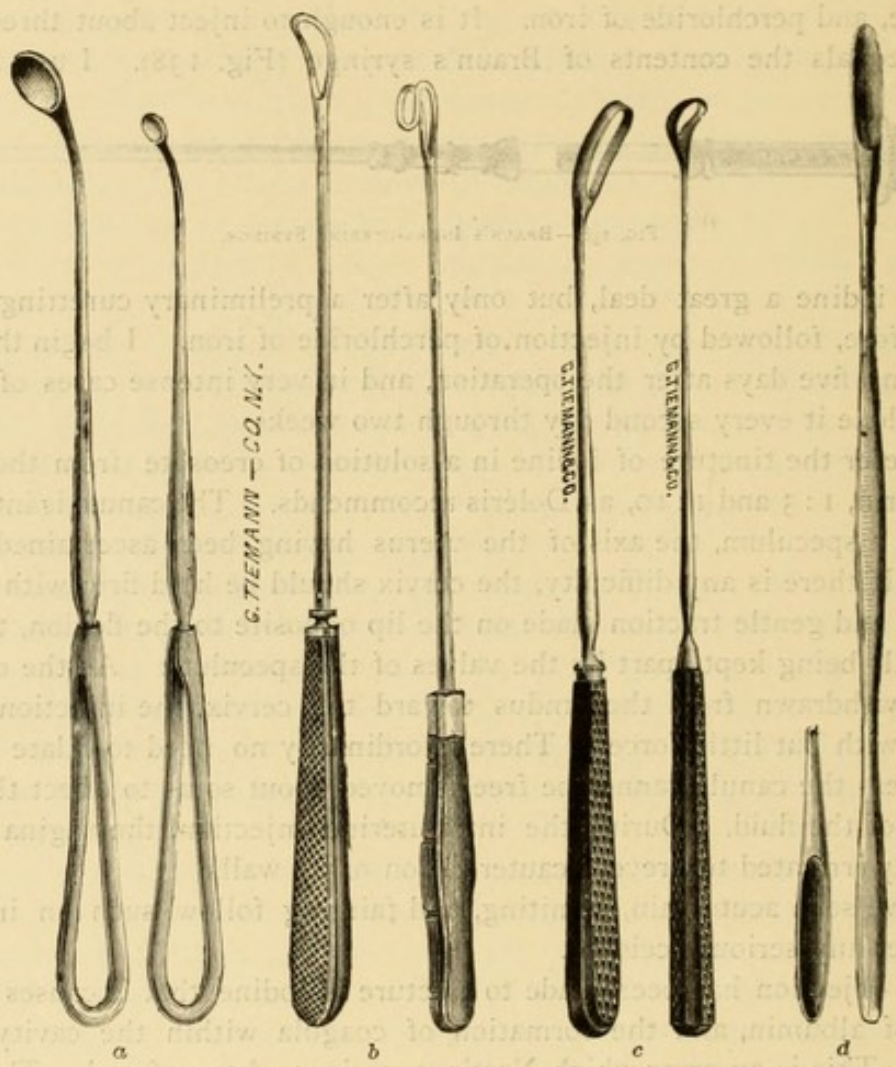


FIG. 139.—CURETTES. *a*, Simon's sharp curette; *b*, Thomas' dull curette and a hooked curette for removing débris from the uterus; *c*, Sims' sharp curette; *d*, curette of Récamier-Roux. (All these curettes should be made with metal handles.)

Curettes are made with a hollow handle and a perforated top, to permit irrigation during their use. I do not find that this simplifies the technique, and they are hard to keep clean. I am a resolute partisan of the dull (by dull I mean that the edges are thin but not cutting, like a knife blade which has not been filed) curette in endometritis. We have not here, as in cancer, to remove a resistant tissue; but simply to scrape a hard muscular wall, covered by a soft investment which is still further softened from inflammation. As is easily understood, it is enough to scrape the interior of the uterus with a narrow blade to be sure of detaching all that is not strongly

adherent—and that is precisely the mucous membrane. Dull curettes have the further advantage that with them there is the least risk of doing injury to the parenchyma of the organ, for if the force used is never too great and is always directed obliquely, it is impossible to perforate the wall of the uterus (except in the post-puerperal state).

By the curette the whole thickness of the membrane is never removed; the glands penetrate to the muscular layer, and the terminal culs-de-sac remain attached to the parenchyma in spite of all scraping, however energetic, and serve to start a very rapid reconstruction of the membrane. It is this fact which has led me to divide curetting, both in my course and in the thesis of Despréaux, my pupil, into "modifying" for metritis, "destructive" for malignant neoplasm, and "exploratory" where the purpose is to secure a small piece for diagnosis. In the two latter cases the cutting instrument is to be preferred.

The mucous membrane of the uterus is unique in its special power of regeneration. What occurs in menstruation and pregnancy demonstrates that a layer equal almost to its whole thickness may be expelled and rapidly replaced. The curette produces artificially, and for a therapeutic object, a moulting of the membrane similar to that of the decidua; it substitutes, so to speak, in an antiseptic way, a regenerated mucous membrane for one infected by germs which has already suffered such changes that its repair would be very long and tedious. After curetting, the fecundity of the woman is no more compromised than after abortion or labor. One may, however, expect the next menstruation to default, and sometimes the second or the third; I have in one case seen amenorrhœa for four months.

Technique of Curettage.—The operation should be done by preference in the first days after menstruation. Though but slightly painful, I prefer to anæsthetize the patient. The preliminary antisepsis of the vagina and vulva should be carried out according to the rules laid down in Chapter I. The patient is placed in the dorso-sacral position, and the thighs supported by two assistants; the one upon the left of the operator draws down the short, flat valve which depresses the fourchette, the other holds the fixing forceps and the canula for continuous irrigation. The patient's knees being held in the axilla, each assistant has the left hand free and can at need hold one of the vaginal retractors (Fig. 9). The cervix is drawn down to the vulva by a Museux's forceps, with teeth opposite, not over-riding (Fig. 140) which is fixed in the anterior lip. The uterine sound is first passed to determine anew the direction and depth of the canal, and then the curette is presented at the external os. Nine times out of ten it passes without difficulty; if any is encountered, the cervix is at once opened with an Ellinger's dilator or by passing one or two of Hegar's bougies. The curette is then directed toward the fundus of the uterus and the scraping is done by bringing it first over the anterior face, then the posterior, and the fundus, the angles, and the sides in turn. After a few strokes with the curette, for which some

force is necessary, the instrument is withdrawn, and at once plunged into a vessel filled with strong carbolic solution which is ready at the right of the operator. One can always pass twice over the same place and make a second curetting, supplementary to the first, following the same order along the internal surface of the uterus. The operation should be done rapidly; not more than three minutes are required. Then a double-current catheter of Bozeman-Fritsch is introduced (Fig. 8), and the surgeon, seizing the canula from which a stream has not ceased to flow gently over the cervix, fits it to the catheter and washes the uterine cavity copiously with the same hot carbolic solution which has served for the continuous irrigation (1 : 100). A



FIG. 140.—TOOTHED FORCEPS.

quarter or a half litre should be injected, until the water, at first bloody, returns but little tinted; the effects of this are hæmostatic, antiseptic, and by it the clots and shreds of membrane are removed.

The catheter is taken out and replaced by a Braun's syringe (full of perchloride of iron at 35° C., or of tincture of iodine), which is passed up to the fundus. As this is retracted, its contents are driven out little by little, scattering them through the cavity from fundus to os externum. During this time continuous irrigation is kept up with a small jet against the cervix to wash away any caustic which might escape and irritate the vagina or vulva.

The Bozeman-Fritsch catheter is again introduced and for the second time the cavity of the uterus is thoroughly washed out; this removes the excess of the caustic, whose action should be rapid, and also the last remaining clots. If there is any difficulty in passing the double-current catheter, one can, without danger, practise the injection in small intermittent jets, by the aid of the long, fine canula which has served for the continuous irrigation, taking care only that the uterus is not distended or the cervix occluded by passing the canula too deeply.

When the operation is finished, a tampon of iodoform gauze is laid over the os, which may be taken out on the second day. Every morning and evening the vagina is thoroughly irrigated with 1 : 2,000 bichloride, and, if the catarrhal metritis has been very stubborn, if the uterine vegetations have been very plentiful, or if there are signs of salpingitis, we begin to make intra-uterine injections of iodine every second day; four to eight of which constitute a complete treatment. William M. Polk advises the following method of performing curettage: after dilatation of the cervix, a small uter-

ine speculum is introduced and the cavity of the uterus is freely irrigated with a 1 : 1,000 bichloride solution. The speculum is then withdrawn and the uterus is curetted. The uterine speculum is reintroduced, the cavity of the uterus again irrigated and very carefully packed with gauze soaked in bichloride, the introduction of the gauze being greatly facilitated by the uterine speculum and special dressing forceps. The operation is finished by loosely tamponing the vagina. This tampon is removed after forty-eight hours, and after that time a vaginal injection is given morning and evening. On the sixth day the intra-uterine tampon is removed unless it has already been expelled. Several vaginal injections are then given. Finally, the author recommends operating during the premenstrual period, that is, six or seven days before menstruation. [A curetting may be easily done without assistance other than the anæsthetizer if an anæsthetic is employed, by placing the patient in the dorso-sacral position on a Kelly pad with the legs held in place by the folded sheet described on pages 70, 75. Then with the perineum retracted by an Edebohl's self-retaining speculum the cervix is easily exposed and the operation completed. I prefer the irrigating curette, as during its use all blood and débris is washed away at once before clotting can occur, and the cavity of the uterus is left clean with more certainty than when an intra-uterine catheter is employed.]

For the first caustic injection which immediately follows the curetting, I use tincture of iodine when it is a case of recent catarrhal metritis; in an older case, or where the oozing demands it, I employ perchloride of iron.

Except in cases of pronounced flexion or stenosis, the previous dilatation may be omitted in women who have had children. It is not needed for the introduction of the instrument, it is illusory as regards the escape of the secretions, for artificial dilatation lasts but a few hours, and as to the débris and clots they should be washed out by the irrigation. Now, this omission is not of trifling importance the first time; even slight dilatation is often very painful, the patient who has agreed to the operation has probably passed a sleepless night, she is in a state of great nervous excitement, and to this may be joined some fever due to the increase in the inflammation caused by the dilatation. Therefore I have given up dilatation after employing it three years, unless there is special indication for it; following in this respect the example of Martin, Fritsch, and others. The first of these observers has seen it cause serious trouble in a case of intracervical polypus which became gangrenous by its action.

To surgeons not familiar with the curette, perforation of the uterus by it seems a horrible possibility, but there is no danger of it if we operate with a dull curette and always obliquely as regards the uterine tissue, after clearly determining the direction of the organ. It must, however, be feared after labor and recent abortion, for then the uterine wall is very soft, thin, and perforable by very slight force. The patient's own statements, the size of the uterus, and the softness of the cervix should prevent any such acci-

Erosion Complicated by Laceration.—We know the capital rôle which this condition plays in uterine pathology according to Emmet. His enthusiasm has had the good effect of showing that the element of laceration, before neglected, is not, however, to be disregarded. Is it the previous inflammation of the cervix which prevents the laceration from healing, as Schröder thinks, or is it the laceration which provokes the catarrh and maintains the ulceration, as Emmet believes? I am inclined to fear that we have here one of those vicious circles that are so frequent in general pathology. At any rate, Emmet's operation, to which Dudley, of Philadelphia, has given the name of "trachelorrhaphy," cannot be performed on an ulcerated cervix until it is healed, or else we shut the wolf up in the sheepfold. Emmet lays down a preparatory treatment which lasts months; there is hence no comparison between his and Schröder's operation: the latter is designed especially for cervical catarrh, the former for nodular tissue due to laceration. For Emmet the ulceration is only accessory, the main lesion being the sclerosis which compresses vessels, nerves, and glands. For this reason I will describe trachelorrhaphy in the section on chronic metritis, since it is not a question so much of the ulcers seen in catarrhal metritis as of the cicatrices met with in the chronic form of the disease.

Lacerations, then, with extensive ulceration, demand excision of the mucous membrane, or Schröder's operation, which insures prompt healing and at the same time restores the external os better than trachelorrhaphy.

When the surface involved is not large, it may be caused to cicatrize by the application of the actual cautery or simple caustic; but this means, good enough in mild cases, should not be used where the ulceration is extensive. The granulation tissue so produced is in itself a pathological element—a fact which does not seem to have been grasped by those gynæcologists who use and abuse the hot iron.

Hemorrhagic Metritis.—The treatment may be divided into two parts—for the bleeding, which is palliative but must be at once carried out; and for the disease itself, which should be curative.

Palliative Treatment for the Hemorrhage.—The patient is kept in the horizontal position, and prolonged vaginal injections of very hot water should at first be tried; ergot is of very little use. Gallard has strongly advocated digitalis, which he says influences the symptom and the inflammatory state at the same time. He advises the infusion of the leaves (0.03–0.05 in 125 gm. of water), of which the woman drinks during the day by the tablespoonful. A remedy which I have tried with good results is fluid extract of hydrastis canadensis, in thirty-drop doses thrice a day; the medicine is also an excellent stomachic.

E. Falk recommends hydrastinine as preferable; it may be administered by subcutaneous injections, which are less painful than those of ergotin. This author reports twenty-eight cases in which he obtained satisfactory results. The drug should be given hypodermatically, employing half the con-

tents of a Pravaz syringe of a ten-per-cent solution (5 to 10 cgm. of hydrastinine).

Dilatation of the cervix or the introduction of a tent of laminaria will sometimes stop the bleeding temporarily, but the respite obtained is short. The action is due, no doubt, to contraction of the uterine body and to vasomotor reflex.

As to injection of perchloride of iron, the amelioration is only temporary, whatever may have been published of cures from its use; the patients were not followed long enough to prove any such assertions.

In case of persistent bleeding we may try vaginal tampons. I have recently used successfully a new mode of hæmostatic tamponade, which I believe was first employed methodically by me. I use sterilized silk, either in free strips or enclosed in a bag of silk. This material has appeared to me to possess remarkable hæmostatic properties, comparable to those of amadou.

I will next describe a palliative measure which has given good results under Fritsch, and which I have seen Martin employ, viz., ligature of the uterine arteries. It is done without incision into the vagina, by tying in mass across the cul-de-sac (see p. 95). Fritsch recommends, for greater surety, to make an incision on each side of the cervix, about 3 cm. long; the first branches met are two vaginal twigs, then more deeply the trunk of the uterine; both are tied. I do not hesitate to proceed thus in an urgent case.

The best hæmostatic, and at the same time the curative treatment, is curetting. It should be practised as soon as possible, according to the rules already given, and be followed by an injection of perchloride of iron at 30° C. The operation may be done while the bleeding is free; I have often seen it at once arrested after the curettage, which I attribute not only to the destruction of the bleeding tissue, but also to the contraction of the muscular fibres in the vessel wall provoked by the scraping. A single injection is usually sufficient; the cure is rapidly obtained.

There are certain rare forms called by the name of hemorrhagic metritis in which all means fail and the bleeding persists, threatening the life of the patient. In such a case the last resort is either castration, to produce an artificial menopause, or vaginal hysterectomy, to remove the very source of the hemorrhage. The exciting cause may be an unrecognized alteration of the adnexa with a symptomatic pseudo-metritis. At any rate, this is our only refuge when all other means remain powerless and it is a question of the life of the patient.

Chronic Painful Metritis.—Local bleedings by scarification of the cervix find here a frequent application; not only is the immediate antiphlogistic effect desired, but also the evacuation of the cysts, superficial and deep, which are scattered over the surface of the neck of the uterus. As regards cauterization with the hot iron and thermo-cautery, especially ignipuncture so praised by certain authors, but the usefulness of which I doubt, I consider them all inferior to puncture and scarification with the bistoury; the scars

which follow their use tend to favor cystic degeneration, by adding to the sclerosis and also to cause contraction of the canal, and compression of the nerves, with the accompanying morbid reflexes.

It is very advisable to employ antiphlogistic dressings, consisting of a coat of tincture of iodine, to the cervix, followed by a glycerin tampon to which is added a very little iodoform. Some authors use a glycerin solution of iodide of potash (5 : 100), but I see no real advantage in this. Ten per cent of ichthyol may be added to the glycerin with great advantage, the drug certainly having a marked analgesic effect.

The application of a simple glycerin tampon must not be confounded with complete tamponing of the vagina, or its "columnization," as the Americans say (page 66). I refer to the method recommended by Bozeman, and extolled afterward by Taliaferro, which is in general use; with many of the American gynæcologists it is the sovereign remedy for chronic metritis and the exudations of perimetritis. The column of cotton (ordinary) which fills the vagina is for the viscera what an elastic bandage is to a relaxed part (Engelmann). It gives a support to the uterus and ovaries, removes traction from the ligaments, and provokes the absorption of plastic products.

Pallen, thinking that the cotton was insufficient, did not hesitate to fill the vagina with clay. Reeves Jackson rejected the cotton, which was apt to settle, and employed wool from which the grease had been removed, as being more elastic. I am content, unless there is a uterine deviation, to place a series of small pieces of glycerinated cotton carefully about the cervix in the cul-de-sac, packing them lightly so that they form a ring like a pessary. The best position in which to put the patient is the genu-pectoral, which permits the ascent of the viscera and assures their final support. The tampons may be left in place four or five days, if to the glycerin a little iodoform has been added. The latter, it is true, may give rise to accidents if too long used; with the first signs of its absorption, such as malaise, headache, loss of appetite, and alteration of the urine, it should be discontinued. But these evil effects are never observed if it is used at intervals, with precautions against constipation, which seems to me to play an indisputable rôle in predisposing to its absorption.

Hot injections are often of great aid, in two conditions: in a chronic metritis in which there is a complicating perimetritis, more or less pronounced; and with very sensitive patients who complain of acute pain, as in the case of what Lisfranc calls hysteralgia, chronic metritis without hypertrophy, and which Routh has termed the irritable uterus. In such cases I have had excellent results, and cannot too strongly recommend this special hot irrigation.

Good effects have been obtained with electricity; from this a bipolar exciter is introduced into the uterus.

Massage has been much recommended in chronic metritis, as well as for prolapse, displacement, and chronic perimetritis. There is a clear distinc-

tion to be made between general massage, a kind of passive gymnastics, which favors nutrition and can only be useful if practised with method; and local massage, which claims to diminish congestion and volume by manipulation of the diseased organ. This latter form consists in passing two fingers into vagina or rectum, supporting the posterior face of the uterus, and with the other hand above the pubis making gentle progressive pressure, like a kind of kneading. In spite of the favor which this method enjoys in Sweden, in spite of the good results published by Reeves Jackson, Runge, Prochownik, etc., I have hesitated to employ this two-edged tool, which might so easily cause some accident to the uterus or its adnexa. I will not, however, condemn a therapeutic measure which is espoused by prominent gynæcologists, and which I have not employed; I merely reserve my decision. There remain certain cases of chronic painful metritis, a great number of them, for which all measures are powerless; the cervix continues to be large, swollen, hard, and mammillated in spite of all scarification, topical applications, and thermal cures; the body is increased in size, heavy and painful on ballottement; the patients are so weak that the least walking tires them, all exercise is troublesome. It is in these cases that surgery renders great service by means of an operation which acts upon the cervix and reacts upon the uterine body—namely, amputation.

Amputation of the cervix is always to be held as our last resort in all cases of chronic metritis with hyperplasia. However, in cases of sclerosis of the cervix it restores the calibre and suppleness of the external orifice and stops the dysmenorrhœa caused by its rigidity and irregularity.

A complete contra-indication to the operation would be coexisting acute perimetritis; but I do not hold the same opinion where the inflammation is old, with sequelæ like adhesions, etc. There is always a fear that the ancient focus will become active after even a perfectly antiseptic operation upon the uterus, whether it be amputation of the cervix, curettage, or simply infractraction. We must then, if we do not altogether refrain from surgical interference in such cases, be on our guard, and search out beforehand any focus in the adnexa or adhesions which may be present whence accidents may result.

The operative technique has been perfected and at the same time simplified by the use of a cutting instrument. The fear of hemorrhage was natural at a time when the operation was done laboriously at the bottom of the vagina. Moreover, the fashion was to employ various hæmostatic measures, like extemporaneous ligature, the linear écraseur, galvano- and thermo-cautery. Previous compression with a ring of rubber, which many operators advise, shows the same exaggerated prudence. When the operation is rapid, there is but little bleeding, which the sutures arrest at once and completely; we need, however, to tie them tightly and securely.

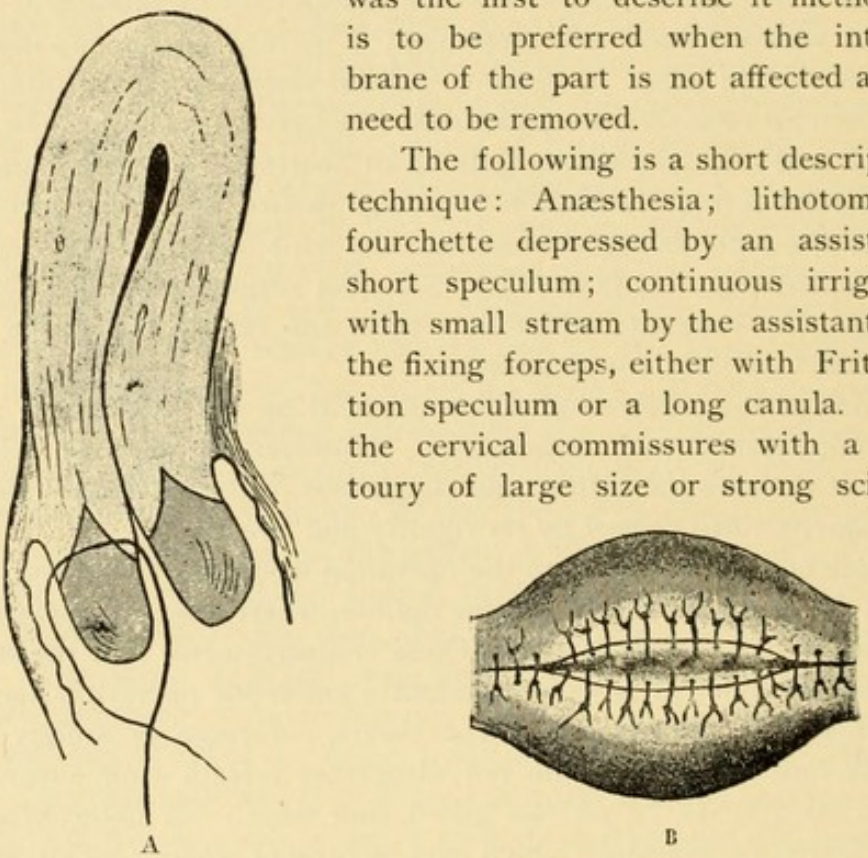
Every amputation by the écraseur or the galvano-cautery has the fatal disadvantage of leaving a harsh cicatrix, with concentric contraction, ending in

stenosis. Other circular amputations with bistoury or guillotine have the same defect, though to a less degree, and the bleeding is hard to stop.

The only amputations which are to be commended are those which allow perfect coaptation and suture of the divided mucous membrane, with the formation of an orifice not liable to contract. Two procedures of this kind may be adopted according to special indications: (1) amputation with two flaps for each lip, or (2) with but one which may be so graduated as to become only an excision of the internal mucous membrane.

Amputation of the Cervix with Double Flaps—Conical Excision.—This procedure, suggested by Simon, generally bears the name of Marckwald, who was the first to describe it methodically. It is to be preferred when the internal membrane of the part is not affected and does not need to be removed.

The following is a short description of the technique: Anæsthesia; lithotomy position; fourchette depressed by an assistant with a short speculum; continuous irrigation made with small stream by the assistant who holds the fixing forceps, either with Fritsch's irrigation speculum or a long canula. Division of the cervical commissures with a convex bistoury of large size or strong scissors. The



A B

FIG. 142.—AMPUTATION OF THE CERVIX WITH DOUBLE FLAPS (SIMON). *A*, Sectional view showing lines of incision for formation of flaps and method of suture. *B*, Front view of cervix, operation complete.

incision of the anterior lip goes deeply through the internal surface, obliquely from below upward; the second, through the anterior mucous membrane, joins the other so as to form a conical segment of the anterior lip, its base below, its apex above. Suture of the two lips thus formed with a sharp needle, threaded with wormgut, taking care to pass it under the whole bleeding surface; five or six points are necessary. The same manœuvre on the posterior cervical lip, after removal of the fixing forceps, using the first sutures to depress the organ. Suture of the commissures by one or two points. Cutting of the threads, vaginal irrigation, uterus restored to its place, iodoform tampon (Fig. 142, A, B).

At the end of three days the tampon may be withdrawn, and antiseptic irrigation practised morning and evening (1 : 2,000 bichloride). It is necessary to keep the patient in bed during at least fifteen days. The sutures are then removed.

This operation is easier of execution than Hegar's, which differs in the absence of the first step, the incision of the commissures; as to the method of Sims, in which the vaginal mucous membrane alone is sutured above the wound, that was considered an improvement when it appeared, but it is now superseded.

Amputation of the Cervix with Single Flap. Excision of the Mucous Membrane. Schröder's Operation.—This is especially applicable to the ca-

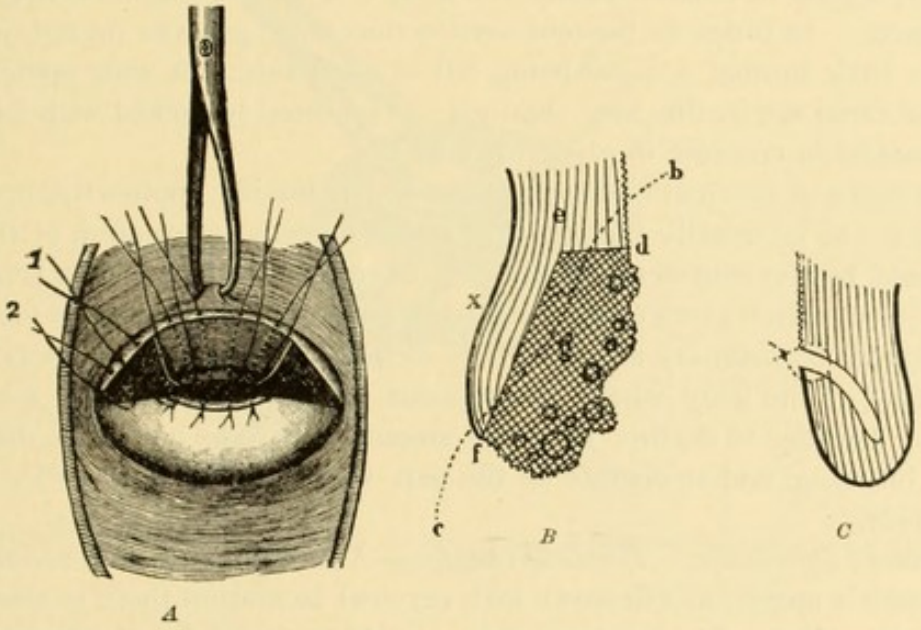


FIG. 143.—AMPUTATION OF THE CERVIX BY ONE FLAP OR EXCISION OF THE MUCOSA (SCHRÖDER'S OPERATION). *A*, Showing method of placing the sutures; 1 and 2 are those uniting the commissures. *B*, Section showing shape of incisions and (*b c*) line of suture. *C*, Shows position of lips after suturing.

tarrhal form, in which there is rebellious ulceration and follicular degeneration more or less deep; but it may be adopted in any chronic metritis in which from the shape or consistence of the cervix it is more convenient.

This operation of Schröder's is coming rapidly into favor elsewhere, and is beginning to be adopted in France, where I was one of the first to practise it.

Its execution is a little more difficult than the preceding. The cervix is made accessible and the bilateral incision made as above; from that we proceed as follows: Transverse incision of the internal mucosa and semicircular incision of the external, forming thus a layer of tissue which is dissected from without till the internal transverse incision is reached and the layer is wholly detached; the thickness of this varies according to the alteration of the tissue. Infolding, entropion, of the lip thus formed and suture in-

ternally by five or six points with catgut, the needle being passed below the whole bleeding surface; two or three auxiliary sutures superficially placed. The same dissection and suture of the posterior lip, the cervix being held firm by the threads already passed. Suture of the commissures, etc., as above (Fig. 143).

At times there may be an advantage in making the twofold incision on one of the cervical lips and the single one on the other. Bouilly extols an operation which has given him thirty-nine successes in forty cases of inveterate glandular cervical metritis. He dilates the cervix and cavity of the body of the uterus with a laminaria tent; then, after having curetted the body, he removes from each lip of the cervix, by means of a long straight bistoury, a strip of mucous membrane 2, 3, or 4 mm. thick according to circumstances. In order to prevent contraction these grooves do not join laterally, a little normal mucosa being left at each side. A wide opening and a dilated canal are in this way obtained. The canal is packed with iodoform gauze soaked in creosote in glycerin, 1 to 3.

The cases of cervical endometritis to which Bouilly applies this operation seem to me to be usually the result of a true mucous obstruction of the cervix caused by the contraction. I prefer to treat these cases by a free bilateral incision, which gives easy access to the mucous membrane and facilitates its treatment by ordinary means. It is well also to precede the operation by a curetting of the body where the mucous membrane is always somewhat altered. I prefer to do this after the amputation, so as not to be disturbed by the bleeding, and to operate on the part while it is not shrivelled by the perchloride.

Emmet's Operation. Trachelorrhaphy.—As I have said, this should yield to Schröder's operation whenever with cervical laceration there is also cervical catarrh. Emmet's operation, then, should be saved for chronic metritis without erosion of the cervix. One might then hope, by removing cicatricial tissue and restoring the normal shape of the part, to cause the disappearance of the pains and irritation; all the more, because the trauma of the cervix usually promotes involution of the body of the uterus, an important factor in the success obtained.

The patient is anæsthetized and the assistants are disposed as before; the cervix is seized with forceps; one forceps catches the anterior lip close to the laceration, the other is placed opposite, symmetrically; then the borders of the laceration are dissected out in a single piece, being careful to reach the depth of the angle and to remove all the cicatricial tissue (Emmet). The wound is then equalized, if necessary, by curved scissors. The first suture is then passed with a strong curved needle near the angle of the wound, piercing the thickness of both sides 2 mm. from the external surface and 1 mm. from the internal, and each suture is tied at once to secure perfect coaptation of the parts. Four to eight sutures are thus passed. I use silkworm-gut for the sutures. I have long employed catgut, but have

abandoned it, for it often becomes softened and gives way, allowing separation of the flaps.

Lately, under the influence of Lawson Tait, there has been a reaction against any loss of substance in plastic operations. Applying the principle of the flap-splitting operations to trachelorrhaphy, Sänger and Fritsch advise the following: Excision of the superior angle, then partial splitting of the lips of the laceration by an incision from above downward, and suture at the external surface alone. I consider this procedure defective, as it does not remove the cicatricial tissue, which it is especially important to excise

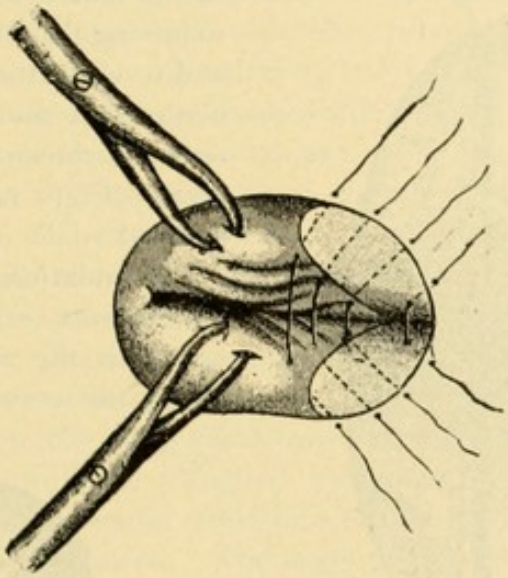


FIG. 144.—EMMET'S OPERATION. [This cut shows the common fault of insufficient denudation at the angle of the laceration.]

with great care. An iodoform tampon left in place three days is all the dressing needed. After this, antiseptic vaginal irrigation morning and evening, and rest in bed for two weeks.

When the laceration is bilateral it is almost impossible, in doing a trachelorrhaphy on both sides, to avoid narrowing the cervical canal. I therefore prefer Schröder's operation, which is in these conditions more expeditious and permits thorough removal of the sclerosed tissue.

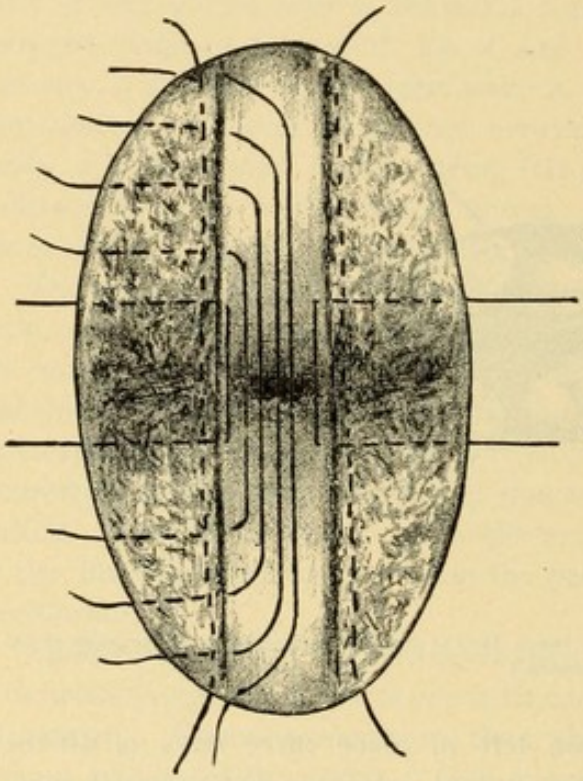
After any procedure of this kind it is well to explore the cavity of the uterus with a curette, and, if anything soft and friable is found, to do a complementary curettage, which does not complicate the principal operation.

There are few operations which have had such passionate partisans and detractors as trachelorrhaphy. While certain authors have accused it of producing sterility and of complicating labor, others have extolled it as a remedy against this very sterility, while some have not hesitated to do it on pregnant women, demonstrating at least by their boldness the harmless nature of the procedure.

To me it seems certain that the operation, well done, need have no bad

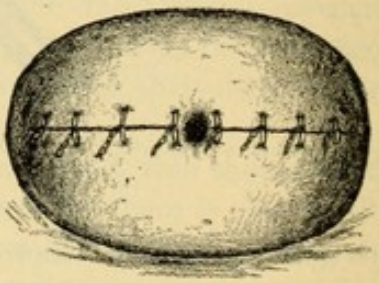
results, though it has no advantages; it is probably often done unnecessarily.

[I cannot wholly agree with the author in his statements concerning Emmet's operation, which has the manifest advantage of restoring the cervix to its natural ante-partum condition instead of removing it by an amputation. Each method has its own indications, and trachelorrhaphy is to be reserved for cases with deep cervical tears with slight glandular or parenchymatous hyperplasia and endometritis, or with symptoms dependent on nervous reflexes. Then the operation as shown in Fig. 145 will be sufficient; care being taken to denude thoroughly, removing all the diseased tissue, and to unite the surfaces accurately; denudation and union of the edges only, as shown in the author's diagram (Fig. 144), being carefully avoided.



[Fig. 145.—Diagram Showing Area of Denudation and Arrangement of Sutures in Emmet's Operation (Trachelorrhaphy).]

Denudation may be accomplished by scissors or scalpel, the patient being in the Sims or lithotomy position, the cervix being steadied by



[Fig. 146.—Appearance of Cervix after Sutures are Tied.]

tenaculum, and excessive downward traction being avoided. Sutures may be of silver wire (No. 27), or of silkworm-gut, silk, or chromicized or juniper catgut. They may be removed in ten days, the patient getting up about the fourteenth. Careful antisepsis.]

The various plastic operations on the cervix, amputation, resection, suture of lacerations, do not diminish the dilatability of the part, for they heal by primary cicatrization without the formation of inelastic tissue. Many observers agree on this theoretic point, and prove that there is no need to fear sterility or dystocia.

Is castration a legitimate operation in metritis? I do not hesitate to answer in the negative. Castration owes its unquestionable success, not so much to the fact that it was done for disease of the uterus as for characteristic alterations in the adnexa (peri-oöphoritis, perisalpingitis), in cases of

old or badly treated metritis. In such cases the metritis occupies the second place, and the treatment relates more especially to the complication which has become the principal disease. But to practise a castration with removal of both ovaries and tubes on the sole indication of excessive pain during the menses, to establish thus an artificial menopause, seems to be too extended an application of the operation. In a number of the reported cases all the measures of conservative surgery do not appear to have been exhausted before reaching an operation which, if legitimate, is hardly indispensable.

Péan has often performed vaginal hysterectomy, which he calls uterine castration, for painful metritis accompanied, as he says, by the morbid state described as utero-ovarian neuralgia, which has resisted all medication. In such cases he has seen ovarian castration by itself permit the pains to continue, as if the uterus were a centre from which reflexes started independent of those which take their birth in the adnexa. On the contrary, where he has removed the uterus and left the adnexa, the results have been more satisfactory. Péan, then, desires to substitute vaginal hysterectomy for Battey's operation in cases of chronic and painful inflammation of the utero-ovarian apparatus; he recognizes that after ablation of the uterus, however, one may be obliged to open the abdomen to remove the altered adnexa, which are difficult to reach by way of the vagina. It does not seem to me proven that the secondary operation has not a right to precede the principal one, which it has often rendered needless. Vaginal hysterectomy has been performed many times by other surgeons for rebellious hemorrhagic or painful metritis; and it has certainly been abused. The most recent researches demonstrate that every hypertrophic glandular metritis which has resisted curetting for many months shows thereby its tendency to become an epithelioma. These growths are styled adenoma in Germany, and form the transition between hyperplasia (benign adenoma) and cancer (malignant adenoma). Exploration by the curette is not always sufficient to remove doubt, for we are not able thus to examine the glands in all their depth. We must in such a case give the most weight to the clinical signs; in any case we may well be cautious about operating for a cancerous tendency in metritis when there is no actual degeneration present.

CHAPTER VIII.

UTERINE FIBROMATA.

Pathology.—To those tumors of the uterus which have the same structure as the uterus itself, the names of fibrous body, fibrous tumor, myoma, fibroma fibro-leiomyoma, fibroid, and hysteroma have been given. They are usually benign, that is to say, incapable of becoming general and infecting the organism; but, while the greater number of them may exist unnoticed, causing

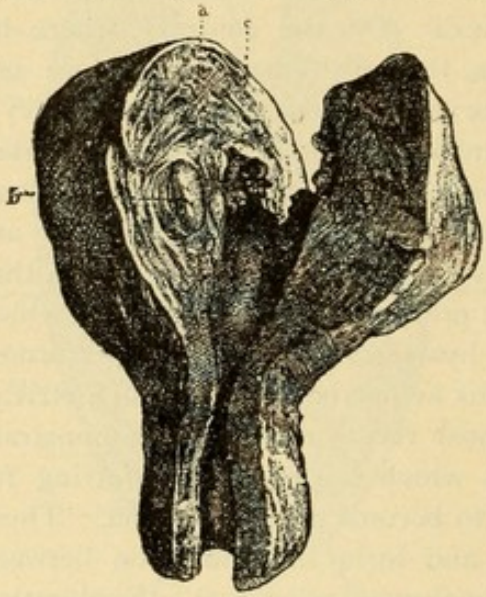


FIG. 147.—SMALL INTERSTITIAL FIBROID. *a*, Hypertrophied uterine wall; *b*, fibroid; *c*, uterine mucosa showing the lesions of endometritis with polypoid vegetations.

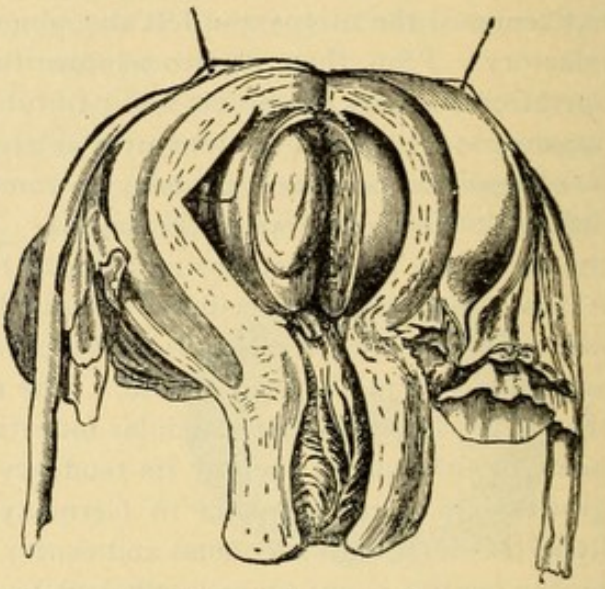


FIG. 148.—SUBMUCOUS PEDICULATED FIBROID.

only a hidden deformity or a slight infirmity, there are many which are of more serious import, and which may lead to conditions resulting in death.

Histogeny.—Velpeau, and after him a number of others, attributed the development of fibromata to the presence of a "drop of blood, plastic lymph, or even pus" in the uterine tissue. The spontaneous organization of coagula after ligation of arteries suggested the idea that the same process might result in the formation of these neoplasms. But experimental study has demonstrated that this organization of coagula is nothing but an ingrowth of the elements of the vessel wall, and thus this edifice of theory, founded on lack of observation, collapses altogether.

Klebs asserts that these fibrous tumors have their origin in a proliferation of the connective tissue and the muscular layers of certain vessels; the different nodules thus formed become aggregated to make one tumor. Klein-

wächter describes the evolution of fibromata as due to a round cell which is found along the capillaries and produces a partial obliteration of them; these cells then become fusiform and produce the nodules. Gottschalk, as the result of the examination of small fibroid nodules, thinks that all fibromata originate by an endarterial proliferation rapidly followed by an increase of the

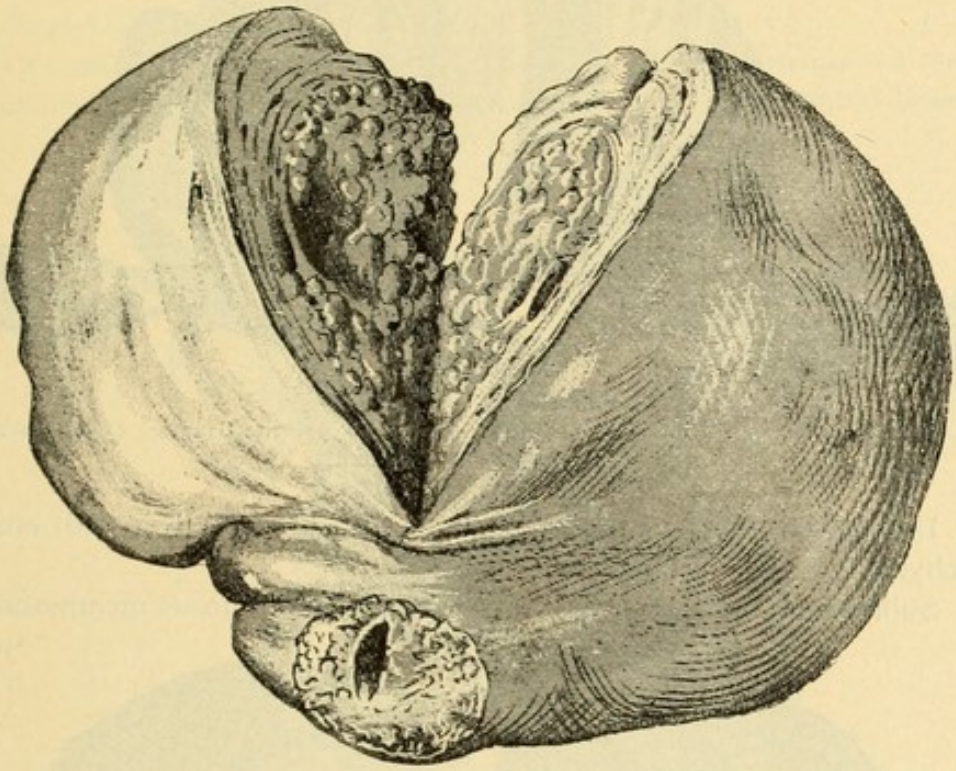


FIG. 149.—SUBMUCOUS ŒDEMATOUS FIBROID WITH HYPERTROPHY OF UTERINE WALL.

cellular elements surrounding the artery. Local irritation and circulatory disturbances would be the principal agents in this pathological process. Our knowledge of this subject is very limited.

These neoplasms are very frequent; according to Bayle, who described certain anatomical features of them in 1813, a fifth of all women over thirty-five have fibromata.

The number is very variable; certain uteri present an enormous number of interstitial or pediculated nodules. Most frequently there are three or four distinct tumors; at other times there is but one. Though clinically there may appear to be but one, not rarely there is another in the thickness or on the surface of the organ, which either may remain latent indefinitely or may finally develop; this fact is often demonstrated at laparatomies.

These tumors may reach very large proportions, and then often become fibro-cysts. Stockard found one, in a negress, that was colossal, weighing one hundred and thirty-five pounds. Even the solid tumors may be as large. Hunter, of New York, recently observed one that weighed one hundred and forty pounds, while the cadaver after its removal weighed but ninety-five.

The body of the uterus is more often affected than the cervix. The tumor's position relative to the unterine tissues permit us to distinguish the following varieties:

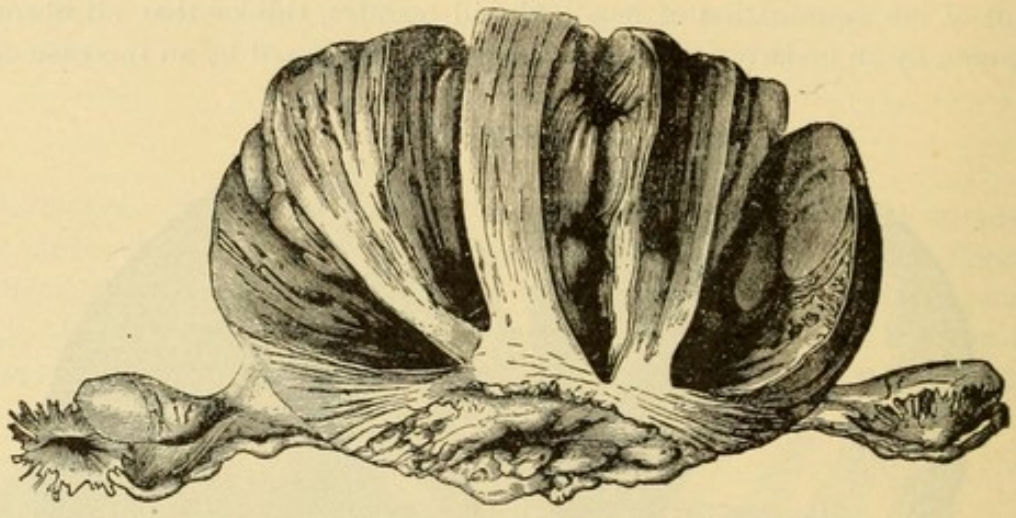


FIG. 150.—SUBPERITONEAL AND INTERSTITIAL FIBROIDS OF THE FUNDUS OF THE UTERUS. (The incisions are to show the multiple nodules.)

1. Interstitial, in the thickness of the (usually hypertrophied) muscular parenchyma.

2. Submucous, immediately or nearly below the mucous membrane.

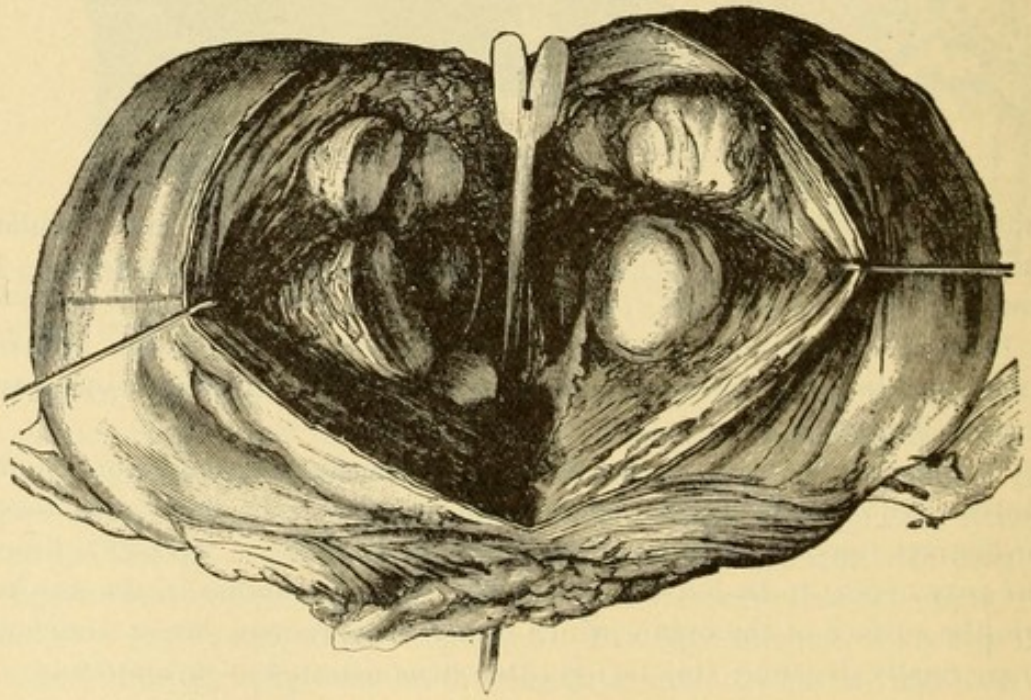


FIG. 151.—INTERSTITIAL FIBROID OF THE BODY OF THE UTERUS.

3. Polypoid, or pediculated, hanging from the mucous membrane by a stem or fold of the mucosa, with muscular fibres and vessels.

4. Subperitoneal, external to the muscular tissue, with a broad base or

with a narrow pedicle; it is well not to speak of these as polyps, even though they may resemble them, but keep that name for those which are found within the cavity of the organ. An important sub-variety is the intraligamentous, developing in the thickness of the broad ligament, which will be described with tumors of the cervix.

Whatever may be the seat of the fibroma, it provokes a constant but varying degree of uterine hypertrophy.

The muscular wall increases in such a way as to encapsulate a number of tumors as a single mass; the muscular layers then resemble those of the

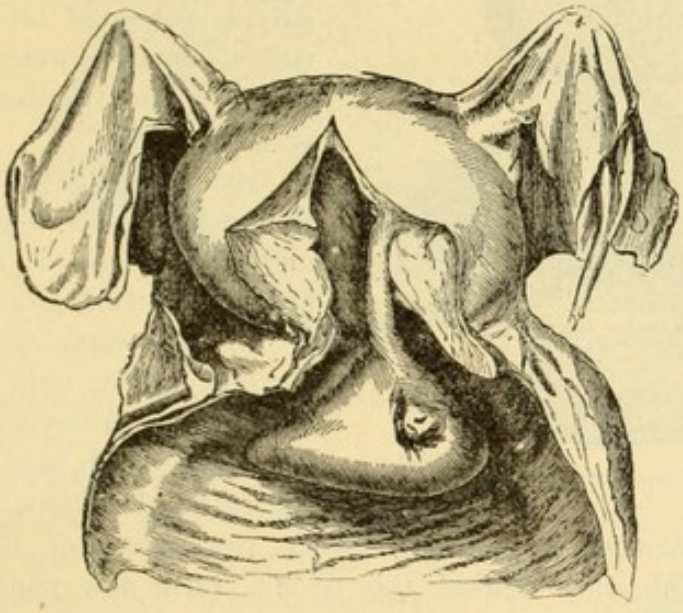


FIG. 152.—UTERINE POLYP EXPELLED INTO THE VAGINA BUT PRESERVING THE TRIANGULAR FORM OF THE UTERINE CAVITY.

gravid uterus, often being continued far into the broad ligaments, which become thickened and fleshy. A large vascular development generally accompanies this hypertrophy.

The increase in the volume of the uterus, caused by the continual congestion of which the neoplasm is the focus, might be compared to that which occurs in the first months after fecundation; for which reason the name fibrous pregnancy (grossesse fibreuse) has been proposed by Guyon to designate the fact. Even small fibromata are sufficient to produce the condition (Fig. 147). The uterine cavity is found much enlarged by the eccentric hypertrophy, and also, in part, by the traction of the mass which hangs from the fundus of the organ.

Fibromata of the Cervix.—Fibrous tumors of the cervix deserve a special paragraph; they are found in the same positions and could be classified as other fibroids; but the division of the cervix into two distinct regions, the supra- and the subvaginal, makes another classification necessary.

A. Fibromata of the External Os.—Whether submucous or interstitial,

they give to the lip involved a cylindrical and elongated form (Fig. 154). The submucous tumors of the cervical canal occasionally take on a peculiar polypoid form, of which I have observed examples. They descend into the vaginal canal in the form of slender stalactites or like the drops from a torch, forming a kind of sheaf which appears at the external os and is attached by a circular or semicircular base at the level of the isthmus or often much lower. I have seen a submucous cervical fibroma make a projection in the interior of the dilated cervix like a plaited collar round the internal orifice. At other times these little polypi contain a layer of glandular tissue, newly formed, and have a papillary or mulberry appearance (Fig. 155).

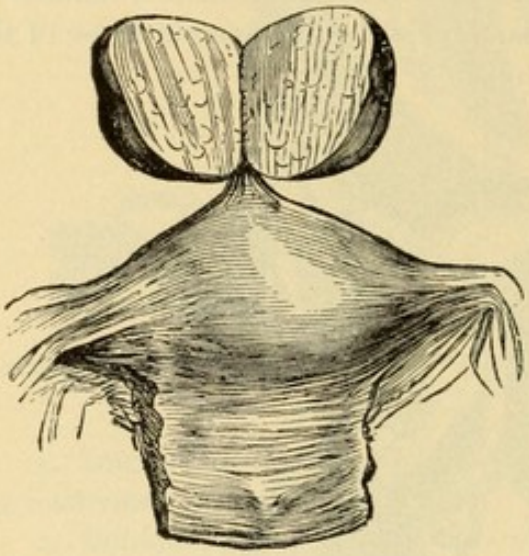


Fig. 153.—Subperitoneal Pediculated Fibroid.

Exceptionally a fibroma within the uterine wall may descend into one of the lips of the cervix by a kind of splitting process.

B. Fibromata of the Subvaginal Portion.—The only forms in this class which deserve special mention are those which are developed from the external surface of the region, and so find themselves at once between the layers of the pelvic floor. They usually develop behind the cervix, raise the pouch of Douglas, and come into contact with the posterior wall of the vagina and the rectum. They often pass between the layers of the broad ligament, constituting one of the most dangerous of the intraligamentous varieties. They may even exceed these limits, crowding in anteriorly between the bladder and the uterus, and pushing prolongations as far as the iliac mesocolon. Imprisoned by their attachments in the narrow enclosure of the bony pelvis, which is itself inextensible, they give rise to the most serious symptoms by compression. I have proposed to name them "pelvic fibromata."

Connection of Fibrous Tumors with the Uterine Tissue.—Fibrous tumors have usually an investment of loose cellular tissue which forms a capsule, out of which they can be shelled without much effort. This arrangement is sometimes so well marked that, as soon as the capsule is incised, the tumor projects strongly, under the influence of the muscular contraction; but more often the fibroma, instead of being encased in the uterine parenchyma like a foreign body, is held in place by the fibrous bands, more or less dense, by which its vascular connections are established. There are also rare cases in which there is no more demarcation between tumor and uterus than a local thickening at its periphery. In general, the softer the tumor the fewer its connections with the neighboring tissues.

Structure and Texture.—To the naked eye, uterine fibromata are formed of dense tissue, shiny or rosy white, elastic, giving a very clean surface on section, sometimes unequally convex, as if the middle portions were com-

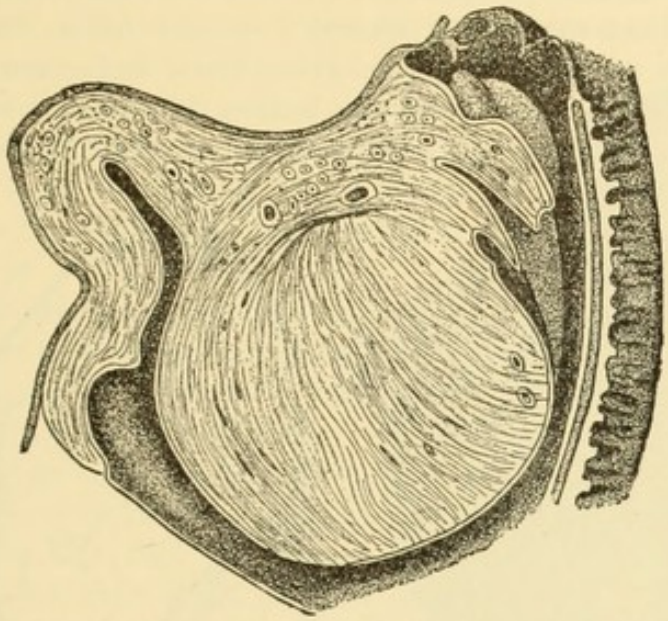


FIG. 154.—INTERSTITIAL FIBROID OF THE POSTERIOR LIP OF THE CERVIX.

pressed by the superficial layers, generally more closely packed. One can at times distinguish on the surface, with the aid of a glass, the intercrossing loops of fibres and the vortices, which look as if the fibres were rolled about many different axes (Fig. 157).

The vessels are relatively few; but in tumors of great size we do see them, superficially, under the peritoneum or in the capsule, and I have observed in one case a vessel of the broad ligament which was as large as the brachial and had given a loud bruit with a thrill. The peripheral veins then are of the size of the jugular, adherent on all sides to the muscular bundles, which hold them wide open. When this arrangement is very well marked and the tumor is hollowed by vascular lacunæ, due to the dilatation of the capillaries, we have the form which Virchow calls "teleangiectatic myoma," or "myoma cavernosum"; the portions thus degenerated resemble a sponge soaked in blood.

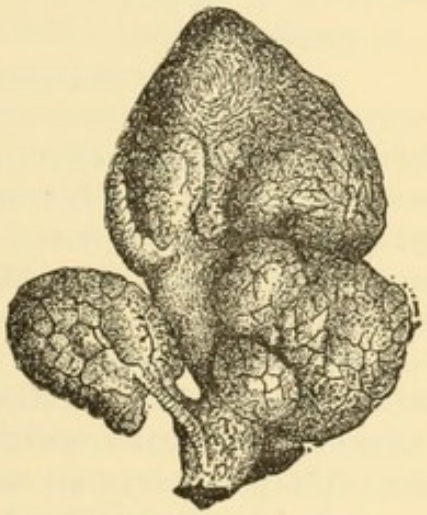


FIG. 155.—SMALL MURIFORM POLYP of THE CERVIX. (Papillary fibroma with glandular hypertrophy. Ackermann.)

In polypi the pedicle sometimes contains large arteries. They present, however, a thickness of their walls and a contractility which, joined to the elasticity of the pedicle itself, secure a rapid, spontaneous hæmostatic action

as soon as they are cut off. The spaces which separate the different layers are considered by Klebs to be lymph channels.

Nerves have been followed into these tumors by Astruc and Dupuytren; Bidder has demonstrated them anew, and Hertz has described their mode of termination in the nuclei of the smooth muscular fibres. On microscopic section fibromata present smooth muscular fibres and connective tissue in varying proportion. According to Ch. Robin, the muscular fibres are always in the minority, perhaps as high as half and at times as low as one-tenth.

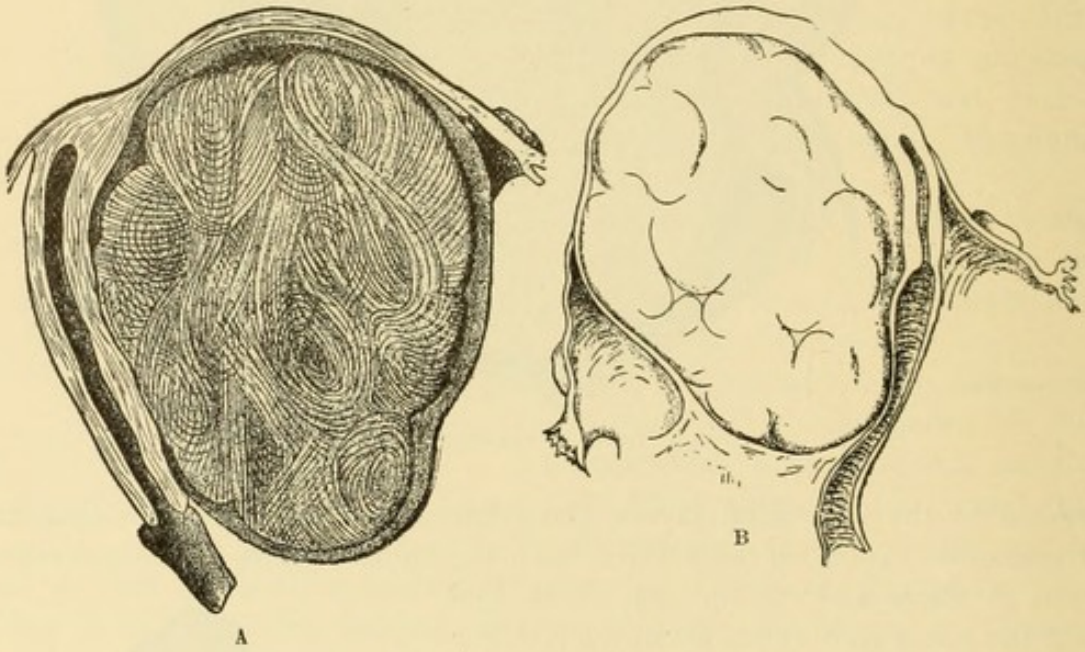


FIG. 156.—INTRALIGAMENTOUS FIBROMA. *A*, Abdominal variety. *B*, Pelvic variety.

As one or the other predominates, the tumor is called a fibroma, a myoma, or a fibromyoma. These terms are not exact but relative, for almost always the two elements are mixed. Gusserow proposes to distinguish them as hard, where the connective tissue is in excess, and soft, composed chiefly of muscular fibres; the latter form is seldom entirely encapsuled and is more vascular. On section we see the fibres cut transversely, obliquely, or longitudinally. The first are easily distinguished by the fusiform aspect of their elements and the characteristic nuclei which look on cross section like a mosaic; this appearance must not be confounded with that of round cells. Between the bundles there are fibrous layers of unequal thickness which cross in all directions; they are partly connective tissue, poor in cells, and partly fusiform bodies prolonged longitudinally (Fig. 158).

Connections with Neighboring Organs.—When a fibroma with a broad base grows from some free portion of the uterus (fundus, anterior or posterior surface), it extends into the abdominal cavity above the superior strait and floats among the intestines; the uterus is then drawn upward, the cervix is thinned and elongated.

If its point of attachment is narrow, the tumor may fall backward into the pouch of Douglas and become fixed. When it is of large size and not bound down by adhesions, it jolts about in the abdomen, irritating the peritoneum till it provokes an exudation, at times liquid, at times plastic, which forms adhesions. This ascites is generally abundant and of a yellow color, rarely tinged with blood, except with malignant tumors. A form of ascites has been observed to which the name "chylous" has been given; it is probably due to a transformation to fatty granules of a fibrinous exudation.

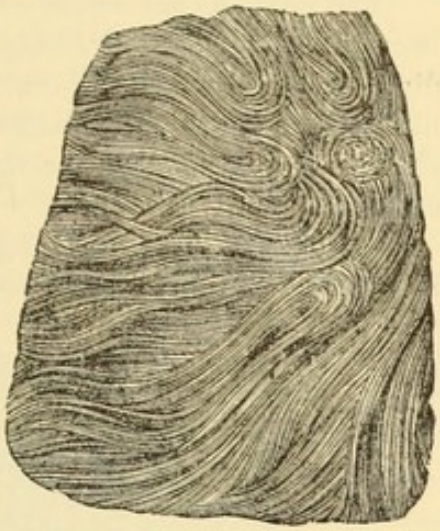


FIG. 157.—UTERINE FIBROID. Section showing the disposition of the fibres to the naked eye.

Adhesions when present are usually with the great omentum or the intestine; a loop of the gut may be so fused with the surface of a fibroma as to defy all dissection. These adhesions become then the principal source of derangement of nutrition, and the pedicle may become so thin that the tumor ceases to grow. It may even break off and leave the fibroma independent of the uterus and grafted on some part of the pelvic circumference. Huguier and Nélaton have reported cases of this kind. Depaul found a fibroma entirely free in the cul-de-sac of Douglas; such a case may be explained by the rupture of the pedicle with absence of adhesions.

Elongation or torsion of the pedicle may cause various changes in the nutrition of the tumor, with consecutive degenerations.

Alterations and Degenerations.—At the menopause most of the fibromata undergo a progressive induration; at the same time they diminish in volume and the uterus may present a senile involution and atrophy; the tumor still persists, but without causing any morbid reaction: this is the condition of most of these tumors, not recognized during life and found for the first time at the autopsy of aged women.

Calcification is an unusual change. It is not an ossification, as the older authors thought; the deposits of carbonate of lime are found toward the middle of the tumor, sometimes partially, sometimes completely converting it into a uterine stone. We observed this but rarely in the pedicled subserous form or in polypi, which may then become free and be expelled spontaneously. This fact has been known since the days of Hippocrates, and the Academy of Surgery has collected a number of such cases.

Softening may result from various causes. During pregnancy the tumors acquire a considerable volume, sharing in the exaggerated nutrition of the uterus. Thus swollen with juices they are usually very soft; after labor and by a process attributed a little hypothetically to a fatty degeneration, they may gradually disappear, taking part in the uterine involution. Differ-

ent authors have cited many cases of this regression and I have observed it in one very remarkable instance; the pregnancy, intervening during a thermal treatment for a large fibroma, had doubled the size of the tumor; the labor took place without accident, and the fibroma disappeared completely, leaving no traces.

The fatty degeneration, as so justly remarked by Gusserow, has never been proven by the microscope, except in two cases, in which there was no diminution in the size of the tumor as the result. Amyloid degeneration has been found in one instance by Stratz, a unique case up to the present. Œdema, which is often the first stage of gangrene, may be the cause of the softening.

Colloid or myxomatous degeneration, according to Virchow, is characterized by the effusion of a mucous fluid between the muscular bands. It is

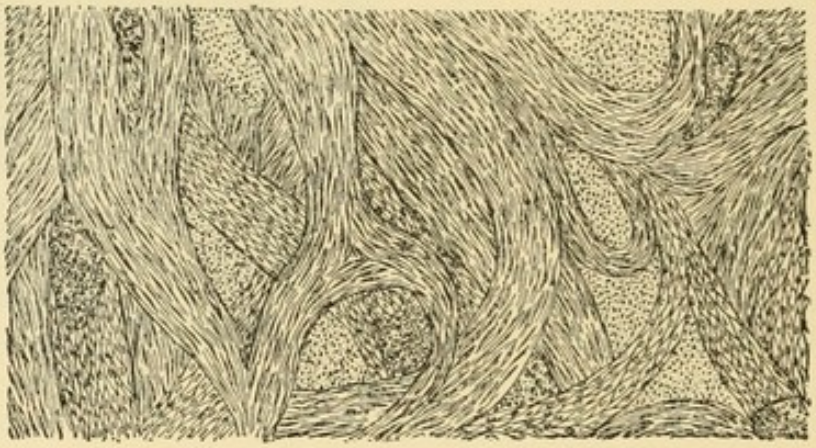


FIG. 158.—UTERINE FIBROMYOMA. Microscopic view.

distinguished from simple œdema by the presence of the mucin and the proliferation of nuclei and small round cells in the interstitial tissue. The formation of fibrocystic tumors may succeed these degenerations when the bands which separate the small cells from the œdema are destroyed. There are no distinct walls in these cysts, as they are formed simply from the lacunæ of the tumor tissue.

Other fibrocystic tumors have a very different origin and belong in a special pathological class. These cysts are formed in pre-existing cavities, in dilated lymph spaces comparable to the similar dilatations which the blood-vessels may present. The fluid which they contain is limpid and coagulates on contact with the air. Leopold has termed these tumors "lymphangiectatic myomata." It must be noted that this lymphatic origin of certain cystic tumors of the uterus had already been clearly formulated by Koeberlé. Their formation seems to be due to the development of part of the tumor along the path of the lymph-vessels contained in the broad ligament. On the internal surface of such tumors we can demonstrate an epithelial investment which distinguishes them from simple cavities formed

from softening of the neoplasm or apoplexy into its substance. There are also mixed forms in part vascular and in part lymphatic.

We must be careful not to confound these tumors of the uterus with either the intraligamentous ovarian cysts, which are very adherent to that organ, or with the serous accumulations found at times in foci of peritonitis about the uterus; the mistake seems to have been more than once committed. Certain forms of pseudo-cysts are produced in the foci of molecular fatty disintegration at the centres of large tumors where the nutrition is impeded. There can be no gangrene because of the absence of germs; it is then a necrobiosis, with the formation of soft masses, which later may fall into deliquescence and fill the cavity with more or less dense fluid. Hemorrhages are often added to dilute the contents of the cyst and increase their size. These have been known to rupture into the uterus. In certain of these rare cases, the uterine orifice may be obliterated by the elongation of the cervix, the partial rotation of the organ, and a certain degree of inflammation, and thus is formed a peculiar form of hæmatometra. W. A. Meredith has reported a remarkable case of this condition which was cured by supravaginal hysterectomy; the morbid mass weighed fifteen pounds and contained five pounds of blood. Dubreuil has punctured and drained, in a woman of sixty-five years, an hæmatometra that simulated a fibrocyst, due to obliteration of the neck of the uterus containing a fibroma; this incomplete operation was followed by death. Tillaux has published under the name "cystic uterus" an analogous case, which was cured by abdominal hysterectomy. These cases are usually found in aged patients, in whom the cervix has a tendency to become retracted and obliterated under the influence of senile atrophy.

It is evident, then, that from an anatomical point of view these tumors do not form a natural group of myo- and fibrocysts; for they may take their origin from: (1st) closed spaces, resulting in dilatation of the lymphatics, or lymphangiectasis; (2d) œdematous or myxomatous infiltrations, in their highest development; (3d) lacunæ (geodes) formed at the centre of myomatous or sarcomatous tumors by disintegration of their tissue. Apoplectic foci may complicate either of these different varieties.

Inflammation; Suppuration; Gangrene.—It is probable that the starting-point for inflammation in fibrous tumors is always a mortification, more or less extended, which infects the capsule and sets up a suppuration in the zone where the tissue is both more lax and more vascular. This initial mortification may be due to surgical interference, which has opened the seat of the fibroma with a therapeutic object, or to an infection from outside following septic exploration (dilatation, sounding, etc.); or, finally, it may come from compression and obliteration of the nutritive vessels of the tumor, with chafing of the mucous membrane which covers and protects it against the entrance of germs. The latter mode of origin is especially frequent in polypi. Finally it may occur suddenly through torsion of the uterus on its axis below the insertion of the tumor. If it is true that a mortification of a small part

of the tumor, interstitial or submucous, precedes inflammation and suppuration, it is due, on the other hand, to the agency of this, in its turn, that the whole mass becomes gangrenous, and separates, by an actual dissection, from the adjacent tissues.

The sphacelated portions are eliminated spontaneously or by the aid of art; or they may produce a putrid infection. The pus may spread itself out in the pelvic cellular tissue. G. Braun reports a case in which the pus, after

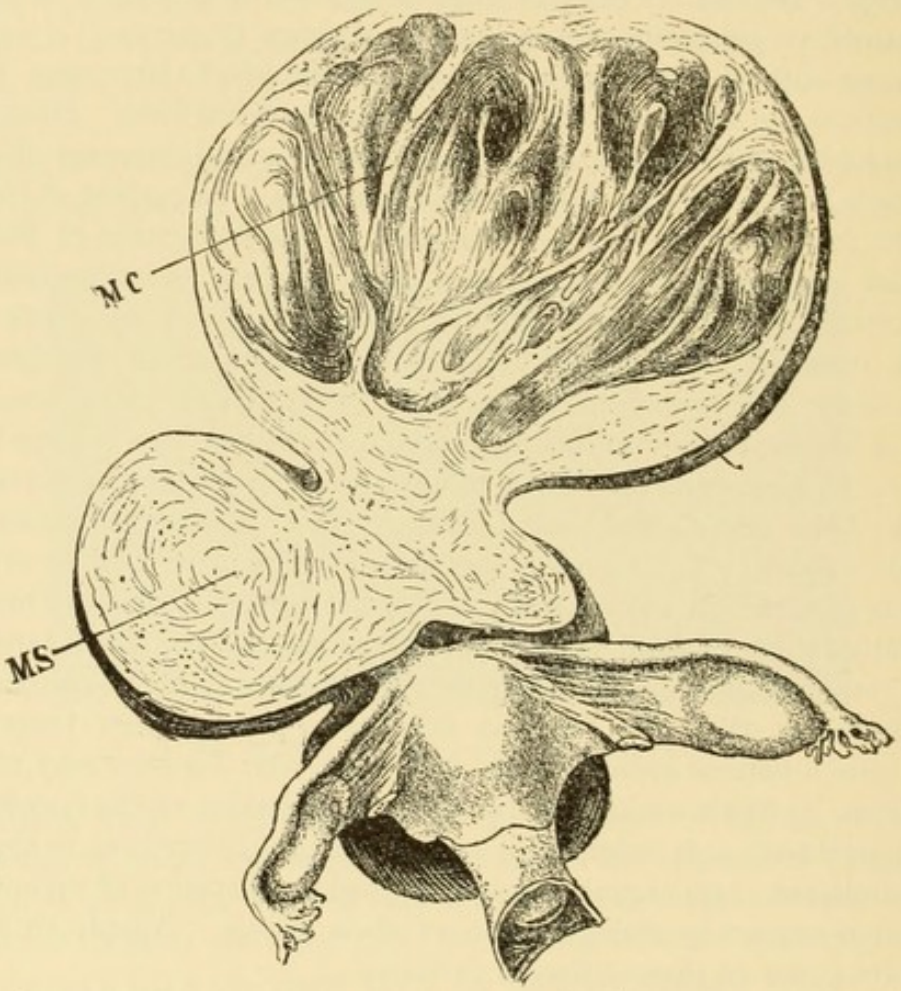


FIG. 159.—PEDICULATED FIBROID WITH ABDOMINAL EVOLUTION (SCHRÖDER). *MS*, Fibroid lobe; *MC*, Fibro-cystic lobe.

distending the uterine cavity, discharged by the external os and also through the inguinal region. Orthmann performed an unsuccessful laparatomy on a woman in whom a suppurating fibroma had perforated the posterior uterine wall and caused peritonitis.

Cancerous Degeneration.—Can a carcinoma arise from a fibroma? Simpson maintained that the irritation produced by a fibroma invited the formation of malignant neoplasm; to-day we express the same idea by saying that its presence constitutes a *locus minoris resistentiæ*, producing the local determination of the diathesis. Recent researches allow us to form a definite idea of the process. It is probable that in certain cases it is the chronic in-

flammation which involves the mucous membrane and is the constant accompaniment of fibromata, which first causes a proliferation of the glands; this, at the beginning of a typical form (adenoma), passes to the atypical and becomes epitheliomatous. E. Wahrendorff collected in Schröder's clinic four such cases which seem conclusive. A second way in which cancer may arise from a fibroma is by sarcomatous degeneration of the framework of the tumor, which is little by little infiltrated with round cells until the muscular fibres disappear. It is also possible that these myosarcomata undergo a cystic transformation either by softening and hemorrhages or by distention of the lymph spaces. There is then a sarcomatous variety of fibrocyst. [Williams states that fibromyomata may be transformed into sarcomata either by the proliferation of the connective-tissue cells between the muscle bundles, or by the proliferation of the muscle cells themselves, or possibly by a combination of both processes, the first giving rise to ordinary sarcomata and the second to muscle-cell sarcomata.]

As to the degeneration of a fibroma into carcinoma Virchow admits it in principle, but it is evident from Gusserow's inquiry into the subject that it is far from being demonstrated. The observations cited to prove the point have to do generally with cancer invading the uterus by the side of a fibroma, which is a very different thing from the pathological and pathogenic standpoint, however much like it it may be clinically. C. Liebmann has lately published a case in which it seems certain; there was also cancer of both ovaries.

Ehrendorfer has operated upon a woman of fifty-four for a polypus of the cervix, which presented, besides the classical characteristics of a fibromyoma, a carcinomatous degeneration. No other carcinomatous focus existed in the uterus.

The association of cancer of the cervix with fibroma of the body is not infrequent.

Adjacent and Distant Lesions.—Wyder and von Campe have shown that in almost all cases of fibroma there is present also an endometritis: the mucous membrane of the uterus suffers a glandular or interstitial hyperplasia. Wyder has observed that the former is found almost exclusively where the tumor is at a distance from the uterine cavity, and the interstitial occurs with those but little removed from the mucous membrane; occasionally we encounter a mixed form, which Olshausen calls "endometritis fungosa." These lesions explain the symptomatic hemorrhages of fibromata.

According to O. Semb, certain secondary changes (pressure occasioned by the neoplasm, concomitant inflammations) may cause a complete disappearance of the initial hypertrophy at an advanced period in the evolution of a myoma.

It is certain also that there exists in some cases an endosalpingitis by propagation; for a times, in hysterectomies and castration for fibroma, the tubes are found flexuous and full of blood. Complicating abscess of the

ovary and also chronic salpingitis have been noted. Röse, in the course of a myomotomy, discovered one of these hæmatomata of the tube, which was so thinned that rupture seemed imminent, and he cites this condition among the indications for operation.

Bantock finds that in patients with uterine fibroma the liver is fatty, and attributes the lesion to the presence of the tumor; he believes it to be a frequent cause of unsuccessful operation. Fibrous uterine tumors, by pressure on the ureters, may produce grave kidney disorders—pyelitis, pyelonephritis, hydronephrosis. These accidents are especially frequent when the tumor has a pelvic development; I will describe them with cancer.

Lesions of the heart, which may be found in all cases of large abdominal tumor, are very often a complication of uterine fibroma. They seem at times dependent upon renal changes, as Traube has indicated, but often we cannot find any such correlation. The hypertrophy, with or without dilatation of the cavities or consecutive change in the cardiac tissue, produces itself, no doubt, by a pathogeny similar to that which causes the hypertrophy in pregnancy. As to the final degeneration of the heart, it is strongly favored by the anæmic and cachectic condition of certain subjects; two such forms of degeneration are described, the fatty and brown atrophy of the myocardium. Sebileau has recently called attention to the troubles caused by hypertrophy and dilatation of the left side of the heart, more rarely of the right, in voluminous tumors of the abdomen.

CHAPTER IX.

SYMPTOMS, DIAGNOSIS, AND ETIOLOGY OF UTERINE FIBROMATA.

THE symptoms of fibroma of the uterus are of two kinds: (1st) the rational signs which reproduce the uterine syndroma described in Chapter VI., with certain special differences and a predominance of the hemorrhage; (2d) the physical signs proper to the tumor.

1. *Rational Signs.*—The completeness of my description of the uterine syndroma permits me to abridge this section. The hemorrhages appear in a peculiar form and become the chief symptom in the majority of these cases. They occur either as metrorrhagia or as menorrhagia; that is, they come at the regular period of menstruation or during the intervals. They are intimately connected with the lesion of interstitial metritis, which always accompanies fibroma situated at but little distance from the mucous membrane; the glandular metritis which is found with tumors farther removed from the uterine cavity gives rise only to leucorrhœa. In general the symptom of bleeding is more complained of the more the neoplasm invades the cavity and reaches its highest grade in polypi. The loss of blood is very enfeebling to the patient, but death by hemorrhage is exceptional: Duncan has reported one such case in which at the autopsy a rupture of a large uterine sinus was found.

The leucorrhœa is not distinctive; at times there may be very abundant serous discharges, a hydrorrhœa, which differs from that of cancer in having no odor and in being intermittent.

The pains are various. There is usually only a sensation of dragging and weight, with reflex neuralgias in the lumbar region and abdomen, as is so common in any uterine affection. To these are joined, when the tumor projects into the uterine cavity, colic and expulsive pains occurring at the time of the hemorrhages. When the tumor is very large, it may press upon the sacral plexus and cause extreme sciatic pain, which is apt to be more violent at the menstrual period. Jude Huë observed one case of this kind in which the support of an air pessary caused the sciatica to disappear.

The symptoms of vesical compression are very frequent. West found dysuria in thirty-five cases out of eighty-six, but Gallard did not regard this as simply a mechanical trouble, although he gave no explanation of its production. It is probable that this dysuria is due to small tumors on the anterior face of the uterus in direct relation with the neck of the bladder. All

these visceral symptoms are more pronounced during the periodical congestion of menstruation, and they may at times acquire the importance of a cystitis from the permanent presence of residual urine or from infection introduced by the catheter when proper precautions are not observed. The compression of the vesical neck may produce a chronic distention which simulates ovarian cyst.

The compression of the rectum, more rare than the preceding, may at times cause hemorrhoids, and with the dyspepsia will produce constipation. Barnes attributes great importance to the absorption of excrementitious matters which follows this obstinate constipation, and considers it a veritable toxæmia, which he proposes to call copræmia; recent researches on the ptomaines and leucomaines give a certain weight to this opinion, which seemed a very bold one when it was first formulated.

Fibromata which are contained within the lesser pelvis may cause internal strangulation and death.

Compression of the ureters and grave renal troubles have been known since Murphy's description of them; since which time there have been numerous observations of this kind scattered through the literature of the subject. I have collected some of these and shown that the risk of this serious complication, wrongly considered rare by Gallard as by most other authors, should on the contrary be one of the most serious indications for operation.

A very great number of the deaths following hysterectomy or castration must be attributed to renal degeneration, by reason of which the surgical interference and the long inhalation of the anæsthetic are invested with great and sudden gravity. (Lee reported a case of pregnancy at four and one-half months with three fibromata, of the size of an apple, compressing the bladder; the fundus imprisoned, the cervix above the symphysis; unsuccessful attempts to disengage; death; and at the autopsy, pyelonephritis. Skene, on this occasion, said that it was the third fatal case of pyelonephritis which he had seen from pressure on the vesical neck, and that such cases were probably more frequent than was supposed. Salin and Wallis report a case of castration with death, from double hydronephrosis, due to a large uterine myoma in a woman of forty years, who had always suffered great pain in the dorsal decubitus. The castration was followed by suppression and death in seven days, with the symptoms of uræmia and a little albumin in the urine. At the autopsy the ureters were found compressed and thickened, their pelves dilated). On the other hand, symptoms of pyelitis, and of albuminuria with threatening uræmia, have been seen to disappear after the removal of a fibroma which compressed the ureters. We must never neglect to examine the urine both chemically and by the microscope, and determine the proportion of urea, the presence of albumin or pus, and the characteristic hyaline and granular casts.

Every abdominal tumor causes an increased vascular pressure, and so reacts upon the cardiac muscle. It is not therefore astonishing that any

heart lesion, although slight, may be aggravated by the presence of a fibroid; for a similar effect is produced by pregnancy. A part of the cardiac trouble observed in patients with voluminous tumors of this kind has often no other origin. Only a few isolated observations have been published, since Hofmeier, in 1884, in an article remarkable for its physiological and pathological explanation of shock, insisted on the frequency of cardiac disease in cases of abdominal tumor, and especially with fibromata of large size. He collected a series of eighteen cases in which sudden death was caused by cardiac failure provoked by the presence of a large abdominal tumor, either physiological or pathological; in three of these there was advanced fatty degeneration of the heart muscle (two myomata and one ovarian cyst) and in fifteen brown atrophy of it (five ovarian tumors, five myomata, and five pregnancies). Five deaths occurred before any operation, nine after operation, and five following labor.

This interesting question has been studied by other authors also. Fehling, in a series of fourteen hysterectomies, studied all the patients from this point of view, and found in four of them manifest signs of cardiac alteration. He also observed at the same time three cases of fibroma of middle size, with symptoms of heart disease; two of these patients died afterward, one of them suddenly. In America, Dower published an observation of this kind; and in England, B. Fenwick presented to the Gynæcological Society of London a memoir upon the subject. In France, Sebileau collected confirmatory cases. Among eighteen cases of tumor of the abdomen which he observed in reference to this point, seventeen had cardiac trouble indicated by a murmur; but in the three cases of myoma which he cites there was no autopsy. We should, then, auscultate carefully every patient with a tumor of any considerable size; the dull character of the heart sounds, the dyspnœa and the general debility may lead us to fear a fatty degeneration of the myocardium. Brown atrophy may not give any special symptoms; it is found chiefly in individuals who are much weakened by hemorrhages.

I share in the opinion of those surgeons who see in this lesion a new indication for operation and at the same time a grave addition to the prognosis.

Among the signs furnished by local examination, that which is common to all tumors, whether large or small, should be given the first place, namely, elongation of the uterine cavity. This is constant in all tumors during their evolution—that is, all giving rise to morbid phenomena. The uterus is dilated both with a small interstitial fibroma and with a small polyp, since it is hypertrophied under the influence of what Guyon has called the "fibrous pregnancy." With a large fibroma the uterus is also elongated by the eccentric development of the tumor, and the traction which it causes upon the cervix; the sound may pass as far as twenty centimetres (eight inches).

This passage of the uterine sound should always be done with the greatest care; it is generally possible to use a silver instrument which one can curve as is necessary. But for fear of meeting difficulties we may employ a

urethral bougie which is moderately flexible, seizing it close to the cervix to determine how far it has penetrated.

The uterine cavity may be effaced by a tumor which projects into it, and the sound may not pass.

The search for the tumor should be made by bimanual palpation, aided by rectal touch; and in difficult cases it may be well to administer an anæsthetic, to relax the abdominal walls. One general remark is applicable to all these examinations—they furnish very variable information, according as they are made during or after a fluxionary or hemorrhagic period. In the second case we often find a great diminution in the size of the tumor, which might cause mistakes as to the internal treatment to be followed. We must be on our guard as to the contractions which some have claimed to feel in certain of these tumors; a fibrillary movement of the abdominal walls, the gliding of a loop of the intestine, might easily give rise to this illusion.

When the tumor has effaced or passed beyond the cervix it is accessible to vaginal touch.

Diagnosis.—From a clinical point of view we may divide these fibrous bodies into three great classes, according as the tumor (1) is very small and interstitial or (2 and 3) is well characterized and pursues its evolution toward the peritoneal or the uterine cavity. In the first case the chief symptoms are those of the complicating metritis, the metritic type.

In the second form, with a vaginal evolution, we must distinguish the varieties caused by (A) submucous fibroma of the body; (B) pediculated fibroma of the body, or polypi; (C) fibroma of the external os, or of the subvaginal portion of the cervix.

In the third case, with an abdominal evolution, we must distinguish: (A) pediculated fibroma; (B) those developed at the fundus above the attachment of the broad ligaments; (C) those from the body of the organ below the attachment of the broad ligaments; and, among these last (D) those of the subvaginal portion of the cervix below the peritoneum which have a pelvic development in the tissues of the lesser pelvis. The following table renders this clear:

I. Metritic type—small interstitial fibroma.
II. Type of vaginal evolution:
    A. Fibroma of the external os—sessile or pedicled.
    B. Submucous fibroma of the body.
    C. Fibroma of the body, pedicled or polypi.
        a. Intra-uterine.
        b. With intermittent signs.
        c. Intravaginal—var. enormous polypi.
III. Type of abdominal evolution—subperitoneal or interstitial:
    A. Pedicled fibroma.
    B. Sessile fibroma, not in the broad ligament.

C. Sessile fibroma, in the broad ligament:
   a. Abdominal.
   b. Pelvic.

I. Diagnosis of Fibroma of the Metritic Type.

Small Interstitial Fibroma.—When the tumor is not very large and has a tendency to project from the uterine wall (Fig. 147) it is at times very difficult to recognize the real source of the morbid phenomena observed, the chief of which would be: persistent hemorrhage coincident with enlargement of the uterine cavity, and finally the discovery of a tumor.

We must eliminate hemorrhagic metritis. Early pregnancy is accompanied by cessation of the menses, but we should remember that in exceptional cases they have persisted. Abortion with delay in the involution of the uterus caused by retention of placental fragments, is distinguished by its special course and by the study of the material furnished by the curette. Cancer of the uterus is also accompanied by hemorrhage, but with this there is fetid leucorrhœa, and the curette will remove fragments which under the microscope determine the nature of the tumor. Inflammations of the tubes and ovaries are a frequent source of error, for there may be repeated hemorrhages, and a tumor (hydro-, hæmato-, or pyosalpinx) which appears to form part of the uterus, attached either to the sides of the organ or to the posterior surface in Douglas' pouch. We cannot always in our search determine the presence of fluctuation, and it is dangerous to examine for it with too much zeal; in the small, tense tumors it is generally absent. The very great rapidity of the formation, the patient's own story, the rational signs, careful local examination under the influence of anæsthetics, and the absence of increase in the size of the uterus are all valuable means for recognizing disease of the adnexa.

Anteflexion and retroflexion, although accompanied by bleeding, do not deceive us for very long; the nature of the tumor which we feel in the cul-de-sac on one side or the other of the vagina should be quickly recognized by the sound and bimanual palpation. The small collections of fæces which are found in the rectum and felt by vaginal touch need only be called to mind in order to dismiss them; they could deceive no one but a novice. The finger indents them and a purgative causes them to disappear.

II. Diagnosis of Fibroma with a Vaginal Evolution.

A. Of the External Os.—The existence of a tumor hanging from the lip of the cervix is here the capital symptom. Ordinarily it is not ulcerated, but is smooth and elastic. Passing the index along it to the base, we feel the os in front or behind, according to the lip from which it hangs; the other lip is usually thinned and partially effaced. This circumstance has caused

the error of supposing the uterus everted or that the tumor came from the interior of the organ. Attentive examination of both lips by touch, of the cavity by the sound, and of the position of the organ by bimanual palpation will furnish the needed corrections. A fibroma of the external os may itself be pedicled, and the fact should not be forgotten. Finally, when they grow at the level of the vaginal insertion they may split the rectovaginal septum and then simulate a tumor of that situation, or they may develop toward the uterine cavity.

B. Submucous Fibroma.—The hemorrhages and the increase in the size of the uterine cavity are here especially marked, and the presence of the tumor is readily ascertained. For this purpose, touch should be practised during the bleeding, since at that time the uterus is softened and the os patulous. If necessary, we may increase the cervical dilatation by the means already described, and confirm the diagnosis by intra-uterine touch. On the level face of the uterus there is then to be felt a tumor which projects into the cavity and reduces it to a mere linear cleft, laterally distorted. The surface of the tumor is covered by hypertrophied mucous membrane, which is smooth and downy. There is no pedicle, but a large base of attachment, which excludes the idea of a polyp.

Externally the uterus has a globular form which would resemble that of the first months of pregnancy, were not hemorrhages exceptional at that time.

When the surface of the tumor has become gangrenous, the possibility of a mistaken diagnosis is much increased; the sanious discharge, the irregular and putrid surface, and the patient's cachexia make us think of malignant tumor, or of cancer of the body of the uterus.

C. Pedicled or Polypoid Fibroma of the Body.—We can divide the evolution of a polyp into three stages, and each one of these corresponds to a variety of fibroma. In the first, the pedicled fibroma is still far from the uterine cavity, which is often very much dilated; that is, it is intra-uterine. In the second period there is a tendency to pass beyond the cervix, after dilating it, which is far more marked at the moment of the monthly discharge and disappears between-while; this is the variety with intermittent symptoms. Finally, in the third period of their evolution, these polypi protrude completely from the uterus, have become intravaginal, and may take on an enormous size, thus forming a new variety from the point of view of the symptoms and possible operation.

These intra-uterine polypi may be distinguished from sessile submucous tumors by direct examination after dilatation of the cervix, the presence of the pedicle being characteristic.

A polyp with intermittent symptoms, occurring at the menstrual periods, may pass unrecognized unless we see the patient at the favorable time, and here again the cervix will require to be dilated, both for diagnosis and to permit removal.

An intravaginal polyp of the vagina, coming from the body of the or-

gan, would seldom be confounded with a sessile or pedicled fibroma of the cervix; touch alone should reveal its relations. We might think of an inverted uterus, especially if the organ itself contained a fibroma; and this error is very easy to make, as is shown by the fact that more than one distinguished surgeon has committed it. This inversion may be unrecognized in two conditions—if there is a complicating polyp or submucous tumor which alone attracts attention; and when it is the only alteration, and the constriction at the level of the internal os makes the upper part of the everted organ seem like a pedicle. The operator may especially note, as an aid in guarding against mistake, the extreme sensitiveness of a tumor formed by the uterus, though this symptom is very inconstant. But the sound and rectal touch, combined with vesical catheterism and bimanual palpation under anæsthesia, will make it evident that the uterus is not in its usual place—that we have to do with a case of uterine prolapse.

This examination is at all times difficult with polypi which are of great size, for they fill the vagina and even project from the vulva, causing a displacement of the uterus. They may also form adhesions with the vaginal walls, provoke ulcerations, or themselves slough in places; and, more than that, by retention of decomposing fluids above them in the occluded vagina, they may cause the absorption of these putrid products, and thus seriously disturb the general condition. Though the statements of the patient and the local signs might lead us to suspect cancer, a careful examination will quickly correct the error.

III. Fibroma with an Abdominal Evolution.

A. Subperitoneal: Pedicled.—The uterus is here entirely distinct from the tumor, whose movements cannot be transmitted to the finger placed in the vagina (Fig. 153). The cervix is generally raised; there is usually no metrorrhagia; and the cavity of the uterus is not enlarged. Ovarian cysts are the most difficult things from which to differentiate these fibromata. The fluctuation in the cyst would be pathognomonic, but it might be confounded with the softness of an œdematous fibroma; and if the cyst were small and tense or multilocular, with small areolar cavities, it would be very hard to appreciate. Examination under anæsthesia would then be necessary to remove all doubt. In the case of fibrocystic tumor the fluctuant parts alternate with harder portions.

Another point for consideration is that the fibroma develops very slowly and the ovarian cyst rapidly. As Thornton has remarked, "there are certain pedicled fibromata which run so rapid a course that confusion is easy, as they also react but little upon the uterus; and thus in every ovariotomy we should be prepared to do a hysterectomy."

Exploratory puncture, which has been abused in former years, should be completely given up; it may cause serious accidents, as discharge of the cyst

within the abdomen, internal hemorrhage, thrombosis or embolism in case of a fibroma, or even more or less extended peritonitis. Harsha observed, in the case of a fibrocystic tumor, that he could clearly perceive contractions in the muscular wall, and proposed to anæsthetize the patient at the menstrual period—a time most propitious for the examination—and verify the existence of contractions in the tumor by percussion.

H. Jones has described an exceptional condition of the gravid uterus which simulates pedicled fibroma. In four observations which form the basis of his paper, the uterus formed a hard, round tumor, movable, and of the size of the fist, between the symphysis and the umbilicus, and appeared to be a mass connected by a long pedicle to some pelvic organ. Pressure upon the tumor moved the cervix but little, there was no fluctuation, and the sound (before the pregnancy was recognized) gave a depth of the uterine cavity of 12 cm. The author attributed this peculiar state of the organ to the absence of liquor amnii; the fundus, the point where the ovum is commonly attached, would then become globular, while the lower segment would remain lax; hence there would be a false sensation of a pedicle. It is very probable that the case occurred in a woman with hypertrophy of the supravaginal portion of the cervix. A short delay is all that is needed to make the matter clear.

Floating kidneys may be recognized by their contour and the entire absence of any connection with the uterus.

The large cancerous cakes formed in peritoneal carcinoma by the degeneration of the omentum may be mistaken for fibroma if there are adhesions to the uterus; but the sanguinolent ascites, the shape and situation of the tumors, the cachexia, and other symptoms, with the freedom of the uterus as disclosed by the sound and bimanual palpation, are sufficient to distinguish the two diseases.

B. Subperitoneal Fibroma, Sessile and Free: Not in the Broad Ligament.—The differential diagnosis is here the same as in the preceding cases. Occasionally it is very difficult to diagnose pregnancy complicated by such a tumor, for even exact analysis of the symptoms, with careful attention to those characteristic of the fœtus, may be without result during the first months.

Fibroma of this variety may be discovered by its solid union with the uterus, for the two constitute but a single mass on bimanual palpation. At the same time the examination reveals how much the lower portion of the organ is involved; for if the tumor has developed above the insertion of the adnexa this part will be intact, but in the contrary condition it will become a part of the tumor's circumference. The mass is then immobilized by the walls of the lower pelvis, and permits no lateral movements; but on bimanual palpation we feel that the iliac fossæ are free, which distinguishes it from the next form.

C. (*a*) *Intraligamentous Fibroma—Abdominal Variety.*—Here the development of the tumor is altogether lateral, splitting up the layers of the broad

ligaments, and ordinarily the tumor lies in one of the iliac fossæ, and fills it up. By touch and palpation we can determine its connections with the uterus, and we find usually that but one of the lobes of the tumor is actually in the ligament, the other being above it; but that which gives the tumor its name and importance is its very grave nature and the special therapeutic measures required. It is only exceptional that there is any doubt as to the existence of a fibroma, though before complete examination we might suppose that there was present a tumor of the iliac bone.

Parovarian cysts within the broad ligament may be recognized by their fluctuation.

Encysted tumors of the tubes, especially hydro- and hæmatosalpinx, may be difficult of diagnosis from their adhesion to the posterior surface of the uterus and the difficulty of appreciating any fluctuation; but here the patient's history, the use of the sound, and the determination of the *grossesse fibreuse* are valuable diagnostic measures.

C. (*b*) *Intraligamentous Fibroma—Pelvic Variety.*—The chief characteristic of this variety is found in the development of the neoplasm within the pelvic floor between the organs attached there, and its tendency to fill up all places between them and raise the body of the uterus into the abdomen (Fig. 156, *B*). Clinically we have, as the result of this, the most serious compression symptoms, and for the operator there are extreme difficulties.

The starting-point of these tumors is always in the subserous portion of the uterus; that is, the supravaginal part of the cervix. If their attachment is anterior, while their volume is still very small, they may cause grave disturbance of the bladder, dysuria, and retention of the urine. And it is in this variety also that we observe especially the intense pain caused by pressure on the nerves, as well as the accidents of intestinal obstruction.

Vaginal and rectal touch, combined palpation, determine the close connection of these tumors with the organs of the pelvis; the culs-de-sac are found to be depressed or obliterated, and the cervix may have wholly retracted to form part of the tumor. About its orifice, of which only the external os may remain, there are felt hard nodular masses which are connected with the uterus and which pressure does not displace; it is in the latter respect especially that these tumors differ from those of the body of the uterus, which invade the pelvis only as there is a retroflexion developed. These latter, which become pelvic by immigration, may produce the same symptoms from compression and give the same sensations to the examining finger, but they are not tightly bound down unless there are adhesions of inflammatory origin; and pressure made through rectum and vagina upon the morbid mass, with the woman in the genu-pectoral position, will change the tumor's place if it does not return it above the superior strait.

Hæmatocele, inflammatory foci about the uterus, and encysted collections in the tubes are at times difficult of diagnosis, and have been the cause of

numberless errors; no doubt the so-called medical treatment of fibrous tumors owes much of its success to this fact. Before finishing the clinical description, I may mention certain symptoms which are occasionally observed.

It is common to all tumors which compress the great vessels to present an intermittent murmur, called the uterine souffle in pregnancy. It has little diagnostic worth. If it is absent in a case of ovarian tumor, we may then be sure of finding fluctuation; with solid tumors, on the contrary, it is present.

With telangiectatic fibroma there is often a distinct area over one of the broad ligaments where we find a continuous murmur which resembles that of an arterio-venous aneurism, and, like it, is accompanied by a thrill; I have observed one such case.

Ascites is uncommon with fibroma, but it may develop when the tumor is very movable or when it has undergone a degeneration from torsion of its pedicle. In cachectic subjects, also, it will at times appear with tumors which in another patient would certainly not have caused it. I have observed it in these conditions in a patient who suffered from mental disease, in which hysterectomy was successfully performed and ameliorated the mental condition. Hemorrhagic ascites is an almost constant symptom with malignant tumor, and its presence warrants a very guarded diagnosis. I have already spoken of chylous ascites as a great rarity.

Serous cysts of the broad ligament coexist quite frequently with fibroma of abdominal development, and are more than merely fortuitous, since the exaggerated nutrition caused by the tumor favors their development in the vestiges of the Wolffian body which constitute the parametrium. Some large tumors of the uterus drag the organ downward and cause a genital prolapse as do also some of the ovarian tumors. Inversion of the uterus may be found with polypi, and, exceptionally, with subserous fibroma.

A rare accident, of which I have seen one case and which has been made the subject of a thesis by Düll, of which Schröder has given an analysis, is the separation of the linea alba and consequent eventration with the formation of a hernial sac, in which the large fibroma, usually pedicled, is found lodged. In my case the patient was an old woman who had carried this singular hernia many years. Its size was larger than her head, there was so small a ring that reduction was impossible, and the sac was thinned and rested upon her knees. In a case mentioned by Düll death followed mortification of the sac.

Course and Prognosis.—The great majority of these cases present nothing during life beyond a few vague symptoms which are often unrecognized. But there are others which cause serious disturbance throughout the entire period of sexual activity until the menopause, when most of these tumors atrophy and diminish in volume by induration and involution. This effect is at times hastened by a pregnancy, but the rule is not absolute. A certain number of these tumors have a veritable "galloping" course, as I have termed

it, causing death not so much by the hemorrhage, as by the exaggerated development of the morbid mass and the phenomena of compression and denutrition which result from it; of this number are fibrocysts in general and some simple fibromyomas. On the other hand, there are certain tumors of a less rapid course which continue to grow indefinitely after the critical age; but most frequently there is a distinct retardation at that epoch.

The natural evolution of a fibroma tends toward its expulsion from the uterine walls, either externally or into the peritoneal cavity, and this effort is shown by the pedicles which are produced in these two directions. Although such cases are rare, still at times we observe the accouchement of a polyp under the influence of strong uterine contractions with rupture of the pedicle; or the same thing may occur from the weight of the tumor alone and the thinning of the pedicle. In these conditions an effort of defecation or of vomiting suffices to expel the polyp. The rupture of the capsule of a submucous fibroma may produce its spontaneous enucleation, preceded by a period of pains and hemorrhage, or suddenly after some effort or while under examination; it has sometimes followed labor and the consecutive contraction of the uterus.

An analogous process to that which causes the rupture of the pedicle of a submucous polyp may also liberate a fibroma which is subserous and pedicled. The tumor then remains grafted to some point where it has formed adhesions, or lies free in the peritoneum and undergoes a kind of mummification.

Another and more serious mode of spontaneous extrusion is produced by the mortification of the tumor, the sphacelated portions tending to escape outwardly; at times this takes place toward the uterine cavity and all may go well, despite the danger of infection. Or there may be perforation of some neighboring organ, as the bladder, the rectovaginal pouch, or the abdominal wall; the two former almost always causing death, the latter sometimes ending in recovery. Finally, the tumor may undergo absorption, as I have said above, after pregnancy, or at the menopause; but in the latter case there is more truly an induration and diminution than complete disappearance. Although fibromata are an undoubted cause of sterility, fecundation may take place and pursue its normal course.

The cause of death may be the gradual exhaustion produced by the profound anæmia which follows repeated hemorrhages, or it may occur from successive attacks of chronic peritonitis, from disease of the kidneys and uræmia, or from cardiac complication and heart failure. Rupture of a cyst, or inflammation and gangrene of the tumor, propagated with or without perforation to the neighboring serous membrane, may set up an acute peritonitis, with a rapidly fatal termination. Or gangrene of a submucous tumor may be the origin of a fatal septicæmia. Ghastly, sudden death has been observed after embolism, especially in the case of fibrocysts of telangiectatic nature; exploratory puncture seems to favor the production of thrombi in

the large venous sinuses. Almost immediate death by shock has been observed after intra-abdominal rupture of a fibrocystic tumor.

Etiology.—In spite of the patient researches which have been made upon this subject, we still know nothing positive about the exciting causes of uterine fibroma. We can only give certain predisposing conditions, among which are race (the negro being more subject to such tumors than the white) and advanced age; in the white races the most susceptible age is from thirty to forty years. Sterility is not so much a cause as a consequence. All the local exciting causes which have been advanced are without proof. On the other hand, it has been supposed that a celibate life disposed to their formation, but Gusserow's statistics disprove the idea. Fehling has attributed great importance to incomplete involution after labor and abortion where a sufficient period of repose was not enjoyed. Prochownik thinks that the specific irritations due to syphilis, malaria, and typhoidal infections may have a pathogenic action in the development of uterine fibromyomata.

CHAPTER X.

MEDICAL TREATMENT OF FIBROMA—SURGICAL TREATMENT OF FIBROMA WITH A VAGINAL EVOLUTION.

The treatment of fibroma may be divided into medical and surgical.

Medical treatment of these cases is often only the treatment of the symptoms. The various substances which have been advocated for the purpose of acting directly upon the tumor itself, either to cause contraction of the nutritive vessels (as ergot) or to set up a fatty degeneration (as arsenic and phosphorus), appear to produce a good effect by far other means; the first contracting the uterine vessels and thus decreasing the hemorrhage, the second relieving the general malnutrition. As specific agents, electricity, to which certain authors attribute considerable importance in the absorption of fibrous tumors, and mineral waters charged with sodium chloride, of which the action is incontestable, may be mentioned.

Ergot injections have been practised since the writings of Hildebrandt, who gave his name to the method. The treatment must be used persistently for months; for which purpose the following formula may be employed:

℞ Ergotini, ...	5 gm.	gr. lxxv.
Chloral. hydrat., ...	1 "	gr. xv.
Aquæ destill., ...	100 "	ad ℥ iij.

M.

and twelve minims injected daily. If it is desired to preserve the solution for a long time, it is well to add, besides the chloral, which is intended to accomplish the same object, a few drops of Van Swieten's fluid. A wire must be kept in the needle to insure its being permeable, and it must be passed through the flame of an alcohol lamp after each injection to dry it, and beforehand to sterilize it, so that abscess may be avoided. The injection is best made in a fleshy part, like the deltoid or the buttock, the needle being inserted perpendicularly from a half to three fourths of an inch. To prevent pain, Bumm advises that the solution be neutralized with soda and filtered. The patient may be taught to give herself these injections; Winckel speaks of a woman who had thus done it fifteen hundred times.

In spite of the so-called demonstrative cases which have been published, the effect of this method upon the development of fibrous tumors is still contested. Schröder asserts that he has seen no diminution in the size of the tumor after four hundred injections, although the dose employed was stronger than the one I have indicated; but he has noticed that the tumor remained

stationary, though it had been increasing up to that time. Leopold recommends the method, and Byford, in America, is its warm partisan. On the other hand, many others declare that they never obtained any good effect from it. In the use of this treatment, if the prescribed dose is much exceeded, it may produce cramps of the extremities, vomiting and fever, or even suppuration of the tumor. [It is well to remember that this long continued use of ergot often produces degeneration of the heart muscle and that cases so treated are apt to die of "heart failure" after operation.]

One of the good effects attributed to the ergot treatment is that it favors the spontaneous expulsion of fibroma; but it is doubtful if it will cause the formation of a pedicle in a tumor which is submucous, and those which are already polypoid require more than medical treatment.

Churchill and MacClintock strongly advise the administration of tincture of cannabis indica in six-drop doses, given three times a day, to arrest the hemorrhage. Antipyrine has been tried with the same object.

A drug, which I have used with good results, introduced into European practice from America by Freund, is the fluid extract of hydrastis canadensis. This acts as a hæmostatic by contracting the vessels, while its bitter taste makes it a good stomachic; the dose is forty drops three or four times a day. Schatz praises the drug highly, claiming to have seen a fibroma, which had reached the umbilicus, return to the pelvic cavity after two years' use of hydrastis. Lack of success, according to him, may be due to the difficulty of procuring a pure form of the medicine.

Bromide of potassium, given in small doses for a long time, has been advocated by Simpson; but it seems to act only as a sedative against the pain, and its prolonged use may impair the digestive function, which it is so important to preserve.

Arsenic, advised by Guéniot, does not display the selective action which had been hoped from it, but, as a tonic, may be of benefit.

Baths of mineral waters containing sodium chloride have an undoubted beneficial action on fibrous tumors, doing more than simply improving the general condition, and the cases in which I have obtained good results from them are very numerous. Many of these bitter waters contain alkaline bromides and iodides which impart to them a peculiar sedative action, those of Salies-de-Bearn, for instance, containing 10 gm. of bromide of sodium to the quart.

As the result of Apostoli's work, who has followed with rare patience the way opened by his master Tripier, electricity has been much employed, especially in America and England. The application of electrolysis to fibromata was made in 1871 by Cutter, in America, and in 1876 by Ciniselli and his pupil Omboni in Italy.

As is well known, the effect of a strong current of electricity is to produce chemical decomposition of the tissues, the positive electrode attracting the acid elements and the negative the basic; if then we put the positive

(acid) pole in contact with the tissues, either on the surface of the mucous membrane or in the depth of the tumor, we produce an eschar similar to that which follows the application of acids, ending in a cicatrix which is fibrous and retractile. If the contact has been made with the negative pole, the result is a soft non-retractile eschar, like that caused by potassium hydrate. This excessive chemical action can be prevented at one or the other pole by largely increasing its area and covering it with some good conducting substance (clay, gelosin, gelatin, wet cotton or chamois leather, etc.), which spreads it over so large a surface that its action is not felt.

The first who employed electricity used feeble currents which had a catalytic effect without actual destruction of the tissues, and many authors still hold to this method as least dangerous. But the great majority follow the example of Apostoli and Engelmann, employing currents of high intensity from a battery of Leclanché cells. Apostoli, in 1884, did not use more than 100 milliampères; he now reaches 250 at times. The strength of the current is measured by a galvanometer. [The "ampère" is the current developed by an electromotive force of one "volt" in a circuit in which the total resistance is one "ohm." The "volt" is an electromotive force which differs but little from that of one "Daniell" cell; the "ohm" is the resistance of a column of mercury 1 mm. square, 106 cm. long.] His technique is as follows:

One of the poles is applied to the abdomen by means of a large moist clay electrode or other appropriate medium, and the other pole is introduced into the uterine cavity in the form of a platinum or carbon sound, which is insulated with celluloid or rubber over the part which does not enter the uterine cavity. The electrode is pushed into the substance of the organ "after preliminary puncture where we desire to hasten the denutrition of the neoplasm, or where the cervix is impermeable or inaccessible." Thus an intra-uterine eschar is produced, the positive pole being used when the tumor is hemorrhagic, the negative in the opposite case.

Apostoli asserts that "if well applied and continued long enough (from three to nine months), this method is very successful, leading in ninety-five per cent of the cases to the reduction of the tumor from one-fifth to one-third of its former size, and sometimes to one-half and producing rapid and lasting control of the hemorrhage and disappearance of compression symptoms."

Engelmann describes a similar technique, with the employment of 50 to 250 milliampères during three to six minutes; exceptionally with double puncture of the tumor through the vagina.

The mode of action seems to be a double one. In the first place the mucous membrane is cauterized, producing, as Apostoli expresses it, an actual electric curettage; and, as well known, the curette will often control hemorrhage by destroying the diseased mucosa; both curette and electricity may thus cause a superficial mortification of a submucous fibroma. Bröse especially insists upon this mode of action for electricity, and Nicaise agrees

with him in considering the destruction of the mucous membrane as the chief benefit derived from it; this destruction is never more than an incomplete one, in a straight line corresponding to the sound in the uterus. It should not be compared with that obtained by the curette, which works effectively in all directions, penetrating all the corners. Danion, in his experiments with animals, demonstrated that, with a sound introduced into the

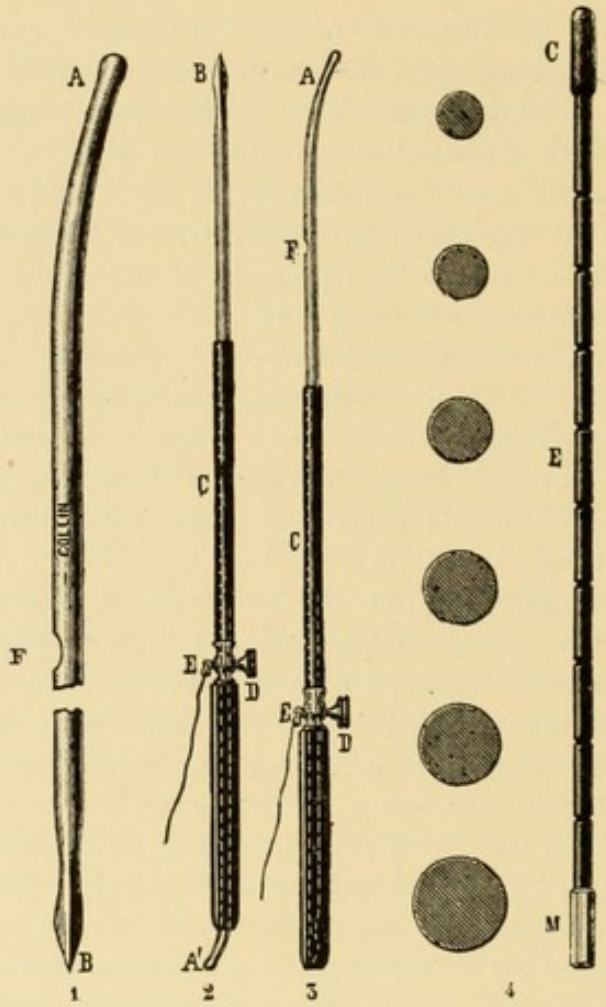


FIG. 160.—APOSTOLI'S UTERINE ELECTRODE. 1, Natural size of the instrument; *A*, ordinary hysterometer; *B*, trocar for puncture; *F*, notch marking average depth of uterus. 2 and 3, Entire instrument, reduced to one-third size, in *C*, celluloid handle to protect the vagina; *E*, electrode; *D*, thumb screw, to regulate length of exposed sound. 4, Carbon electrode for galvanochemical cautery; one-third size. Apostoli now replaces the platinum trocar by one of gold or steel, which has the advantage of being more readily sharpened.

uterine cornu of a rabbit, the current used by Apostoli caused but very slight cauterization.

Still another mode of action is claimed by all partisans of the method, whether they use feeble or strong currents, namely, the so-called "interpolar" action. Unfortunately this is pure theory; is it a chemical change in the living elements of the tumor, or a vasomotor effect with electrotonic action on the muscular fibres? Danion has even spoken of galvanic massage, insisting that the current be reversed for the purpose. All these ideas are

hypothetical and rest upon imagination only. The method is not altogether safe, for several fatal cases have been already recorded.

Far more dangerous yet is the method of Cutter, who employs a battery of great strength and pierces the tumor in two places, either through vagina, rectum, or abdominal wall; he has had four deaths in his first fifty cases. His results are as follows: arrest of the tumor, 25 cases; tumor not arrested, 7 cases; improvement, 3 cases; cure, 11 cases. Cutter, in seeking the elec-

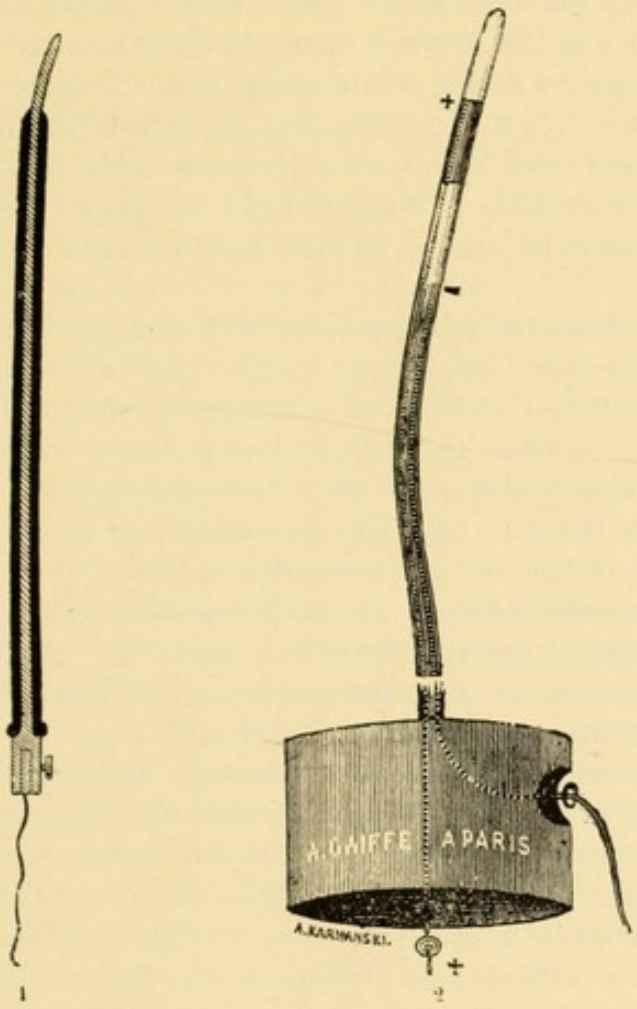


FIG. 161.—1, Tripier's Unipolar Uterine Electrode. 2, Apostoli's Bipolar Uterine Electrode.

trolytic destruction of the tumor, follows other theoretical views than those of Apostoli, though the latter seems to have made certain attempts in the same direction, when in exceptional cases he buried the electrode deeply in the centre of the tumor. One of the inconveniences of this method is that it gives rise to protracted suppuration.

Reacting against these violent measures, Danion and Championnière advise the employment of feeble currents of from 45 to 65 milliampères, or very rarely up to 90, claiming that these weaker currents are quite as satisfactory as the stronger. Danion attaches much importance to frequent reversal of the current. He introduces the electrode into the cervix, but

claims that he can obtain the same effects by placing it in the vagina if he takes the necessary precautions.

It is very difficult, even now, to pass judgment upon the value of electrolysis as applied to uterine fibromata. Diverse opinions are held in New York, in London, in Berlin, and in France. Doléris, who has employed the method in a series of twenty cases, thinks that he is often the victim of an illusion, mistaking for a diminution in the size of the tumor what is really only its subsiding into the lesser pelvic cavity. One must further be on his guard not to mistake for the tumor the perimetritic exudations which often become absorbed as the result of the rest and good care. The value of this treatment has been overestimated as regards the diminution in the size of the tumor, for when this effect is produced it is only temporary and ceases when the electricity is discontinued; but the majority recognize that it does lessen the hemorrhages and the pain and improve the general condition.

Without accepting the exaggerations of Keith, who has declared it criminal to practise hysterectomy unless electricity had been first employed, we should remember that in it we have a therapeutic resource which should not be neglected in those cases in which operation cannot promise a radical cure.

I will mention only the use of the interrupted constant current, of which Aimé Martin and Chéron have spoken warmly; its employment is no more useful or general than is the use of faradization.

[While ultra-enthusiasm and too great expectations have undoubtedly led to failure or disappointment in the use of electricity, there can be no question of its importance as a palliative therapeutic agent. When carefully employed, the treatment is generally considered to be free from any danger to life, unless electro-puncture be the method. Most of the unsatisfactory results have been in the case of tumors which have proved cystic—a condition which absolutely contraindicates the use of electricity—or in cases in which the proper precautions in regard to cleanliness or asepsis were not employed. Treatment by electricity is indicated in inoperable cases or where operation is refused; in fibroids of the smooth interstitial variety, especially when near the menopause; and in incipient fibroids in women over forty. It is absolutely contraindicated when there is pus in the pelvis, or where there is a suspicion of cystic degeneration.

Some knowledge of electrophysics, carefulness in manipulation, and exactness in dose are necessary to the effective employment of galvanism, together with a proper selection of the cases and accurate knowledge of the tumors to be treated. The current must be localized and its effects confined as closely as possible to the neoplasm. One pole must serve as the active agent for the application of the electricity, and upon this its entire effect is concentrated. This is termed the active pole. The current at the opposite pole is to be dispersed over as large a surface as possible, so that its effects will be least perceptible. The

poles should be placed on opposite sides of the diseased part, and as near to it as possible, the indifferent pole being placed on the largest and least sensitive surface. The current should be of sufficient strength to accomplish the object desired in the shortest possible time without detriment to the patient. This strength will usually be from 80 to 250 milliampères. The first instrument required is a battery of sufficient constancy and strength. One which has been found most serviceable is composed of fifty or sixty improved Law or Leclanché cells. These can be stored in any closet, or even in the cellar, connected in series with wires leading to any convenient spot in the office. Here we need a rheostat for the purpose of controlling the current strength, and an ampèremeter for measuring the amount used. In addition to these, there are the connecting cords, the abdominal and the internal electrodes. The abdominal electrode may be the original one of clay, first devised by Apostoli, or a thin plate of lead or tin as large as can be used upon the abdomen, covered with a thin layer of soft clay, held in place by gauze; or it may be made of gauze covered with wet canton flannel or thin, soft buckskin, held in place on the abdomen by a quilted sand-bag. The internal electrode is either a gold or platinum-plated sound, or a curved rod of carbon.

If the patient is hyperæsthetic or nervous, anæsthesia may be necessary; but, ordinarily, if skilfully and carefully used, the current may be passed without an anæsthetic. The patient is to be put upon the operating table or chair in the dorsal decubitus, the clothing loosened about the waist, the corset removed; the abdominal electrode, previously soaked in warm water, is then snugly adapted to the abdomen, so that the epidermal layers of the skin may have a chance to become thoroughly moistened, the current then passing with much less resistance and consequently less pain. Before placing this electrode, any scratches, pimples, or excrescences should be covered with bits of plaster or oiled silk, as otherwise the passage of the current will cause much pain at these points. Warm, dry towels should be placed over and above the electrode to protect other portions of the patient's body, as well as her garments, from any excess of moisture. The vagina should now be cleansed by an antiseptic douche and the uterine electrode carefully introduced. Being certain that the rheostat is at its greatest point of resistance, the connecting cords are now attached to the electrodes and the current turned on very slowly and evenly, so that in the course of a minute we have increased it from nothing up to 50 or 100 milliampères or more. The first sitting should not be for a longer time than six minutes, the current remaining at its strongest for half of this time, and then being slowly reduced. During the passage of the current the operator must constantly observe both his galvanometer and the patient. The needle should remain perfectly steady, with no oscillations which would indicate jar or shock. The operator must be particularly careful to avoid any accident which might produce a sudden change in the inten-

sity of the current, as the shocks thus produced are exceedingly trying. At the end of the sitting the vagina should be again douched and the patient kept in bed for the rest of the day. If there are evidences of pain or reaction, and in susceptible individuals, it is well to insist on rest in bed for several days, together with the use of the ice-bag over the region of the tumor. Should there be any bleeding, it may be necessary to tampon the vagina with styptic cotton. The necessity for this, however, is rare. We must always warn the patient of what is coming; we must first apply the moistened, warm, dispersing electrode to the abdomen; we must have the intra-pelvic electrode aseptic, and introduce it with the greatest possible gentleness; we must thoroughly insulate all but the active portions of the instrument, avoiding metallic contact with vagina, vulva, or speculum, and never establish the current until intra-pelvic disturbance has ceased; always increase the current very gradually, bearing in mind that the intra-uterine or intra-pelvic pole must never cause pain. All shock must be avoided, the connections made before the current is established, and not broken until it is entirely turned off.]

Treatment of Tumors Incarcerated in the Pelvis.—Certain fibrous tumors, either developing in the lesser pelvis or retroflexed into it, may cause serious compression of the rectum, bladder, or nerves, even producing ileus, uræmia, or paraplegia. At times all these symptoms may be relieved by replacing the tumor above the promontory. The patient is put in Sims' position, or, better, in the genu-pectoral, and the tumor is elevated by pressure from the vagina or the rectum; if there is much muscular contraction, chloroform should be used. This procedure may be adopted also in cases of pregnancy complicated with fibroma at the time of parturition.

Minor Hæmostatic Operations.—Before the description of the major operations for the relief of fibroma, a few words may be said about the more simple surgical measures which are employed against the often very serious hemorrhage.

Curettage and Intra-uterine Injection.—This measure has frequently been adopted, often, without doubt, from an erroneous diagnosis of hemorrhagic endometritis. Recent researches demonstrate that it is nevertheless the correct thing to do. It may be successful when the uterine cavity is not much deformed and the curette can be employed efficaciously. The injection of perchloride of iron with Braun's syringe, and copious washing afterward with the double-current catheter, as described under the head of metritis, may then follow. Such injections must always be made with the greatest care, remembering that the tubes may be markedly dilated and permeable.

Dilatation of the Cervix.—This operation, advised by Baker Brown, MacClintock, and Nélaton, has been recently advocated by Kaltenbach, who uses Hegar's bougies, from 16 to 18 mm., and in certain cases has obtained remarkable success. He attributes great importance to the narrowness of the

cervical canal in the causation of both pain and bleeding with myomata, and especially recommends this palliative measure in women with a small tumor who are near the menopause or when it is desirable to gain time. I have seen good results from it.

Bilateral Section of the Cervix.—This operation was done first by Nélaton, then by Baker Brown, and recently has been recommended anew; but as the incision must be carried down to the chief branches of the uterine artery, it amounts to nothing more than ligation of these vessels. It is of benefit only when the neoplasm occupies the lower segment of the uterus, and is thus of restricted application.

Intra-uterine Scarification.—In cases of obstinate bleeding depending upon an intra-uterine fibroma, Martin claims to have had good results from a measure formerly employed by Simpson, namely, the division of the capsule by scarification upon the projecting part of the submucous tumor, the severed vessels undergoing retraction.

Surgical Treatment of Fibrous Tumors.

The operations applicable to fibromata differ according as the tumors are accessible by the natural passages or only by laparatomy. The progress of operative gynæcology permits us to-day to avoid in most cases the division of the abdominal walls.

I shall treat in this chapter of those tumors only which by their evolution toward the vagina may be reached by that passage.

A. Fibroma of the Vaginal Portion of the Cervix.—In the cervix, owing to the small size of the part, we do not distinguish between submucous and interstitial tumors. They are ordinarily not difficult to detach from the surrounding tissues, and we may then, as Lisfranc and all other surgeons have done, attempt to enucleate them by the aid of finger and spatula after removal of their lower portion and a section of the tissue, or making a conical excision, in order to facilitate the manœuvre.

It is always useless to complicate the operation by the employment of the écraseur or the galvano-caustic loop; the latter is dangerous to the surrounding parts and of too delicate an action, and should be used only in exceptional cases. The écraseur, which many surgeons still advise for the ablation of tumors by the vagina, has several defects—it may break on tissues of great resistance, it cuts very slowly and causes a loss of time during which the uterus may be bleeding above the tumor, and it has a tendency to rise upward by a climbing motion on very hard tissues, which has caused the peritoneum to be opened. To avoid loss of blood, the best way is to proceed as quickly as may be with the bistoury; fibrous tumors are not very vascular, and, if certain vessels bleed, it is easy to arrest the hemorrhage by means of forceps. If the cervical tumor, as in one of Schauta's cases, is prolonged above into the uterus, it should be attacked by morcellation so as

to remove it completely. If the tumor has no capsule, we may amputate it as high as possible, saving two lips, which should then be reunited. When there is a clean wound after enucleation, we may equalize its edges and suture them; but if primary union seems improbable, it is better to remove the débris of the capsule and pack the cavity with iodoform gauze.

B. Pedicled Fibroma of the Body or Polyp.—When the tumor is intra-uterine, it is necessary to do a preliminary operation to render it accessible;

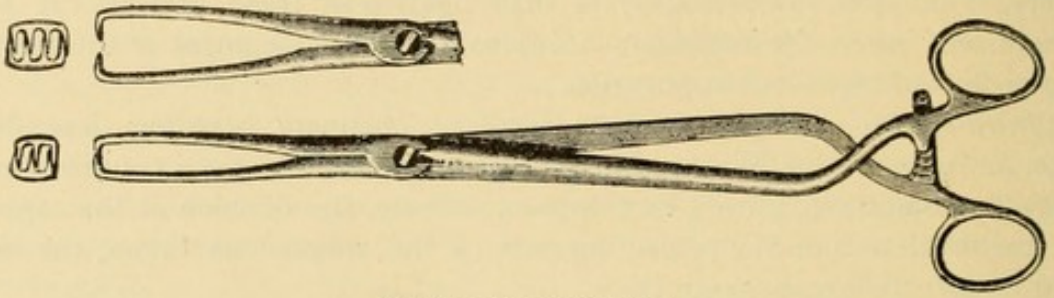


Fig. 162.—Museux Forceps.

this is best accomplished by the bilateral division of the cervix with strong scissors up to the vaginal insertion. The upper portion of the canal is usually dilated by the tumor itself; if otherwise, the part is softened by laminaria tents, and then dilated by Hegar's bougies; or we may make a bilateral incision (pages 90 to 94). The ablation of the polyp is ordinarily very simple. The patient is placed in the dorso-sacral position; the vagina is dilated with a speculum or retractors; and the polyp, being seized with toothed forceps (Figs. 162 and 163), is drawn downward as much as possible while the hand above the pubes examines that the uterus is not inverted. Then the pedicle is twisted by imparting to the polyp a movement of rotation on its axis, and after two or three turns a pair of strong scissors, curved

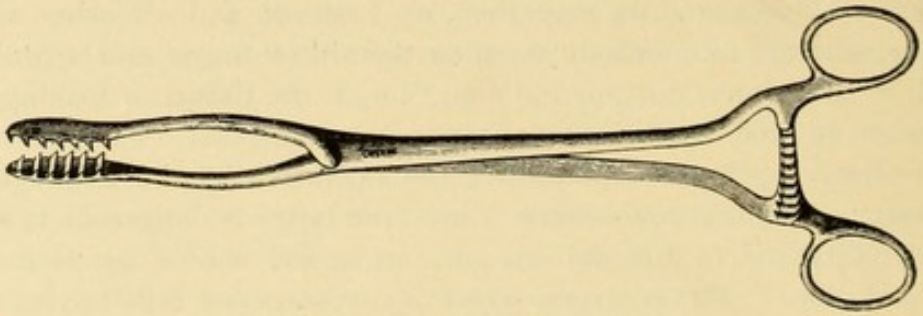


Fig. 163.—Collin's Tumor Forceps.

on the flat, is slid up to the attachment of the pedicle, which is then divided by small cuts while the torsion continues; this has the double effect of aiding the extraction of the tumor and lessening the hemorrhage.

The usual advice is to cut the pedicle as high as possible; but by a lower section I think that there is less risk of secondary hemorrhage, and the stump retracts within the cavity of the uterus and is rapidly obliterated.

All the measures devised with a view to prevent bleeding should be resolutely abandoned; they have resulted in more victims than cures. Galvano-

cautery, ligature, and écraseur all prolong and complicate an operation which, to be safe, should be rapid. Even Dupuytren contended against the chimerical fear of hemorrhage, and advised the cutting instrument; it is time to return to his practice. In the very rare cases, of which Trélat has cited an example, in which the pedicle contains large vessels, the condition may be recognized by palpation, and before operating a pressure forceps should be placed on the part and allowed to remain for several hours. If there is much loss of blood, hot injections, ergot, and tamponade with iodoform gauze will easily check the hemorrhage.

I have proposed the name "enormous polyps" for those which fill the vagina, do not permit the finger to reach the pedicle, and cannot be easily removed through the vulva; these peculiar polyps offer special operative indications. The pedicle should not be treated until the volume of the

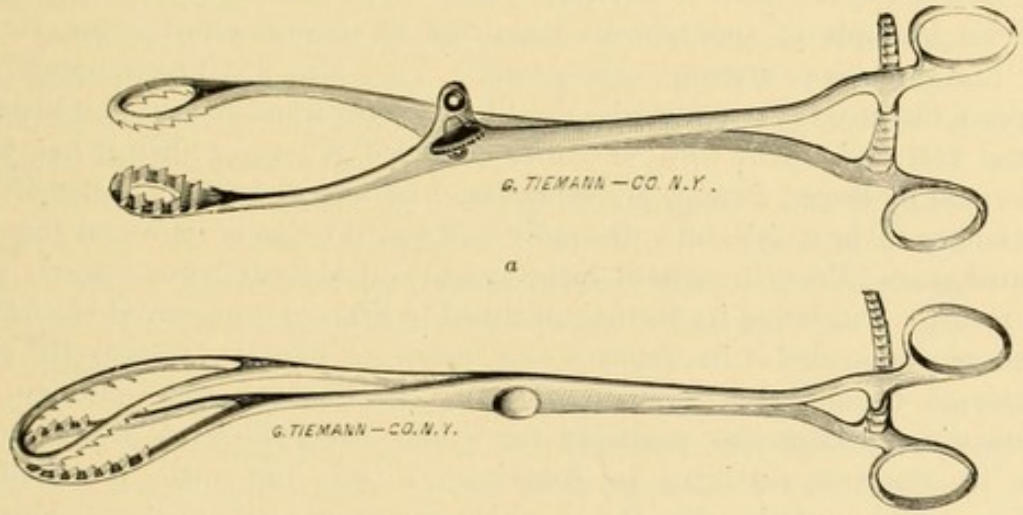


FIG. 164.—FORCEPS FOR REMOVAL OF LARGE TUMORS. *a*, With adjustable joint; *b*, pickerel toothed.

tumor has been diminished—a result easily obtained by combining certain measures which have been advised at different times. Simon's method consists in making a series of transverse deep incisions one above another until the pedicle is reached. Hegar attains the same object by a series of spiral incisions on the capsule of the tumor, which is always the most resistant part. Lastly, the fragmentary removal of the polyp by a number of conoidal excisions seems to me the best method. It is better to attack the tumor at the fourchette and make our incisions at that level, as advised by Dupuytren. When the volume of the tumor has been sufficiently diminished, it is seized between the branches of wide-jawed forceps (Fig. 164); this compression reduces its size still more; and by small incisions with the scissors, and torsion, the section of the pedicle is completed.

When the patient is cachectic or enfeebled, it is especially important to employ the most rapid methods and avoid prolonging the anæsthesia or the operation.

After the removal of the tumor it is well to do a supplementary curettage, either at the same sitting or at the end of a few hours, and follow it with cauterization, to cure the metritis, which is constant, and to hasten the involution of the enlarged uterus resulting from the presence of the neoplasm.

Submucous Fibroma of the Uterine Body.—Clinically, we must include under this head those tumors which are separated from the mucosa by a layer of muscular tissue, for they are more closely related to this surface than to the peritoneum, and cause a decided projection into the cavity of the organ. At certain times, during menstruation, or metrorrhagia accompanied by colic, the cervix is more or less obliterated and opens enough to allow the finger to pass upward to the projection of the tumor. Artificial dilatation, in default of the natural, permits us to appreciate the conditions present. An urgent indication for immediate interference is the commencement of gangrene.

The loose connection of the tumor with the uterus, and the many times repeated example of spontaneous expulsion by natural effort alone, should lead the surgeon to attempt enucleation. This idea was first advanced by Velpeau, but it was Amussat who did the first operation, and made it his own by the zeal and talent with which he defended it; since then it has been performed by Boyer, Berard, Maisonneuve, Lisfranc, and others. But after a momentary favor it fell into discredit and was done only here and there in isolated cases; the criticisms of Jarjavay and Guyon contributed powerfully to this result. But while its fortune declined in France, it improved elsewhere. Atlee recommended it in America as a means of curing "tumors till then considered beyond the resources of art." In England and Germany also Amussat's operation was practised for a long time, though it continued to have its warmest partisans in America. It was but little practised in France, when my fellowship thesis called attention to it anew, and brought out new observations, but the progress of laparatomy has almost entirely directed surgeons to the intraperitoneal methods (hysterotomy, castration), up to the recent reaction in favor of the vaginal operation of Péan and his admirers.

This reaction has caused a nearly complete disappearance of the operation of enucleation in France, it being in that country almost always replaced by vaginal hysterectomy with or without morcellation. The latter operation is in fact more rapid and consequently less serious.

We shall see, however, that morcellation of the tumors permits us to reach much higher up the vagina; and it is only when the tumors are very small that we practise enucleation alone.

Narrowness and rigidity of the vagina do not constitute an absolute contra-indication. One may attempt to overcome them by a preliminary tamponade; but it is preferable to diminish the size of the tumor by morcellation.

In the absence of spontaneous dilatation of the cervix, we use laminaria tents or Hegar's bougies with preliminary bilateral incision. Chrobak prefers multiple incisions, which he carefully sutures after the operation. If

the tumor surpasses the size of the fist, we do not attempt to enucleate it entire, but remove it preferably in small portions.

The operation varies considerably with the volume, the consistence, and the connections of the fibrous tumor.

The most convenient position is the dorso-sacral, but certain operators prefer that of Sims. Anæsthesia is necessary. Two assistants hold the legs of the patient, the one depressing the uterus from above the pubes, the other keeping up continuous irrigation, each of them holding one of the retractors. It is well to have another assistant, as the operation is particularly fatiguing.

When the cervix is not sufficiently dilated, there should be no hesitation in splitting it up to the vaginal insertion, after having ligated the lower branches of the uterine artery (page 94); this is the preliminary step.

If the tumor is small and the cervix is not too much thinned to sustain the traction, forceps in one or the other lip render valuable service in drawing the organ down and furnishing a point of support for the enucleation.

The first step consists in opening the capsule. The projecting part of the tumor is seized by a Museux forceps, and at the point where the mucous membrane is reflected on to the uterus an incision is made with a bistoury or scissors to as great an extent as possible.

The second step consists of peeling the capsule from the tumor with the fingers; a spatula is sometimes necessary for this purpose. It should be dull and slightly concave; I have devised an enucleator in the form of a large spoon with which I have obtained good results (Fig. 165). I prefer the enucleator of Sims to the toothed spoon of Thomas.



FIG. 165. — POZZI'S ENUCLEATOR. 2/3

When the adhesions of the fibroma have been destroyed over a certain area, the Museux forceps are re-applied, and with these or double hooks the tumor is rotated on its axis; if it is necessary, curved scissors may be used to divide the fibrous bands which do not yield to the enucleator.

The third step, or removal of the tumor, is not so laborious as it is extensive. I have removed in mass an intra-uterine fibroma larger than the fist, which was not in a capsule, but free in the uterine cavity, where it had formed adhesions. It was in a very curious case of polyp with intermittent symptoms, which had not been removed though frequently coming down into the vagina, and which finally was retracted into the uterus, where it became secondarily fixed.

Frankenhauser has invented for the extraction of large tumors a special instrument resembling the cephalotribe, and Martin a kind of tongs with a forceps point. P. Segond has an instrument which permits the extraction

of part of the tumor as a core. C. Braun uses a cranioclast to reduce the size of voluminous tumors.

When the fatigue of the operator or the debility of the patient has made it necessary to arrest the operation before it is completed, the spontaneous elimination of the tumor has been observed at the end of a few days, and sometimes a second operation is far less difficult, owing to the infiltration of the capsule and the relaxed adhesions. This latter fact has given the idea to certain operators of spreading the operation over different sessions. But this is to make a matter of choice of what should be only a condition of necessity, and expose the patient to the septic accidents which have so often followed such treatment. There is another variety of operation in two sessions, where the first consists merely of a deep incision of the capsule, after the example of Atlee; then after some days, when we may suppose that the uterine contractions have produced a partial separation of the tumor, we may proceed to enucleation. Vulliet has recently perfected this procedure of Atlee. He attempts, a little theoretically, to direct the fibroma at its first appearance toward the uterine cavity, rather than toward the abdominal, by the aid of a galvanic current; then, when it has become submucous, the capsule is incised and ergot and electricity are employed to increase its tendency toward self-enucleation, and to this are added intra-uterine tampons of iodoform gauze, renewed every forty-eight hours.

The objections to this method are its extreme slowness, the many dangers to which it exposes the uterus, and the uselessness of long temporization with a tumor which has become accessible to operation.

If it is impossible to remove the whole of the tumor without dangerous violence, we may leave a portion of it, hoping that by antiseptic treatment (iodoform tampons and intra-uterine injections, etc.) we may prevent the septicæmia which might be caused by gangrene of the portion left in place; but incomplete removal has given rise to serious disaster when antiseptic precautions have not been observed. Although the result may at any time be disappointing, we may still hope to realize one of the following effects: either the spontaneous expulsion, more or less tardy, or the retraction and atrophy of the intra-uterine portion. I consider, however, that it is best to end the operation by vaginal hysterectomy. After the enucleation of intra-uterine fibroma, there is left a large bleeding cavity containing loosely attached portions of capsule of tumor, in a more or less completely relaxed uterus. All loose pieces should be removed from the wound, and hot antiseptic injections employed. On account of the large absorbing surface, it is better to use a solution of carbolic acid, 1 :50, rather than bichloride which may cause toxic symptoms. If there is much oozing, the temperature of the injections should be raised to 120° F., and the cavity may be packed with iodoform gauze. A hypodermic of ergotin, with massage over the hypogastrium, will bring on uterine contractions. Then several layers of cotton and a bandage are applied, and the patient ordered absolute rest.

The principal accidents of enucleation are hemorrhage, wounds of the uterine wall, inversion of the uterus, and septicæmia.

For the hemorrhage the best remedy is rapid completion of the operation, for the retraction of the uterine walls will stop the bleeding. If necessary we may compress the abdominal aorta and tampon the uterus.

Perforation is not very serious unless there is septic infection of the cavity, without which an adhesive peritonitis closes the wound as after vaginal hysterectomy.

Inversion of the uterus may be produced during the operation from excessive traction. It renders the tumor more accessible to the manipulations of the surgeon, but is dangerous if unrecognized, for it may lead our efforts in a false direction. After the operation, the thinness of the uterine wall where the tumor was situated may produce a consecutive inversion; Bischoff in such a case produced a gradual reposition by tamponade.

Septicæmia, with its different local manifestations, metroperitonitis, thrombosis, etc., may follow when there is a large cavity without much retraction of the uterine wall; it is then necessary to employ repeated antiseptic injections. A permanent drainage tube of rubber made in the shape of a cross may be left in the cavity, where it is retained without exercising pressure (Fig. 52).

Where the secretion is very abundant and putrid, continuous irrigation may be employed, the flow being only drop by drop. This weak current may be regulated with the aid of Schücking's ingenious apparatus fitted to the discharge tube of a container full of carbolic-acid solution (1 :50), and attached to the drainage tube (Fig. 56).

As West and Gillette have remarked, it is impossible to obtain an exact idea of the gravity of this operation from statistics; for some concern only successful cases, others include very different kinds of operation, complete and incomplete enucleations, those divided over different sessions with tumors gangrenous or otherwise, with or without antiseptics, etc.

Moreover, the word enucleation does not have the same meaning with different authors. To judge correctly of this operation, as of all others, we should have a series of individual cases from surgeons of an average skill, established by homologous observations. If such information is lacking, we must content ourselves with the scattered notices, some of them incomplete, accumulated in the medical periodicals. Thus, in 1875 I published 64 cases, with 16 deaths, that is, 25 per cent; Gusserow collected 154 cases since Amussat's, up to 1877, with 51 deaths, that is, 33 per cent; Lomer, who restricted his inquiries to the antiseptic period (from 1873 to 1883), found in 112 cases 18 deaths, that is, 16 per cent. Adding to Lomer's statistics several more recent cases, Gusserow collected 153 cases, with 23 deaths, or 14.6 per cent; Ascher has observed only 1 death in 10 cases, or 10 per cent; Leopold has recently obtained 28 cures in 28 operations, and C. Braun 15 successes in 15 cases. From this it appears how

greatly the fatality of the operation has been lessened by antisepsis. A. Martin has published personal statistics which have an unusual value because of his skill, and the opportunity he has had in a large practice to compare this operation with others done through the abdomen for analogous cases. In 27 operations he had but 5 deaths, of which 2 were from wounds of the peritoneum and peritonitis, 2 from septicæmia (before the antiseptic era), and 1 from collapse. Martin declares that he has entirely abandoned vaginal enucleation for tumors of the body of the uterus, even though they are in partial expulsion; preferring extraction through the abdomen, where he makes an actual enucleation, as far as the integrity of the uterus is concerned, as we shall see farther on.

Transvaginal Enucleation.—If the myoma starts from the supravaginal portion of the cervix or the posterior surface of the uterus, it may make the posterior wall of the vagina prominent to such a degree that the most direct way to reach it is by incision of that wall; less often the incision may be made through the anterior vaginal pouch. In these cases the most rational operation is free incision of the vagina. This procedure may be relatively simple when the tumor is posterior, for it is then developed in the pelvic connective tissue outside of the peritoneum. Czerny reports many successful cases with this method; Ljocis and Olshausen have published similar cases. Le Fort reported a curious case in which the rectovaginal septum was split from above, simulating rectocele, by a pedicled fibroma whose enucleation through the perineum was followed by cure. Marc Sée on this occasion cited a similar case without a pedicle. Eugene Böckel, in a case in which the fibroma was accessible through the vagina, made a median incision through that canal and the cervix, posteriorly, and successfully enucleated the tumor.

When the tumor is very large, both morcellation and enucleation may be required. In a case in which a large fibroma partially separated the rectovaginal septum, I easily removed the tumor by morcellation after opening this septum by an incision extending between the ischial tuberosities (transverse perineotomy). When the fibroid projects toward both vagina and peritoneal cavity, the latter is liable to be opened. One may also open it intentionally, in cases of small tumors of the anterior wall of the fundus, by anterior colpotomy, incise the uterus, enucleate the tumor, and after the operation is finished suture the uterus and fix it to the vagina.

Morcellation or Vaginal Myomotomy.—The difficulty of enucleating the tumor when it is of large size or is closely connected with the uterine tissue on the one hand, and the gravity of opening the abdomen compared with the vaginal method on the other, have led surgeons to remove large tumors in successive fragments by the vagina through the partly effaced cervix, either by natural dilatation or by incision. This operation, which I have described because of its historical interest, has been entirely replaced by vaginal hysterectomy by morcellation, which is more rapidly performed and less serious.

Emmet, in America, has devised, under the name of "extraction of fibroma by traction," a procedure which he has practised since 1884. His object is to produce a pedicle by traction on the tumor, which he then removes by a combination of morcellation and enucleation, but he describes his technique in so incomplete a manner that it is difficult to form precise ideas about it. The isolated cases of Czerny and other German surgeons lack quite as much definite synthesis and method.

On the other hand, this criticism cannot be made of the technique which Péan has made known even in the smallest details by a series of publications which have been collated by Sécheyron. The fundamental idea of this method is the employment of morcellation from the first, without the addition of enucleation. Instead of attacking the tumor at its periphery, the surgeon begins immediately upon the central portion, and, after that is fully excised, finally reaches the fibrous shell; moreover, Péan's method includes a special preliminary operation of splitting, and, at the same time, excising the cervix to obtain easy access to the fibroma.

The cases to which morcellation by the vagina may be applied comprise not only submucous tumors of the size of the infant or adult head, but also cases of interstitial and subperitoneal tumors for which laparatomy might be fatal because of the large opening made in the serous membrane. In certain cases, moreover, Péan has completed the operation by total ablation of the uterus either by the vagina or through the abdominal walls. That seems to me an exaggerated extension of the operation. It would be preferable, in such a case, to perform vaginal hysterectomy at the outset and intentionally, instead of being forced to do so after other laborious manœuvres.

The operation is divided into three steps: 1. Freeing the cervix from its vaginal attachments. 2. Section of the cervix and a segment of the uterus at the level of the tumor. 3. Removal of the tumor by small pieces, with or without enucleation; and excision and suture of the lips of the cervix.

For this operation, Péan uses a series of forceps either straight or curved, with long jaws, flat, toothed or not, without points, round or blunt, especially designed for morcellation (Fig. 166), and, lastly, he is provided with long or short-handled forcipressure forceps. The preliminary steps are the same as those of all gynæcological operations.

The patient is placed in the left lateral or dorsal position. Besides the two assistants at right and left of the operator, a fourth is placed on a footstool on a little lower plane, to help in holding the retractors.

First Step—Liberation of the Cervix.—Two or three elbowed retractors display the cervix at the bottom of the vagina; this is immobilized with strong Museux forceps; a circular incision is made with a bistoury at the level of the vaginal insertion, hæmostatic forceps being placed upon the bleeding vessels as necessary. It is at this point in the operation that the

forceps are the most necessary, for, before completing it, it is necessary to stop the bleeding entirely. When the cervix is free enough above, it is cut almost through with a bistoury in order not to wound either bladder or ureters; it is then very movable, swinging as freely as the pendulum of a clock.

In this part of the operation we must take care not to wound the peritoneum, though that accident has not the gravity which has been attributed to it; in some cases even, according to Péan, it is advised to make this perforation in order to reach a fibroma projecting into the cul-de-sac.

Second Step—Incision of Cervix and Segment of Uterus below Fibroma.—Long, straight scissors with blunt points are introduced into the cervical cavity, and a clean bilateral incision is made. A Museux forceps is then placed on each one of the lips, anterior and posterior. The finger introduced into the cavity determines the exact seat of the tumor and the point where it is most easily accessible, which is distinguished from the uterine wall by its white or violet color and its density. During this examination the organ should be drawn well downward.

Third Step—Fractional Excision of the Tumor.—The tumor projects toward the cavity of the uterus, the peritoneum, or the vagina; it is drawn downward by steady traction with a Museux forceps, or by long forceps with flat teeth fenestrated or furnished with points (Fig. 166). The elbowed retractors are then introduced, the large ones into the vagina, and smaller ones into the uterus, displaying the operative field as widely as possible. These retractors not only make the part accessible, but also form a valuable means of controlling the hemorrhage by the pressure and traction which they exert. If necessary, an electric light may be used to illumine the part operated on.

The fibroma is fixed by the finger, seized with the forceps, and drawn strongly down. A piece of it is then grasped by a strong-toothed forceps, and a deep incision perpendicular to the long axis of the tumor is made; each of the lips of the section, or perhaps but one of them, is grasped as high as possible with a strong-toothed or pointed forceps and the subjacent parts excised. Before the first forceps is removed, a second pair is passed above it, grasping a new portion of the myoma, and the scissors or the bistoury cut out the part below; thus by the aid of the forceps, bistoury, and scissors the tumor is excised portion by portion.

The bistouries which Péan uses are of special make and very strong, resembling metacarpal knives, either straight or curved on the flat, and with long handles.

Very often the procedure is simpler; the tumor may not bleed, and then the forceps are used only to draw down different parts of it, the portions between its jaws being cut out in turn. This excision is practised alternately first on one side of the tumor, then on the other; and as the operation progresses the traction allows us to remove larger fragments, which may be as

large as a nut, or even as an apple. Thus successive fragments are removed, the operation lasting perhaps an hour.

When the lower part of the tumor has thus been removed, it is often possible by reaction and rotation to produce spontaneous expulsion of the upper portion, which will shorten the time of operation considerably. The volume of the mass enucleated by traction alone may exceed that of the portion excised.

When the fibroma is of large size, the intra-muscular cavity which held it is almost always widely opened, communicating with the interior of the uterus and the peritoneum, and bleeding so freely that the important vessels require ligation. This step of the operation demands the dissection of almost the whole lower portion of the uterus, and its infra-traction almost to the vulva; to facilitate this, Péan excises the two cervical lips, and sutures them afterward to the lips of the vaginal wound with metallic sutures.

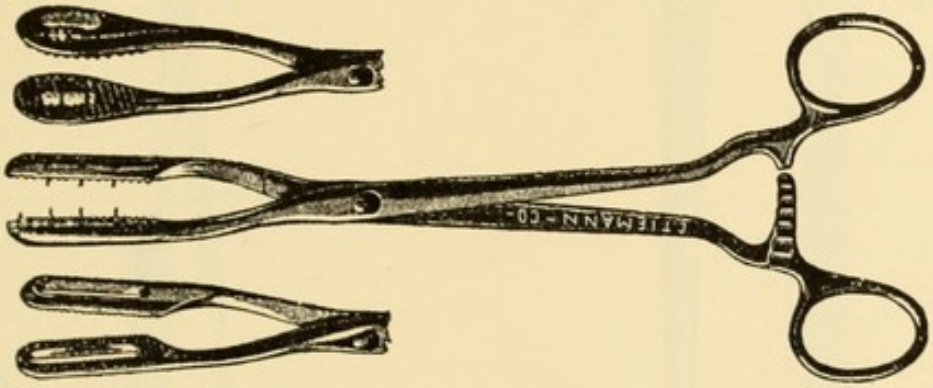


Fig. 166.—Péan's Forceps, Serrated and with Teeth, for Morcellation of Fibromata.

As to any communication with the peritoneal cavity, Péan leaves it open if its edges are much contused, though he narrows it by a few sutures at separate points.

It is easy to determine when the myoma has been completely extracted, for the last portions present a convex, smooth, and red surface, covered with cellular débris. The operation is not complete until the state of the adjacent uterine tissue has been examined by the finger. If another myoma is found near the first, it should be at once removed; for this purpose a larger incision of the uterus may be made with a bistoury if necessary. The second tumor is then strongly grasped with forceps and removed as before. Thus the operator may be obliged to extract a series of small tumors hidden away in the parenchyma.

Fourth Step—The Uterine Toilet and Suture of the Cervix.—As the tumor is removed it leaves a large pocket which communicates freely with the uterine cavity; from this hang the hæmostatic forceps with long handles to the number of twelve to twenty. During the operation Péan uses small sponges provided with long handles to cleanse the walls of the part and find the bleeding points; I replace these with pledgets of absorbent cotton.

The last step of the operation is the thorough cleansing of the wound; the smaller clots are removed, and between the forceps left to control the bleeding (from ten to fifteen) it is well to pack strips of iodoform gauze. Intra-uterine irrigation with hot antiseptic fluid should precede the application of these tampons, and after thirty-six to forty-eight hours the forceps

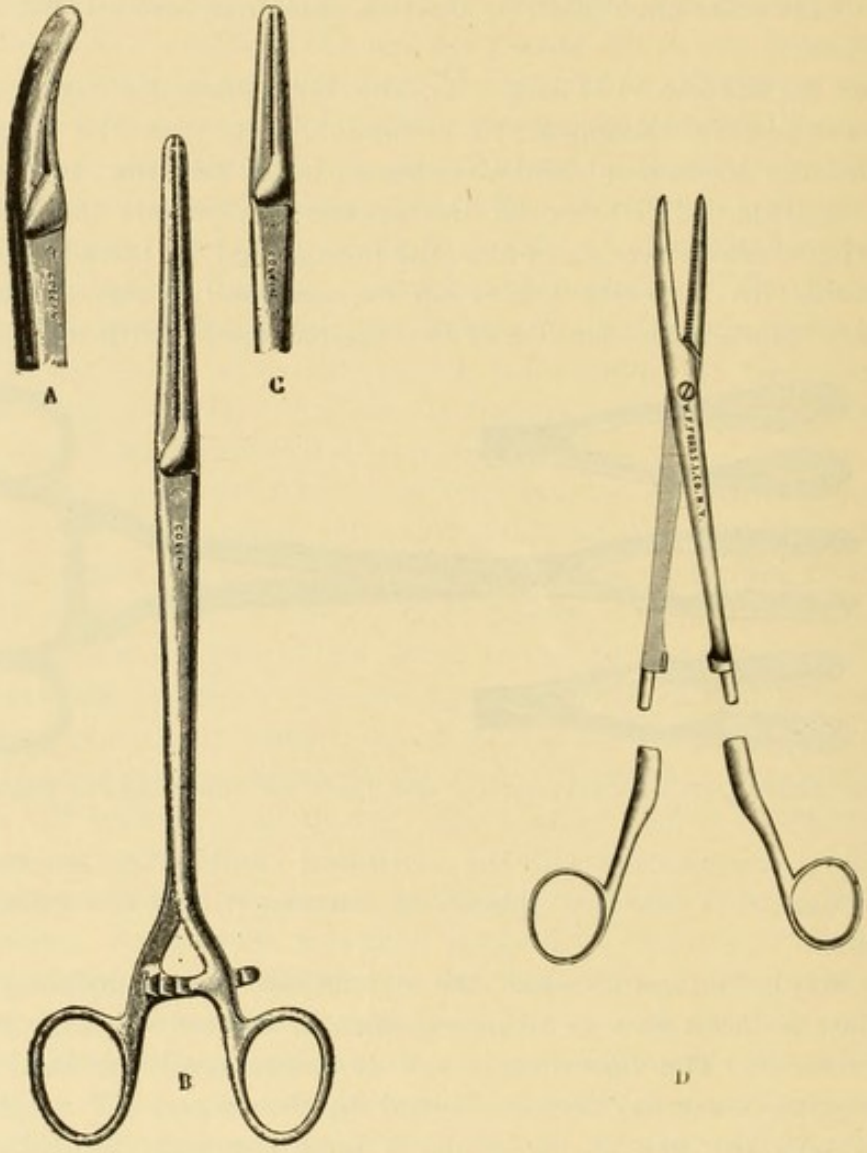


FIG. 167.—HÆMOSTATIC FORCEPS FOR VAGINAL HYSTERECTOMY. *A*, Long curved forceps of Pozzi. *B*, Ordinary long forceps. *C*, Forceps with short jaws. *D*, Pryor's forceps with removable handles.

are removed. When the tumor is small the operation may be finished by suturing the lips of the cervix. During the first days after the operation it is well to give small doses of ergot.

The enucleation of fibroids by this method of morcellation is an operation of but slight gravity, as is shown by the publications of Péan, Terrillon (five successes in five operations), and Bouilly (four successes in five cases). In the single case in which I performed it I obtained a cure. It seems to me certain that this bold procedure ought to give excellent results whenever the tumor,

though of large size, is submucous or interstitial and furnished with a capsule which permits us to limit the operation by a clean extraction of the upper part of the fibrous sphere. But if one attacks a subperitoneal tumor, either at the outset or secondarily, which is intimately fused with the uterine parenchyma, so that nothing marks the boundary between the pathological and the normal tissue, one may be led to complete the removal of the fibroid by a hysterectomy. I believe the latter is much less serious than the procedure of Mikulicz, who after inverting the uterus at an operation, resected a portion of its wall to remove a tumor of this kind, then sutured the peritoneal wound with catgut for a distance of 10 cm. and finally returned the organ to its place; the patient recovered.

Vaginal Hysterectomy.—Total ablation of the uterus for fibrous tumors has been advised in two different conditions: 1. In case of small simple or multiple tumors, which are the cause of grave symptoms. 2. In the case of large tumors when, at the end of an operation for their fractional removal, it becomes evident that a portion of the uterine wall requires excision. In the latter case it is an operation of necessity. I have long preferred to this operation (which Péan terms uterine castration) ovarian castration, which I considered much less serious. Now that I understand more fully all the resources and the benignity of vaginal morcellation, I am more completely abandoning ovarian castration, which I regard as a

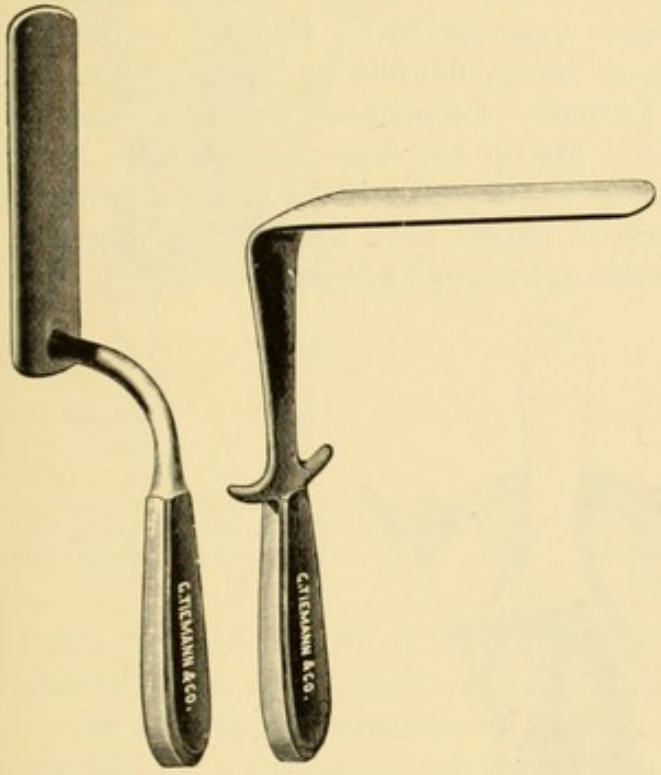


FIG. 168.—PÉAN'S RETRACTORS.

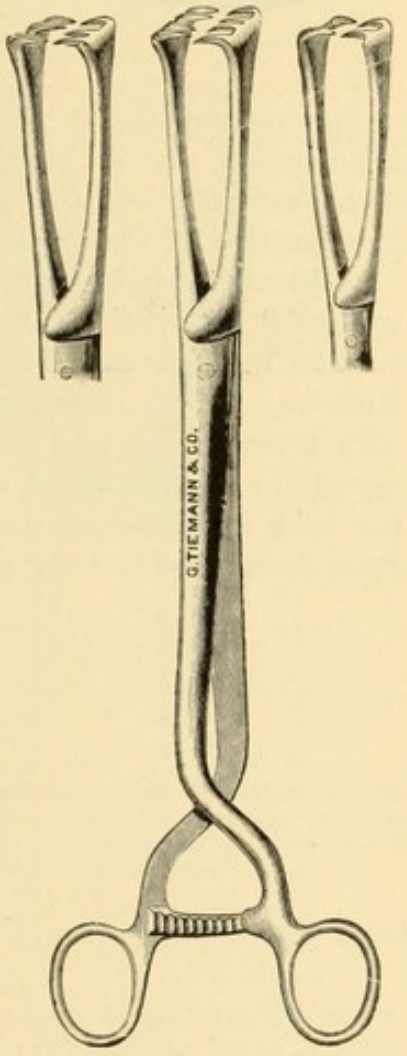


FIG. 169.—FORCEPS FOR MORCELLATION.

makeshift. It is almost as grave a procedure, and certainly less efficacious, than vaginal hysterectomy, and above all it does not relieve the pressure symptoms due to the presence of the fibroid, particularly those of compression

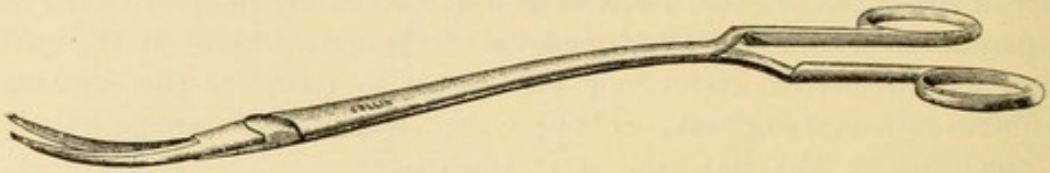


FIG. 170.—LONG, STRONG CURVED SCISSORS.

of the rectum and of the ureters. I have, therefore, come to consider, as Segond does, that all uterine, or peri-uterine fibroids, whose upper borders do not extend above the level of the umbilicus, are amenable to vaginal hysterectomy by morcellation.

Although colpohysterectomy had already been done by Kottmann, Péan was the first to perform it in France systematically. Demons has also advocated it. Successful cases have been published by Sänger, Orthmann, Richelot, Terrier, Späth, and Leopold. Leopold, in 21 operations, had only 3 deaths, or 14.3 per cent. Martin has been less fortunate: in 9 operations he has had 2 deaths, or 22 per cent. Since then the operation has been generally practised, and its results have been greatly improved. Péan, from 1890 to 1895, performed 248 vaginal hysterectomies for fibroids

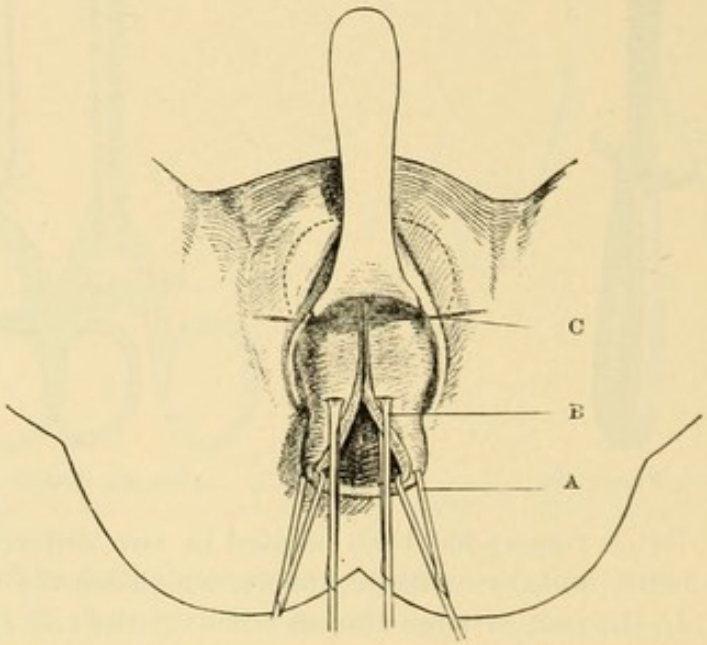


FIG. 171.—VAGINAL HYSTERECTOMY; ANTERIOR HEMISECTION OF THE UTERUS. *A*, First pair of forceps which remain until uterus is removed; *B*, second pair for seizing progressively higher on the median incision to antevert the fundus toward the operator; *C*, opening into peritoneal cavity through the vesico-uterine cul-de-sac.

with four deaths, or 1.6 per cent. Richelot has had 3 deaths in 76 cases, or 3.9 per cent. Finally, Segond has had 7 deaths in 66 cases of large fibroids reaching the umbilicus.

The operation of vaginal hysterectomy for fibroids, as performed by Péan and the French surgeons who have followed him, includes four steps: (1) Liberation of the cervix from its vaginal attachments; (2) division of the cervix after placing forceps upon the uterine arteries; (3) morcellation of the body; (4) hæmostasis of the broad ligaments.

First Step.—The cervix is seized with two toothed forceps at the level of the vaginal insertion. By means of a bistoury and then with scissors the

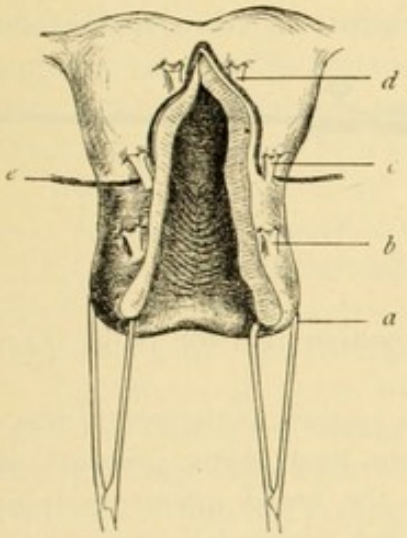


FIG. 172.—DIAGRAM. *a*, Forceps first applied; *b*, *c*, *d*, successive positions of second pair of forceps; *e*, peritoneal border.

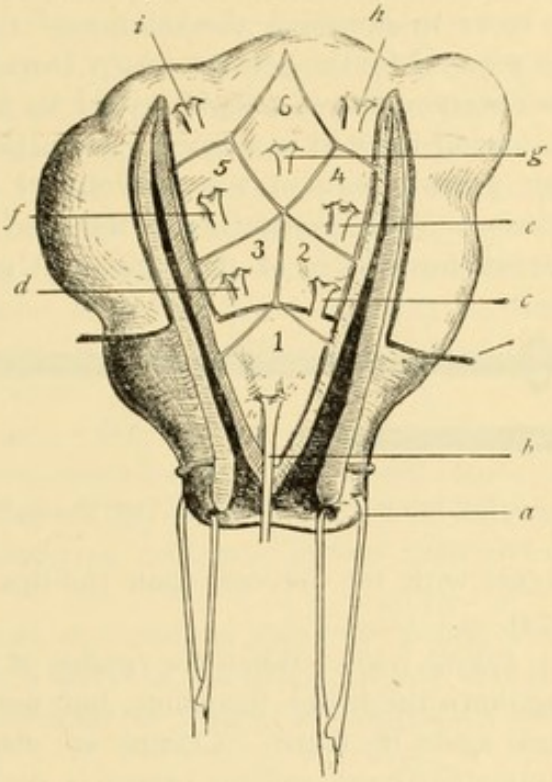


FIG. 173.—DIAGRAM SHOWING METHOD FOR REMOVING A FIBROMATOUS UTERUS THROUGH THE VAGINA BY MORCELLATION. 1-6, Successive portions removed from anterior wall; *b* to *i*, position of forceps.

cervix is circumscribed by an incision, and its anterior and posterior faces liberated as far as into the peritoneal cavity.

Second Step.—The bladder and rectum being held away from the operative field by two retractors, the operator places at the base of the broad ligaments, upon each uterine artery, a hæmostatic forceps with short and strong jaws, and divides the ligaments at the level of these forceps. The cervix, after being freed in this manner, is divided into two flaps, an anterior and a posterior; a strong clamp is placed upon the base of each of these flaps and all the portion of uterine tissue situated below this flap is removed.

Third Step.—The morcellation proper now begins. This manœuvre consists in removing by resection of successive fragments and without preliminary hæmostasis the portions of the two uterine walls which tips forward most easily, sometimes the two walls alternately. The most important point in this operation is never to resect the slightest fragment without

having first seized its base with a new forceps. During this process the fibroids are enucleated by means of a hook, if they are sufficiently small, or are morcellated in the same manner as the uterus itself. According to whether curved scissors or a curved bistoury is employed, the fragments removed resemble more or less closely a V or a cone. In either case one performs morcellation. It is also morcellation to cut out a large V-shaped portion, from the anterior uterine wall, with its base above near the fundus, in order to diminish the volume of the fibroid uterus sufficiently to permit its removal by the process which Doyen has revived. All these procedures had been employed and described by Péan. Doyen's merit consists chiefly in having insisted in a more systematic manner than his predecessors upon the great utility of the preliminary incision of the anterior wall of the uterus. This eventration of the uterine body facilitates to a considerable extent the descent of the organ. A point of support is taken higher and

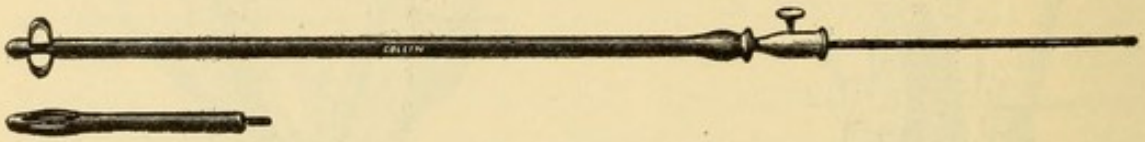


Fig. 174.—Self-retaining Catheter and Mandrill for Facilitating Introduction.

higher with the forceps upon the lips of this median incision (Figs. 172, 173).

Fourth Step.—When the fundus of the uterus appears at the vulva, drawing down the broad ligaments, but not until then, hæmostatic precautions must again be taken. Clamps are placed upon the broad ligaments from above downward, and the uterus is detached. Each clamp falls down causing a torsion of 180° of the portion of broad ligament which it includes. Doyen places only one large clamp upon each ligament. As he leaves the cervix until the end of the operation, he does not find it necessary to secure preliminary hæmostasis of the uterine arteries. I believe this practice offers little security.

When the uterus has been detached the appendages are found and removed if this can be done easily, otherwise they are left. In some cases it has been possible to place the forceps upon the broad ligaments below the appendages and thus to remove them with the fundus of the uterus. When the operation is terminated the clamps are gathered into two lateral bundles, allowing inspection of the deep parts of the wound, and if oozing is found, this is checked by long-handled forceps. A thick strip of sterilized or weak iodoform gauze is placed in Douglas' cul-de-sac to secure drainage. The forceps are arranged in two lateral bundles, and the vagina is packed with strips of iodoform gauze whose ends form a cushion, above the clamps, upon which the intestines rest. The vaginal walls are protected from injury by the forceps by wrapping each bundle with gauze.

Finally, a self-retaining catheter, like that of Malécot (Fig. 174) is inserted into the bladder.

After-treatment.—The broad-ligament clamps and catheter are removed after forty-eight hours. The gauze drainage of the vagina is renewed daily after the fourth day, or twice daily if the condition of the wound appears to demand it. Weak antiseptic vaginal douches should be employed only after the eighth day, and then should be given with great care, in order to avoid breaking up the adhesions which protect the peritoneal cavity above.

Destruction of the Fibroma through the Vagina.—I include under this title several operations which do not belong in the previous categories, but which should nevertheless be described, though only as a matter of history:

Partial Destruction by Incisions.—Baker Brown has attempted to copy the natural processes which at times cure the fibroma by gangrene and consecutive elimination. His method is as follows: Incision of the capsule; introduction into the depths of the tumor of special scissors cutting on their outer edge, and dilaceration of the morbid mass or ablation of a conical fragment; or perforation by a kind of trephine.

Partial Destruction by Cauterization.—Greenhalgh, with the same object, opened the capsule with a hot iron, establishing suppuration, removing débris by the hand; in case of retrovaginal tumor he pierced it in different places with the hot iron over the projecting portions; in two cases out of three death followed from peritonitis.

In the case of tumors which seemed inaccessible, above the pubes, Koeberlé has dilated the cervix and made a series of parallel incisions into the tumor, filling them with enough perchloride of iron to determine the mortification of the intervening portions.

CHAPTER XI.

TREATMENT OF FIBROUS TUMORS OF ABDOMINAL EVOLUTION—MYOMECTOMY AND HYSTERECTOMY.

Hysterectomy, or removal of fibromata by way of the abdomen, is not an operation that was deliberately premeditated, but is the product of diagnostic error. After opening the abdomen to remove a tumor presumably ovarian, it has occurred that the surgeon found himself confronted by a fibrous tumor of the uterus. The first who committed this mistake recoiled from the terrors of an unknown operation, and hastily closed the abdomen without finishing. These were the cases of Lizars in 1825, of Dieffenbach in 1826, and more recently of Atlee (1849–51), Baker Brown, Cutter, Deane, Mussey, and Smith. Fourteen cases of this kind were published during this period, of which five were followed by death. Then certain bold surgeons ventured to extirpate subserous pedicled tumors, Granville in 1837 being unsuccessful, and the cases of Atlee and Lane recovering. Clay and Heath in 1843 and Burnham in 1853 were the first to undertake the partial extirpation of the uterus; G. Kimball was the first to propose hysterectomy for an interstitial fibroma which was the cause of violent hemorrhages; the patient recovered. Koeberlé was the second to do the operation, but the exact determination of the diagnosis, the rational choice of an operative technique, and the absolute novelty of the subject in Europe gave exceptional value to his case. The report which he published on this occasion made the operation the fashion of the day.

Koeberlé was the first to employ the metallic loop and ligature-tightener for ligating the pedicle. This was a great advance over the former practice of ligating the tumor in mass, a method which exposed the patient to great risk of hemorrhage; the first step was thus taken, and from that time the cases multiplied. In the year 1866, Caternault, a pupil of Koeberlé, published a series of forty-two cases of amputation of the uterus and twenty cases of gastrotomy for the extirpation of pedicled tumors. Many of the operators replaced Koeberlé's ligature-tightener by a clamp, which they allowed to remain like a vice about the pedicle—an inferior method. After the operation was made known, Péan obtained great success with it in Paris in cases which were considered unfit for major abdominal operations, and where even ovariotomy appeared bold. The presentation of a successful case at the Academy of Medicine (August, 1870), and three years later the publication of an important work, where the rules for operation were established with a precision up to that time unknown, bound the name of Péan

to hysterotomy with extraperitoneal treatment of the pedicle. The technique consisted chiefly in the employment of forcipressure, which Koeberlé was the only one to use freely at that time; in fractional excision of large tumors, after the application of a metallic ligature, to avoid opening the abdomen too freely; and in transfixing the pedicle with sharp needles placed crosswise below a steel-wire ligature applied by Cintrat's ingenious tightener. This technique, of which the latest improvements have still retained the general features, was for a long time adopted by all operators in France and elsewhere. It is, then, to these two French surgeons that the merit belongs of having established the operation upon a scientific basis.

After this first stage in the progress of abdominal hysterotomy, marked by metallic constriction of the pedicle, and followed by many arguments and disputes, there was a second stage characterized by the application of antisepsis to the operation as to all others in surgery.

A third phase was inaugurated by perfection of the technique, and especially by the introduction of the elastic ligature for temporary or final hæmostasis. The most marked feature of the time was the strife between partisans of extraperitoneal and intraperitoneal methods, and the substitution of castration for hysterotomy in a large number of cases. Finally a fourth stage has been reached; at present all surgeons attempt to substitute total abdominal hysterectomy for methods with formation of a pedicle; according to individual preference, some advise the abdominal route, others the combination of abdominal and vaginal routes.

Synonyms.—The term hysterotomy, which means, from its etymology, section of the uterus, is essentially comprehensive; with the adjective abdominal, it may be applied to every operation where the uterine tissue is removed after opening the abdomen. Still another word may be employed for the sake of precision; thus, supravaginal hysterotomy means section or ablation of the uterus above the vagina. Tillaux, in a communication to the Académie in 1889, proposed the word hysterectomy, which conveys the idea of excision, for those cases in which a part or the whole of the organ is removed. This more exact term has rapidly prevailed, although the older form is still met with. The Germans employ the word myomotomy or myomectomy for removal of a myoma with all or a part of the uterus, thus including both hysterotomy for pedicled fibroma and partial hysterectomy for interstitial fibroma. Lastly, by intraperitoneal enucleation is meant simply incision into the uterine wall to remove a tumor, with preservation of the uterus itself.

General Indications for Abdominal Hysterectomy.—We shall see further on that the possibility of substituting for this always serious operation another which is less grave, namely, castration, reduces in certain definite circumstances the field of hysterectomy. We may thus formulate the indications for the operation:

Rapid growth of the tumor; grave hemorrhage which does not yield to

any palliative; ascites produced by the irritation of a very movable fibroma; compression of important organs; very large tumor, and especially its cystic, œdematous, or suppurative degeneration; symptomatic prolapsus of the uterus; pregnancy, when the fibroma will manifestly be a serious cause of dystocia.

The classification which may be established for the abdominal operation is as follows:

I. Pedicled fibroma.

II. Fibroma with a single nucleus.

III. Fibroma with many nuclei.

IV. Fibroma within the pelvis or the ligaments.

In the first class the removal of the tumor is extremely simple and differs but little from ovariotomy; it is here only that the term myomectomy is applicable.

For the second and third varieties we may generally perform partial hysterotomy or supravaginal hysterectomy, according to the location of the tumor; in certain special cases we may practise intraperitoneal enucleation or total abdominal hysterectomy.

In the fourth class, if it is not possible to employ the pallative operation of castration, we should attempt an intraligamentous decortication or a vaginal morcellation.

Finally, total extirpation of the organ by the abdominal method has been practised for certain multiple tumors which involved the cervix, with hypertrophy of the tissues and no opportunity of saving a pedicle.

Before passing these different operations and their varieties in review, I wish to say a few words concerning an operative manœuvre which is applicable to them all, and which has completely changed their technical conditions since its introduction into abdominal surgery.

Provisional Hæmostasis during the Operation of Hysterotomy.—Whatever may be the nature of the operation done in the abdominal cavity, it is of the greatest importance to be able to perform it without much bleeding. To obtain this end the older operators employed the compression of the écraseur; Billroth invented an enormous forceps which might be used in such cases. A most valuable means of controlling the hemorrhage is the temporary elastic ligature, which must not be confounded with the permanent ligature to be described further on. Kleeberg, of Odessa, first used the elasticity and steadiness of rubber to procure a constant constriction of the uterine pedicle. He replaced the metallic ligature of Koeberlé and Péan with an elastic tube, leaving it in place permanently, and the patient was cured. But it was Hegar who raised it to its present rank, and Martin who gave a general application to the procedure, so that it now fills in gynæcological practice the place of Esmarch's bandage in general surgery.

For the permanent elastic ligature a thick rubber tube of about 5 mm. diameter is employed in Germany. I prefer a solid cord of the same size,

and, after my communication which made it known, it has been generally adopted in France. It has the advantage of being more easily sterilized and, with the same volume, is more resistant. The temporary ligation is best obtained by the same elastic cord. After stretching it and making two or three turns round the part, the crossed ends are secured by a strong pressure forceps; for this purpose Hegar has a special form of forceps, with short-elbowed jaws which are quite convenient. I have invented an elastic constrictor which renders good service when the surgeon is obliged to work in a narrow cavity, and which is far less cumbrous than forceps. Certain operators, forgetting the real object of this instrument, have used it for the purpose of permanently securing the ligature, but this end is best attained by a double thread of silk; the ligator being only employed for tightening the rubber cord. (For the technique see p. 46 and Fig. 44, p. 54.)

I. *Pedicled Fibroma—Myomectomy.*—After the provisional ligature has been applied as low down on the uterus as possible, the pedicle, if thin, is pierced with a needle armed with double silk, whose ends are secured by Bantock's or Tait's knot (Fig. 35, Nos. 5 and 6, p. 48). If the operator is not familiar with this special knot, he simply cuts the loop and ties the ends right and left after crossing them by a half-turn (Fig. 35, 3 and 4); to make the surgical knot, the thread must always be passed twice (Fig. 35, 2).

If the pedicle is thick, it is well to seize and compress it with large clamp forceps while the tumor is cut transversely, taking care to leave a collar of peritoneum and capsule about the margin of the wound. The clamp is then removed, and in the furrow which it has traced around the foot of the pedicle a series of silk sutures are placed. The excess of tissue left above the seat of the clamp is then cut away, leaving only enough to cover the wounded surface, that being secured by the sutures already passed and a few superficial points. The provisional elastic ligature is then removed, and if there is much oozing by the sutures a few deeper ones are added. If, at the moment of section, it is possible to see any of the large vessels, they are separately tied.

The pedicle is returned to the cavity of the abdomen only when all oozing is completely arrested; if there is still any fear of further bleeding, tamponing of the pedicle is practised by the method of Wölfler-Hacker described below. With large pedicled fibromata wide adhesions to the intestines may be found with adventitious vascular connections more important than those of the pedicle itself. To detach these adhesions when they are intimate we make use of the procedure recommended by Schröder, leaving adherent to the intestine a superficial portion of the fibroma with its peritoneum, and passing one or more catgut sutures so as to secure the coaptation of the bleeding surface (Fig. 175). A more expeditious procedure which I have employed is the superficial and rapid cauterization with the thermo-cautery, of the layer of the fibroid left adherent to the intestine.

II. *Encapsuled Fibroma, with One Nodule. Intraperitoneal Enucleation.*—Cases of this variety are relatively rare, the most common form being multiple fibromata, distorting a large segment of the uterus, which seems to be stuffed full of them (Figs. 150 and 151, p. 190). To treat each one of these nuclei separately would not be possible, but when the tumor is single, whether formed by a simple or a compound mass, whether interstitial or submucous, it is possible to carry out the plan of removal by enucleation of the neoplasm alone, preserving the integrity of the uterus and its adnexa, and not interrupting the genital life of the woman. This consideration will have some weight when the patient is not near the menopause, but it rarely needs to be considered. Enucleation, then, may often be considered only a simplification of the operative technique applicable to certain definite cases.

Spiegelberg seems to be the first who employed it; Spencer Wells has

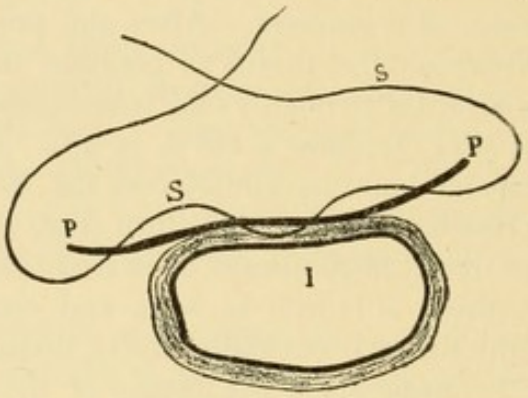


FIG. 175.—SUTURE OF THE THIN FOLD OF PERITONEUM AND FIBROUS TISSUE LEFT AFTER THE DETACHMENT OF A FIRM ADHESION. *I*, Intestine; *P*, peritoneal fold covering the fibroid; *S*, suture.

practised it for a long while; but it is A. Martin who has especially advocated it.

We begin by drawing the uterus outside of the abdomen upon a layer of gauze sponge, and placing about the cervix an elastic cord with its ends crossed and held in place by forceps or my ligator. Having thus provided for control of the bleeding, the uterus is incised over the most projecting part of the tumor, and this is removed, care being taken not to open the uterine cavity.

As this operation has often been performed for submucous fibroma, which most surgeons prefer to remove by the vagina, the uterine canal has sometimes been opened (ten cases out of sixteen: Martin); in these cases Martin closed the mucous wound with a continuous catgut suture.

The incision in the uterine wall is closed by a series of deep sutures taking in the whole extent of the wound. Martin uses for this purpose catgut prepared in oil of juniper, which he has substituted for carbolized silk (Fig. 176).

When the cavity left after the removal of the tumor is very large, Martin uses a cross-drain passed through the cervix into the vagina. Freund, in a remarkable case which was followed by success, where the fibroma was

inflamed, replaced the rubber drain by an iodoformized wick, and then tamponed the uterus with iodoform gauze. We may also diminish the tumor cavity by removing portions of its wall.

Martin, in one case, also removed both the degenerated ovaries, and once a single ovary. He recommends castration in all cases in which we suspect the presence in the uterine tissue of another fibrous nodule beyond our reach.

In sixteen cases he had three deaths; and once he had to do a secondary vaginal amputation of the uterus because of the appearance of a new fibroma whose origin had been unforeseen at the time of the first operation. The possibility of this second operation is the weak point in the whole method, and for that reason it should always be combined with castration. In this

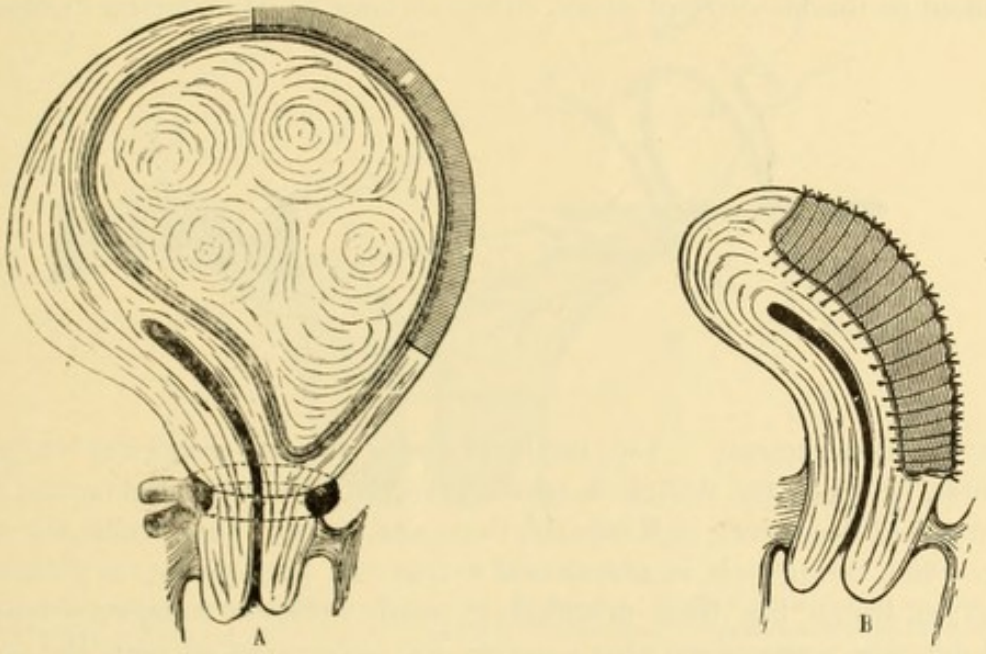


FIG. 176.—*A*, Enucleation of an Interstitial Myoma. *B*, Disposition of Sutures after Enucleation.

case, however, enucleation fails of its initial object, which is to maintain the genital functions, and becomes simply a particular case of partial hysterectomy with the pedicle left within the peritoneum.

III. *Fibroma with Multiple Nodules. Supravaginal Hysterectomy.*—According to Schröder we must distinguish two different classes: the first, where the tumor is above the adnexa at its lower level, the body of the uterus being intact; and the second where the body is invaded in such a way that the adnexa form a more or less sessile appendix to the tumor.

In the first class the rule is not to detach the broad ligaments, which would render the operation more serious; but as we are never sure that there are no small nodules remaining in the uterus which may develop later, it is prudent to remove the ovaries as the last step. In this way we do not usually obtain as narrow a pedicle as by complete ablation of the body of the uterus, which will be reason enough to reject partial hysterectomy; it is

possible, however, to do the operation without opening the uterine cavity, which diminishes the chances of infection.

Partial hysterectomy presents no essential difference from supravaginal amputation, with the exception that it does not include the detachment of the broad ligament. The temporary elastic ligature is placed below the tumor, which is removed with its capsule, saving only a portion of the latter to make, with the peritoneum and subserous tissues, a collar about the wound. This operation is distinguished from enucleation by the removal of the mass as a whole, and by excising it with the knife. I advise that the operator should always assure himself beforehand by a vertical cut that enucleation is not possible; for when it is, it is preferable.

Supra-vaginal amputation, or hysterectomy, is a typical operation, which we adopt in the majority of cases, either at once or after trying enucleation

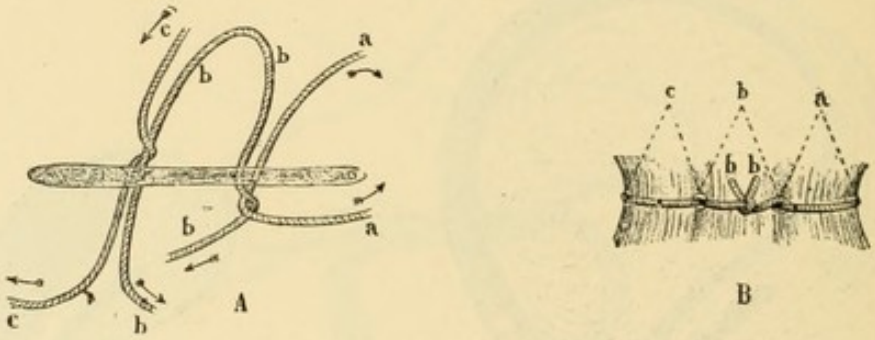


FIG. 177.—CHAIN LIGATURE.

or partial hysterectomy. Two methods divide the preferences of surgeons; the first, in which the pedicle is treated exterior to the peritoneum, to which are attached the names of Koeberlé, Péan, and Hegar; the second, the method in which the pedicle is abandoned within the peritoneum, or Schröder's operation, which has been modified by many different authors. Lastly, I shall describe a procedure which unites the advantages of both the preceding with ablation of both uterus and cervix, or the mixed method of total hysterectomy.

Technique of Supra-vaginal Hysterectomy.—The first steps of the operation are identical whether Hegar's or Schröder's operation is performed. The abdomen is rapidly opened through the linea alba without stopping to put forceps upon the little bleeding points. If the tumor is small and chiefly within the lower pelvis, the incision is prolonged nearly to the pubes, but with the precaution of keeping a sound in the bladder. We have always reason to fear a wound of this organ from elongation of it in front of the tumor. To give a little more room below, the muscular insertion on one side or the other may be divided, though I do not advise it.

If the tumor is very large and soft, we should see whether it may be diminished by puncture of a cystic cavity; if not, it is better to prolong the incision rather than to attempt the long, difficult, and perilous procedure of fractional excision advocated by Péan.

The uterus must then be disengaged so that the elastic ligature may be put in place, the connections of the bladder with the tumor having been determined by exploration with a male sound. It has happened to good surgeons that a portion of the bladder has been included in the ligature and removed. To avoid such an accident in difficult cases Albert transfixes the tumor immediately above the bladder with a pin to prevent the ligature from slipping and including part of it.

The broad ligaments are cut between a double series of ligatures which are passed by a blunt, mounted needle (Fig. 19, 1 and 2) either straight and curved a little at the point or similar in form to a Deschamps needle (for technique see pages 46 to 54); the tube and round ligaments should be sepa-

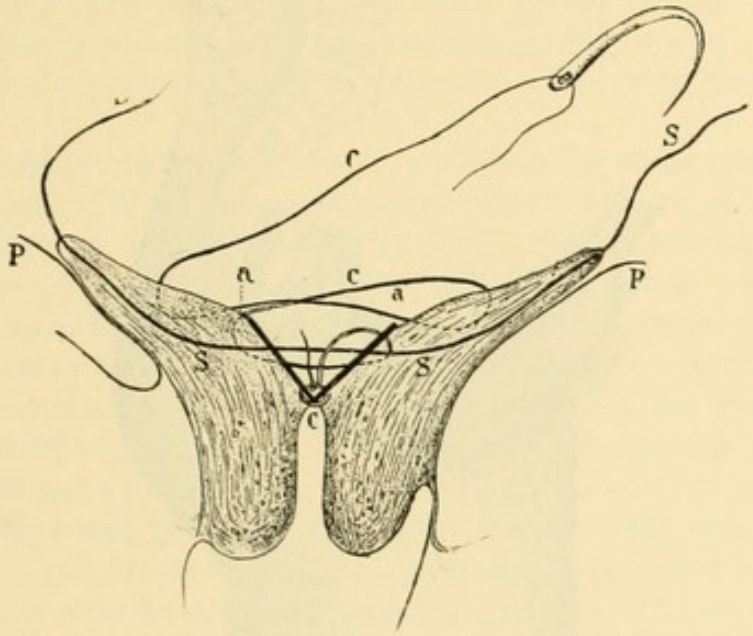


FIG. 178.—SCHRÖDER'S INTRAPERITONEAL SUTURE OF THE PEDICLE. *S*, Deep suture, passed at once under the whole bleeding surface; *C*, continuous suture of catgut in different terraces, bringing together the whole wounded surface whose lower portion is marked by the heavy line *aa*, formed by the cauterized uterine cavity; *P*, peritoneal investment.

rately tied. As soon as the upper part of the cervix is free, the elastic ligature is put in place. Some authors advise to go immediately below and search for the uterine arteries by feeling their pulsation or their projection upon the sides of the uterus. For this purpose it is necessary to descend to the folds of Douglas, which bound the cul-de-sac of that name, including a certain portion of the adjacent soft tissues within the ligature. One of the great advantages of the extra-peritoneal method is that it dispense swith this dangerous step.

It is always better to remove the adnexa, though certain operators attach but little importance to neglect of this extirpation, thinking that the tissues will atrophy. Where there are no difficulties caused by extensive adhesions, castration should be performed at the same time, on account of the accidents which have been described, such as pelvic hæmatocele and extra-uterine pregnancy. When the uterus is sufficiently freed from its peripheral attach-

ments, the elastic ligature is applied to the cervix, and then an antero-posterior incision made a finger's breadth above it, and the fibroma removed as soon as possible by section and enucleation. From this moment, according to the treatment of the pedicle, the operation varies.

Intra-peritoneal Treatment of the Pedicle.—I will describe Schröder's technique as it is given by Hofmeier. In proceeding with the removal of the tumor we should be careful to finish by a circular conoidal incision at least 3 cm. from the ligature and not going more deeply beneath the peritoneum than to slightly pare off this membrane, so that the rim of tissue left is partly serous; with the scissors it is then trimmed so that with slight

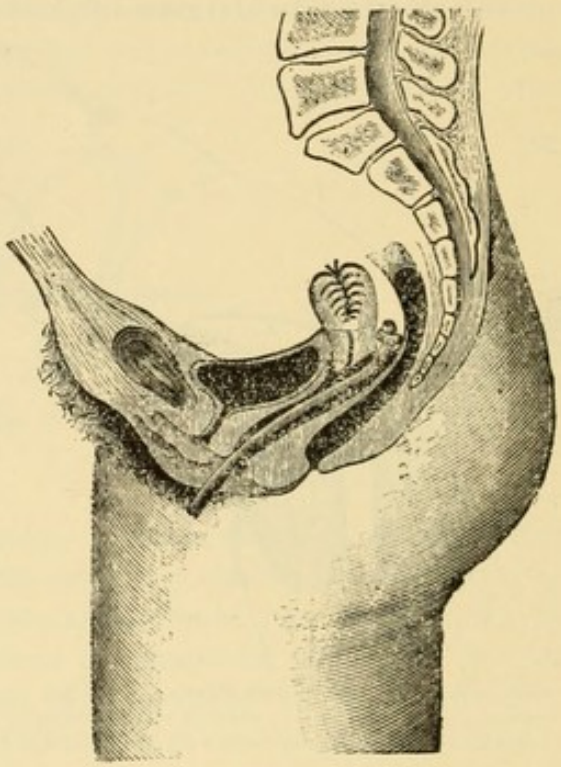


Fig. 179.—Vaginal Drainage with a Cross Tube after Abdominal Hysterectomy (Martin).

traction it just covers the whole of the wound; all gaping vessels that may be found are tied with catgut.

An important feature of the operation is the destruction and disinfection of the mucous membrane of the uterine cavity, which is found in the bottom of the wound. There is no doubt that this opening of the uterus forms one of the unfavorable elements in the intra-peritoneal treatment, since it may be a source of infection; though certain authors, as Martin for example, ascribe but little importance to it. But Hofmeier, in his analysis of Schröder's operations, has clearly demonstrated this influence (21 cases without opening, 2 deaths; 59 with opening, 18 deaths). It is important, then, to reduce this danger to a minimum both by securing rapid cicatrization by exact coaptation and by completely modifying the membrane adjacent to the wound. For this purpose Olshausen recommends the free excision of the

bottom of the wound in the shape of a funnel, dissecting out as much as possible of the mucous membrane. It is well also to cauterize the bottom of the wound with strong carbolic acid (1 : 20), or better with the Paquelin thermocautery, which should be buried perpendicularly in the cervical canal. We must not, however, cauterize the superficial portions of the wound for fear of preventing primary union.

The next step consists in the application of the suture. Veit and Martin employ juniper catgut; Schröder and Hofmeier use both catgut and silk. If the bleeding surface is not extensive, it is sufficient to pass deep sutures with a strong needle under the whole wounded surface, forming thus a series of separate points, which are firmly tied, and completing the junction of the peritoneum by a superficial suture. It must always be kept in mind that exact coaptation is indispensable for complete primary union; the difficulty is to tie tightly enough to obtain it without compromising the nutrition of the tissues.

If the wounded surface is extensive, perfect union of the sides is obtained by the employment of the continuous catgut suture in tiers, or with separate silk sutures, which Schröder originally used. For fear, however, that the catgut will be too quickly absorbed, especially if the tissues are very dense, certain sustaining sutures of silk are placed at equal distances through the whole thickness of the wound before beginning the continuous suture. These are tied after the continuous suture is finished, but they are put in position beforehand in order not to cut the catgut in passing them. They should be inserted a little obliquely, and not perpendicular to the axis of the wound, that they may not be parallel to the vessels which they are meant to constrict (Fig. 178, Hofmeier). The wound should be closed longitudinally, that is, parallel with the abdominal opening (Gersuny, Fritsch, etc.).

When the suture of the pedicle has been completed by Schröder's method, if a few drops of blood ooze by the side of the suture, after the elastic band has been removed, Martin does not hesitate to pass through the pedicle from before backward a strong needle with quadruple thread, and thus tie it in two portions; in autopsies which he has had occasion to make, he has never seen any trace of mortification from this complementary ligature, which Leopold also employs at times.

After hysterectomy, no matter how simple the operation has been, Martin always practises drainage through the vagina (page 58). The lower end of the tube is always folded in the vagina and covered with antiseptic gauze to prevent the entrance of germs from the air; it is withdrawn on the third or fourth day, when the patient begins to feel a peculiar uneasiness in the lower part of the abdomen (Fig. 179). This drainage, after simple operations, without destruction of the peritoneum or septic infection, is not generally employed, and seems to me unnecessary.

Extraperitoneal Treatment of the Pedicle—Hegar's Method.—The abdominal cavity is closed as tightly as possible about the tumor, and this is

surrounded by gauze sponges to receive the blood; the incision is then made transversely, two fingers' breadth above the elastic ligature. At this moment the fibrous nodules which penetrate the pedicle appear upon the cut surface; they may be enucleated without danger of bleeding, the elastic band compressing the pocket left empty by the small tumor. Bleeding vessels should be separately tied. The surface of the stump is then smoothed and held strongly drawn out with Museux forceps. We then proceed with the toilet of the peritoneum, keeping the pedicle fixed in the lower part of the wound. The temporary elastic ligature may often be permanently retained if it is properly placed, but, if too far down to permit the drawing out

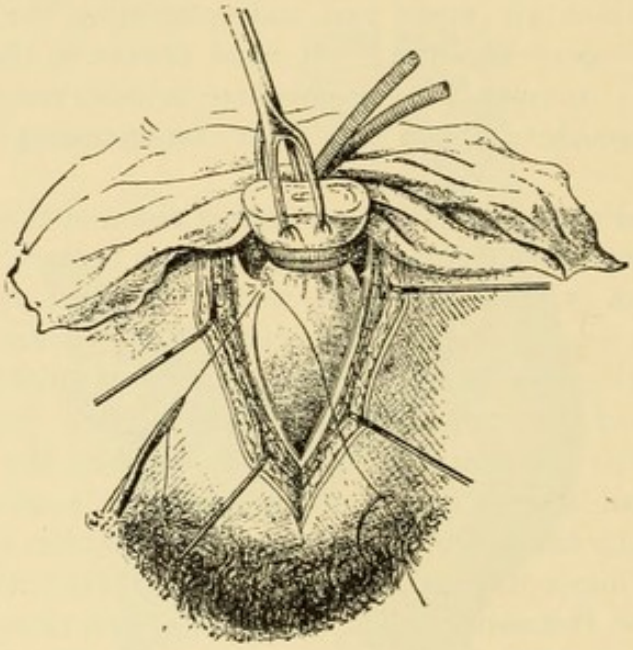


FIG. 180.—SUTURE OF THE ABDOMINAL WALLS AFTER SUPRA-VAGINAL HYSTERECTOMY WITH EXTRA-PERITONEAL TREATMENT OF THE PEDICLE. Suture of the peritoneum in a collar about the pedicle. Suture begun. (Pedicle is shown drawn strongly upwards, exaggerating its distance from the symphysis.)

of the pedicle, a new one is placed above it and tied before the first is removed. When the pedicle is very large, it is well, according to Hegar, to tie it in two portions after transfixing it with a double elastic band by means of a special instrument, Kaltenbach's needle. This complication, it seems to me, might be avoided by taking an additional turn of the elastic ligature as Tauffer has lately advised.

In applying the permanent ligature, the greatest care must be taken to avoid the inclusion of intestinal coils or bladder and to see that nothing but the pedicle is constricted. It is applied in the following manner: While an assistant holds the pedicle in place with the Museux forceps, we make two turns about it with the elastic cord in such a way that it is tightly constricted. The ends are crossed and the cord stretched a little. Between the cross and the cervix a ligature of strong silk is applied with the double surgical knot (Fig. 35, 2); then, after gentle traction on the instrument to

stretch the elastic cord a little more and give room, a second ligature is applied for security a few millimetres in front of the first. After removing the forceps or the clamp (Figs. 41 and 44), the ends of the silk are then cut short, leaving those on the elastic cord a little the longer.

One of the most important points in Hegar's method is the complete isolation of the pedicle outside of the abdominal cavity. By suturing the peritoneum below the elastic ligature and by non-suture of the immediately adjacent abdominal planes he forms a gutter which surrounds the pedicle so that it remains isolated like a pistil in the centre of a flower. This gutter prevents the pedicle, which is meant to slough off, from being imprisoned

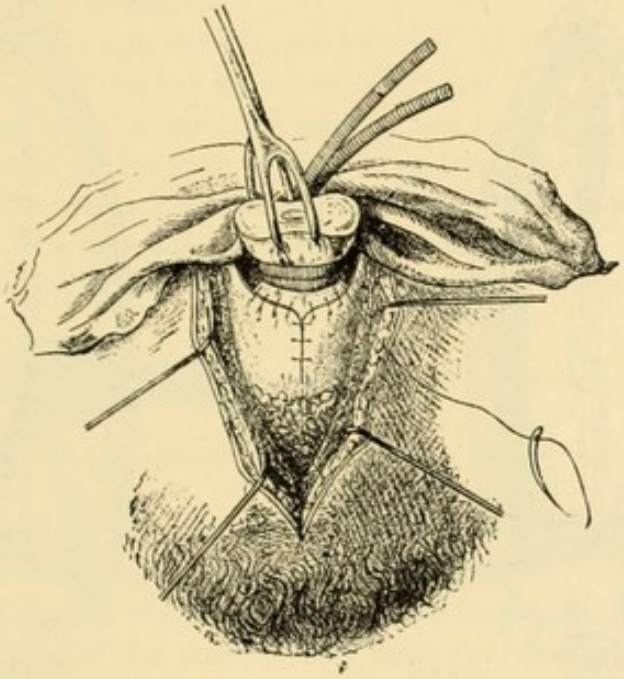


FIG. 181.—SUTURE OF THE ABDOMINAL WALLS AFTER SUPRA-VAGINAL HYSTERECTOMY WITH EXTRA-PERITONEAL TREATMENT OF THE PEDICLE. Suture of the peritoneum in a collar about the pedicle. Suture continued.

within the soft parts and infecting them, and about it we can make topical applications destined to mummify it and keep it aseptic. It is especially in very stout patients that this peculiarity of the technique is of the greatest value.

To suture the peritoneum about the pedicle, Tauffer fixes in the lower part of the abdominal incision a long thread with two ends; each is provided with a needle, and is used to attach the peritoneum to the surface of the pedicle immediately below the ligature, right and left; I prefer to accomplish this with catgut and a single needle (Figs. 180 and 181).

Great care must be taken that only the serous surface is included in this suture, using a very fine curved needle that the punctures may not bleed. It is well in the same suture to attach the stump of the broad ligament on each side to the stump of the uterus as closely as possible. When this peritoneal collar has been applied to the pedicle, we may continue the suture of

the peritoneum through the whole length of the abdominal opening with the same needle and catgut, adding, if necessary, a few supplementary points. The suture of the other abdominal planes is begun about 4 cm. above the pedicle (Fig. 182). At present I use a continuous catgut suture for this purpose.

To prevent the pedicle from descending too far into the pelvis under the influence of movement, etc., two strong pins, crossing like the letter X, are

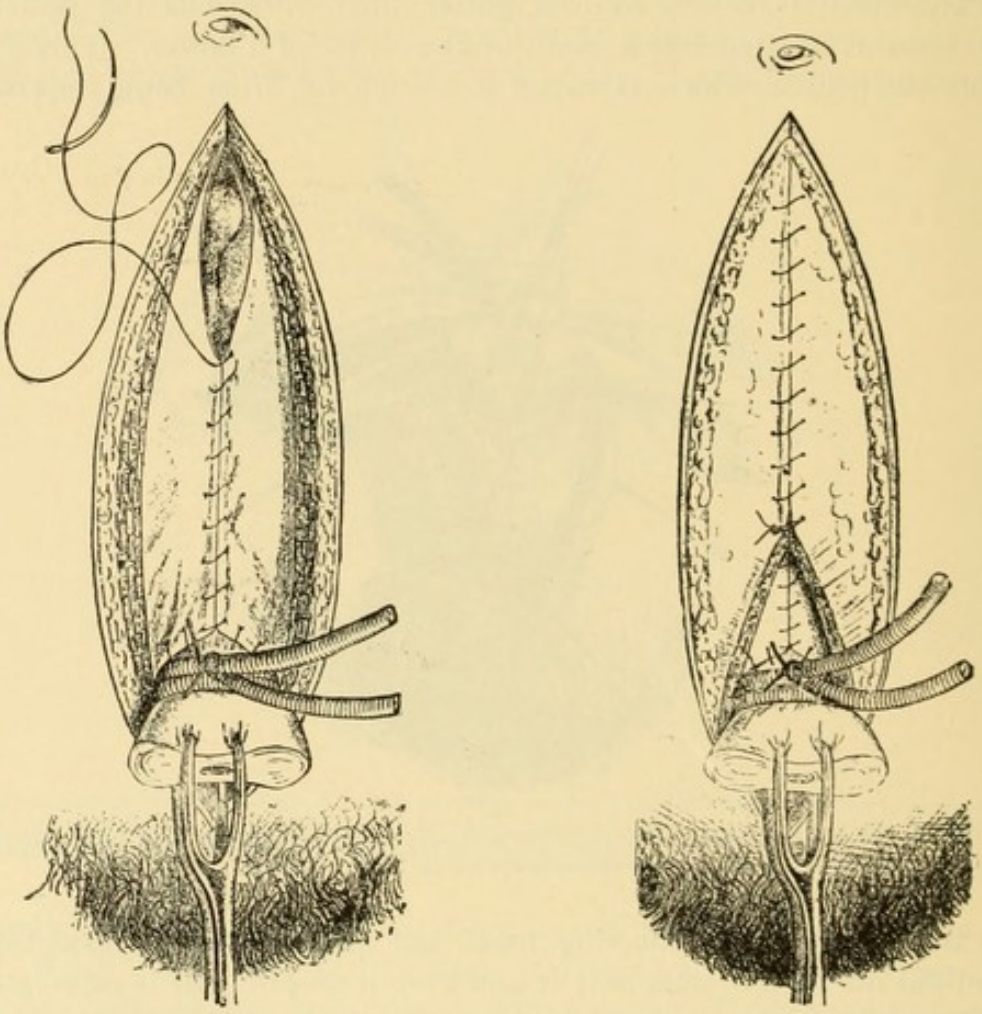


FIG. 182.—SUTURE OF THE ABDOMINAL WALLS AFTER SUPRA-VAGINAL HYSTERECTOMY WITH EXTRA-PERITONEAL TREATMENT OF THE PEDICLE. *A*, Continuous suture of the peritoneum with catgut after finishing the collar about the pedicle. *B*, Continuous suture with catgut of the musculo-aponeurotic planes.

passed through just above the ligature, and their pointed ends cut off. These pins have the additional advantage of preventing the elastic ligature from slipping. Below their ends small pads of iodoform gauze are placed to prevent their wounding the integument (Fig. 184). Then, with the scissors, the pedicle is trimmed to the shape in which it is to be left, and after surrounding it with wet antiseptic compresses its surface is cauterized with the thermo-cautery.

Hegar, Kaltenbach, and Tauffer dress the wound as follows: A tampon

of cotton moistened with a solution of zinc chloride (1 : 10) is placed over the centre of the pedicle, which is surrounded with cotton which has been dipped in a zinc solution (1 : 20) and carefully squeezed dry. Over and about this is placed iodoform gauze covered with several layers of cotton and held in place by a flannel body bandage. This first dressing is usually left in place for from five days to a week, and is then found dry and hard. The tampons of zinc cotton about the pedicle are now replaced by iodoform gauze and the pedicle itself is touched anew with the caustic solution to mummify the eschar and prevent its becoming soft and fetid. This dressing is repeated every day, and if the pedicle is very large the mortified parts are removed little by little with the scissors.

Kaltenbach has recently substituted for the chloride of zinc, which has the disadvantage of making too extensive an eschar and giving rise to capillary bleeding, a dressing of iodoform gauze; but in very fat or very anæmic patients this exposes to the risk of poisoning from rapid absorption in the deep gutter which surrounds the pedicle. Kaltenbach and Hegar have had good results with the mixture of three parts tannin and one part salicylic acid which Freund recommends for use for operation in extra-uterine preg-

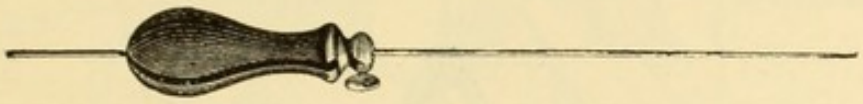


Fig. 183.—Holder for Passing Pedicle Needles.

nancy; I substitute, for the salicylic acid, iodoform in the proportion of 1 : 5 of the tannin, and find the mixture very serviceable. After the operation, as soon as the interior of the pedicle has been cauterized, the gutter about the pedicle is filled with the powder, and then the dressings applied; thus the part is tanned, so to speak, with no danger of cauterizing the adjacent healthy tissue. The first dressing is left in place from eight to ten days.

This modification is a great improvement, permitting the patient to rest quietly instead of fatiguing her with repeated dressings, and producing the drying up of the entire pedicle, without the need of removing portions of it from time to time with the scissors.

On the third or fourth day after the operation it is not uncommon to see, as after salpingectomy, a slight sanguineous discharge from the vagina; this is of no serious importance.

The elastic ligature and the pedicle with its pins usually fall on the fifteenth to twentieth day, leaving a granulating funnel which should be lightly packed with iodoform gauze; it is sometimes very deep, for the mortification of the pedicle is seldom arrested at the level of the elastic ligature. This cicatrix formed at a weak part often makes it necessary for the patient to wear an abdominal supporter. If the ovaries have not been removed, there is observed at each menstrual period a discharge of blood from the scar. There may even be a persistent cervico-abdominal fistula.

Dropped Elastic Ligature.—Whatever may have been done in this direction by Czerny and Kaltenbach, it was Olshausen who first recommended retention of the elastic ligature. It is applied as for the external method and then sutured about the pedicle with silk thread to prevent its slipping. Olshausen employed this procedure occasionally where the hemorrhage was very difficult to control, yet, though very successful, he has to-day relinquished it. The pedicle thus ligated does not mortify but continues to de-

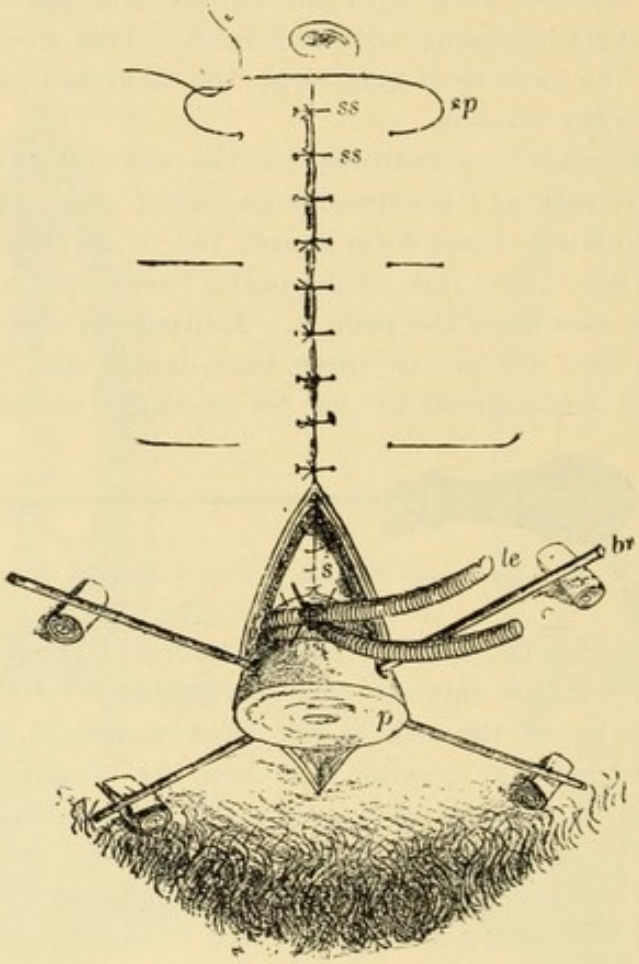


FIG. 184.—SUTURE OF THE ABDOMINAL WALLS AFTER SUPRA-VAGINAL HYSTERECTOMY WITH EXTRA-PERITONEAL TREATMENT OF THE PEDICLE. Skin and deep sutures placed above the pedicle (pedicle is drawn down to show upper part of peritoneal collar), but not yet placed below.

rive nourishment, either through the base or through adjacent adhesions; its nutrition is, however, very scant, and it undergoes a granulo-fatty degeneration. There have also been cases in which it has suppurated and caused serious symptoms with the elimination of the ligature or fatal peritonitis. At other times the ligature has been expelled without inconvenience to the patient. Ahlfeld cites an instance which the surgeon complicated by fastening the ligature, after having taken two turns about the pedicle, with a ring of lead 5 mm. in diameter, which he crushed about the rubber with strong forceps. This mode of fixing the ligature had already been employed by Thiersch, but only for extra-peritoneal treatment, and was then adopted by

Sänger, who later abandoned it for his mixed method after obtaining nine successes without a single failure.

The following procedures are cited only because of their originality:

Schwarz has proposed to cover the elastic ligature with a fold of peritoneum cut from the pedicle after preliminary hæmostasis.

Albert isolates the stump completely by means of an anterior and a posterior peritoneal flap which he sutures carefully to each other.

Meinert has proposed to open Douglas' pouch and pass the pedicle into the vagina; he made the experiment once, but the patient died.

Hysterectomy has been performed in two stages; the first consisting in opening the peritoneum and the production of adhesions; the second, of the

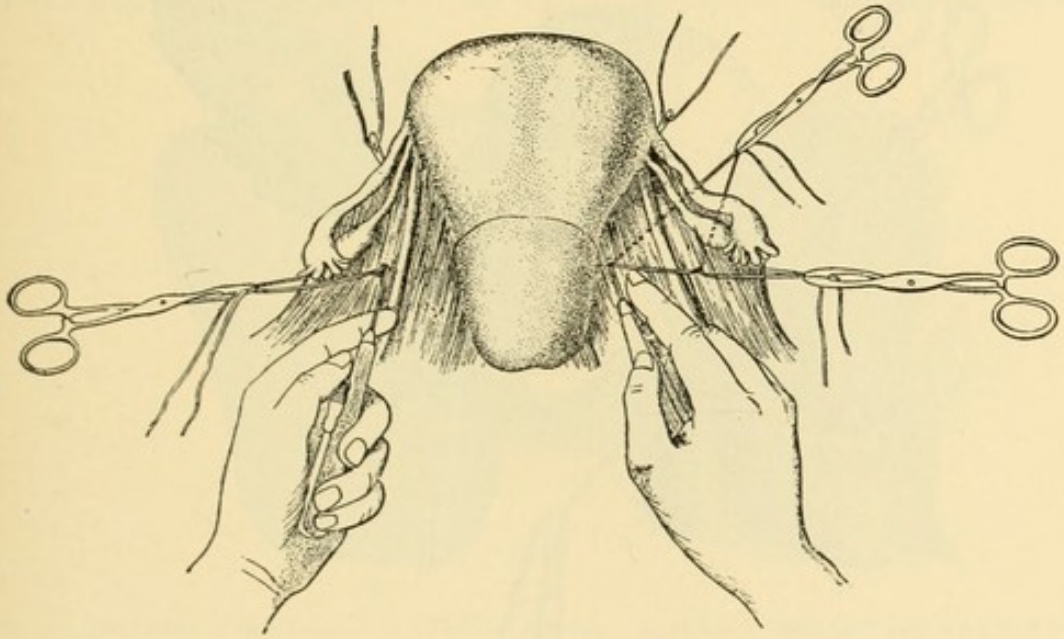


FIG. 185.—LIGATURE OF THE PEDICLE BY ZWEIFEL'S METHOD. Chain suture of the broad ligaments.

removal of the tumor. Nussbaum has employed this dangerous method in the case of a suppurating myoma; the patient died. Vulliet has recently adopted it, but his patient, when he published his case, had not recovered.

Continuous Fractional Ligature (*Fortlaufende Partienligatur*).—Under this name Zweifel has described a method of suturing the pedicle which certainly assures better hæmostasis than Schröder's, but seems, *a priori*, inferior in technique as regards primary union of the stump and its chances of sloughing; however, the good results published by Zweifel demand attention.

In ten cases with his method there was but one death when he published his book (1888), and in April, 1894, he announced a series of ninety-two cases with three deaths. His technique is as follows: For all his ligatures he employs sterilized silk and a needle furnished with a groove which resembles Reverdin's; the point is blunt. He first ties the broad ligaments with chain sutures. He then divides them. He previously takes care to

leave the ends of the two silk ligatures of the broad ligaments, which are nearest to the uterus, sufficiently long to be able to utilize them for a chain ligature of the stump.

In the excision of the tumor a small musculo-peritoneal lip is preserved in front (Fig. 186) A sharp needle is then threaded and a series of partial ligatures passed, of which the figure (185) gives a sufficient explanation. The peritoneum is closed by a series of superficial sutures (Fig. 187). Drainage

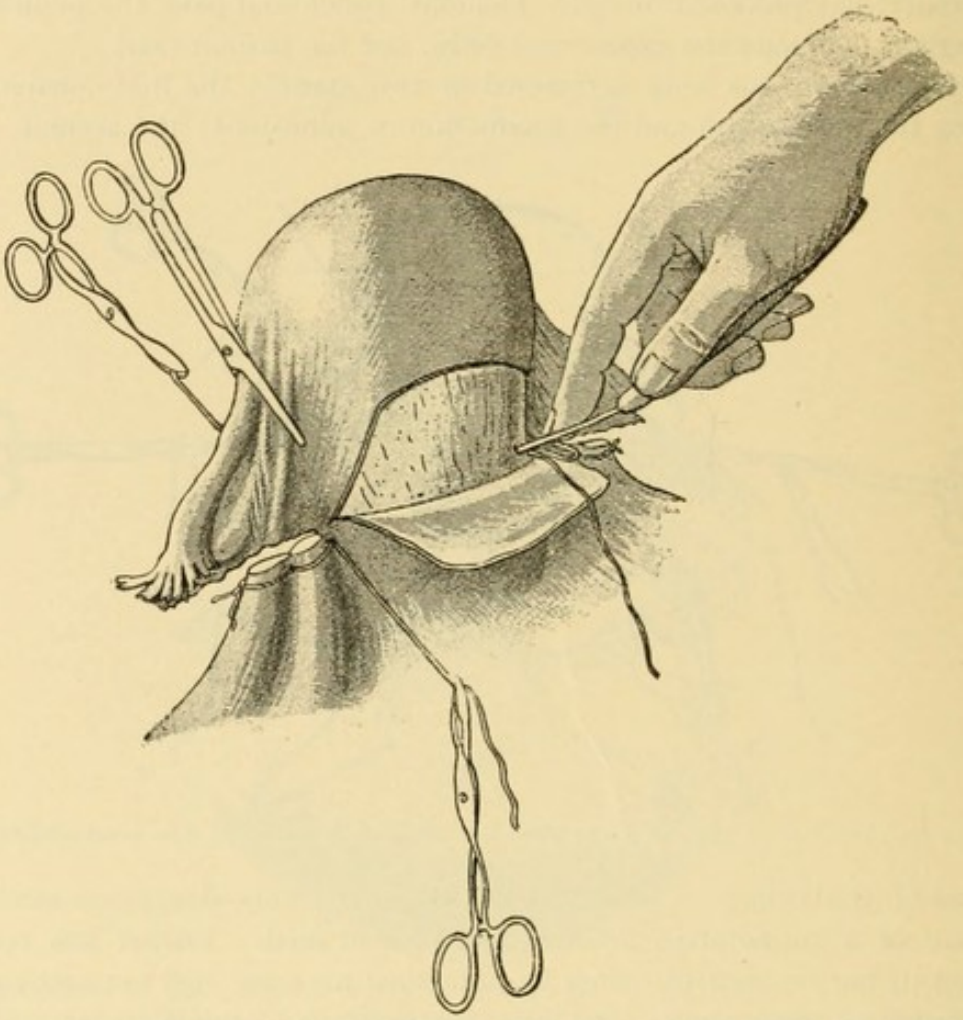
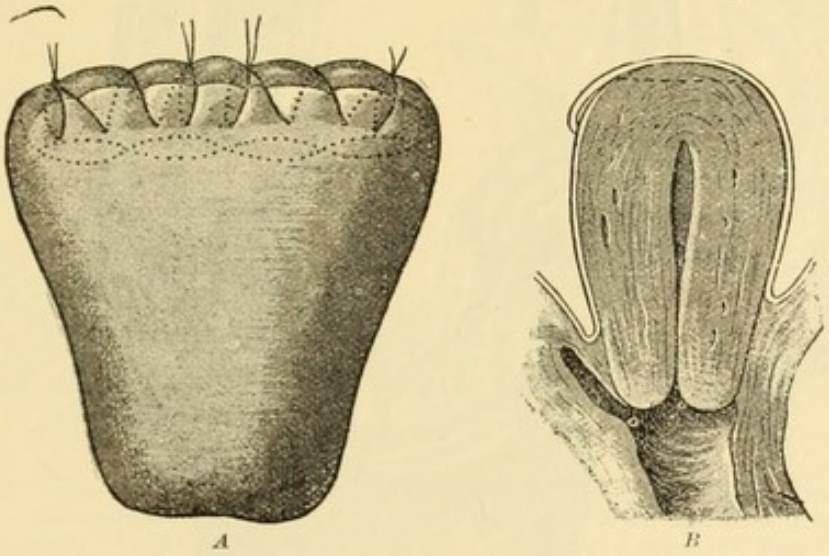


FIG. 186.—LIGATURE OF THE PEDICLE BY ZWEIFEL'S METHOD. Shows the manner of cutting the peritoneal flap for covering the pedicle. The needle is carrying a suture through the pedicle.

through the vagina by the cross-tube is necessary only when there is persistent oozing.

Mixed Method (It might also be called juxtaparietal).—Owing to the difficulty which some surgeons have found in fixing a short pedicle in the abdominal wound, it has been abandoned within the cavity of the abdomen as in the successful case of Kleeberg, of Odessa, whom I have cited as the inventor of the elastic ligature, and who in 1887 allowed a thick and short stump to drop back into the peritoneal cavity, bringing out the ends of the constricting ligature through the lower angle of the abdominal wound. Péan

has at times left a bundle of forceps projecting from the abdomen, with success. But these were all procedures of necessity. Fixation of the pedicle immediately below or in the thickness of the abdominal walls, with permanent communication exteriorly at this level, has been lately proposed and carried out as a procedure of choice, with the intention of permitting examination where the hæmostasis has been difficult, and to insure the external discharge of products which could infect the peritoneum. The first to apply a mixed method was probably Freund, who, after amputation of a voluminous uterine tumor, made one bundle of stump and broad ligaments, passed an elastic cord about them, and covered their extremities with a condom whose lower shut extremity he cut off; into this he passed a glass tube to the pedicle, brought the extremities of the elastic ligature out of it, and packed with



A *B*

FIG. 187.—LIGATURE OF THE PEDICLE BY ZWEIFEL'S METHOD. *A*, Pedicle finished (one sees in a dotted line the course of the subperitoneal suture). *B*, Antero-posterior view of the pedicle.

iodoform gauze. The patient recovered. It is very evident that the rapid formation of protecting adhesions, and not the condom, made the barrier against infection of the peritoneum; tamponing with iodoform gauze above the pedicle would have been both more simple and more sure.

Two surgeons of Vienna, pupils of Billroth, Wölfler and von Hacker, and Sänger, of Leipsic, have lately proposed a mixed method which deserves to be described in detail. Hacker conceived the method, inspired by a case of Billroth's, and first performed it August 31st, 1884.

Wölfler-Hacker's Method.—The pedicle is sutured according to Schröder's method and is then dropped back, so that its summit lies against the deeper surface of the abdominal wall; it is fixed there, close to the peritoneal incision, by passing through it on each side a carbolized silk suture which traverses its superficial layers and then the abdominal walls. The ends of the silk are looped over small rolls of iodoform gauze and tied so that the surface of the stump is held between the lips of the peritoneal wound. The

edges of the parietal peritoneum are not sutured together at this point, but are carefully stitched around the top of the pedicle so that it, as regards the abdominal cavity, is extraperitoneal, and yet juxtaparietal. The abdominal walls are then sutured, leaving only room for a band of iodoform gauze and the drain which is passed down to the pedicle (Figs. 188, 189).

The first two cases of Wölfler and Hacker recovered with but little suppuration or sloughing; both would probably have died of septic peritonitis if the pedicle had been abandoned within the abdominal cavity; then followed a number of cures by first intention. Fritsch adopted the method, and obtained nineteen successive successes, while Olshausen's and Schröder's

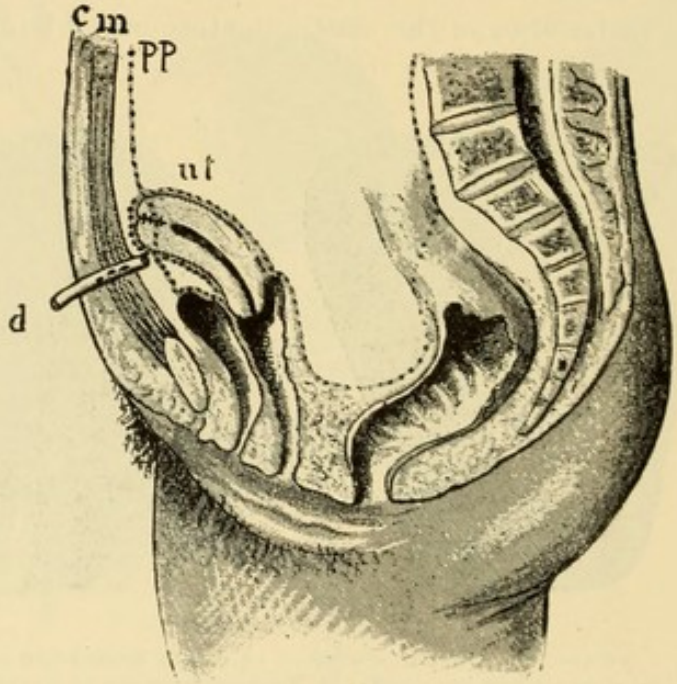


FIG. 188.—WÖLFLER-HACKER'S MIXED TREATMENT OF THE PEDICLE. *c*, Skin; *m*, muscular layers; *pp*, parietal peritoneum; *d*, drain; *ut*, pedicle. Median section; diagrammatic.

methods had given twelve deaths in thirty-nine cases. Although I have not adopted it exclusively, it is certain that the method is a very useful one, for it is applicable both to large and to short pedicles, which could not be drawn out of the abdominal wound without too much effort, and where the abundance of the vessels and the number of the ligatures would render abandonment in the abdomen dangerous, because of the probability of secondary hemorrhage, mortification, and septicæmia.

Sänger's Method.—Intra-peritoneal sequestration: Sänger thus designates an operative procedure which consists of suturing the peritoneum closely about the pedicle, drawing upon the parietal peritoneum for this purpose, and fixing it along the posterior face of the stump. The abdominal cavity is thus separated from its lower division, in which lies the sequestrated pedicle.

Sänger distinguishes two modifications of this procedure:

1. The pedicle is sutured by Schröder's method, but, hemorrhage being probable, it is sequestrated by suturing to it the parietal peritoneum, with drainage (Fig. 190).

2. The pedicle is too short to be drawn out of the abdomen. The transfixing pins are placed some distance above the elastic ligature, which is disposed as in Hegar's method. The peritoneum is then sutured to the upper part of the pedicle in front of the elastic ligature, to sequestrate it from the abdominal cavity. A barrier is thus formed above, making the elastic ligature extra-peritoneal and yet intra-abdominal (Fig. 191). Sänger has thus

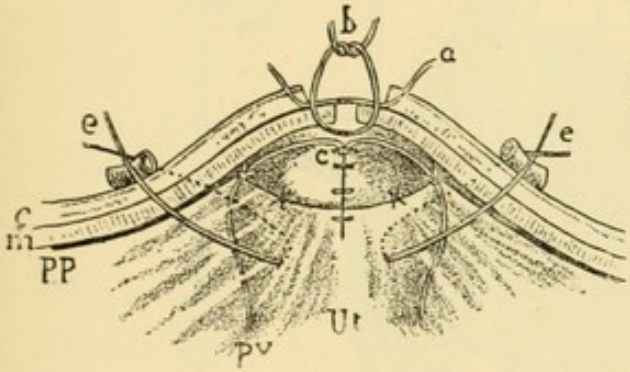


Fig. 189.—Wolfler-Hacker's Mixed Treatment of the Pedicle. *c*, Skin; *m*, muscles; *pp*, parietal peritoneum; *pv*, visceral peritoneum; *ut*, pedicle; *a*, cutaneous suture; *b*, muscular suture; *c*, peritoneal suture with catgut; *e*, pedicle supports on rolls of iodoform gauze. Transverse section; diagrammatic.

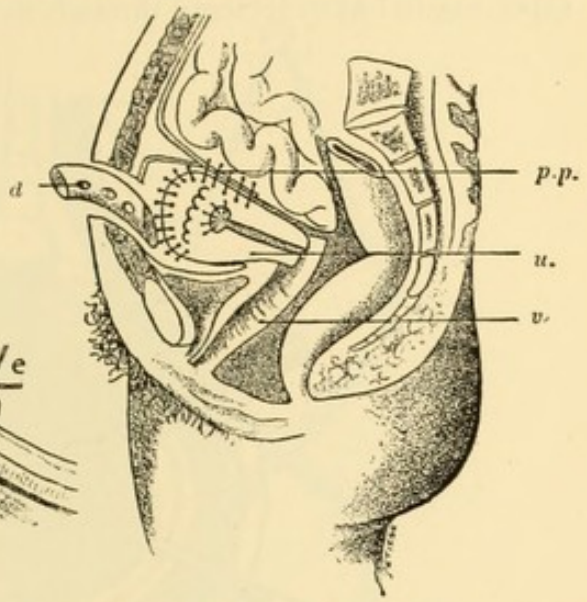


Fig. 190.—Sänger's Mixed Treatment of the Pedicle; Intra-peritoneal Sequestration of a Pedicle Sutured by Schröder's Method. *pp*, Parietal peritoneum sutured to posterior surface of stump; *u*, utérine pedicle; *v*, vagina; *d*, drainage.

obtained great success with a stump which was very short, thick, and hemorrhagic.

A careful study of these two methods demonstrates that the first of Sänger's does not differ materially from Wölfler-Hacker's, for the two lateral sutures for the suspension of the uterus are replaced by the suture of the peritoneum to the posterior face of the stump. As to the second, it is practically Hegar's method applied to a very short stump, in which the suture around the pedicle is replaced by the suture above it of the peritoneum; but it presents this originality, that the peritoneum is sutured (with catgut) above the elastic ligature to the part which is intended to slough. Sänger powders the stump with a mixture of salicylic acid, iodoform, and tannin; to this I add a covering of iodoform gauze.

Total Abdominal Hysterectomy.—Péan was the first to perform total abdominal hysterectomy, doing this operation in 1869 upon a patient who recovered. In 1873 he again advised this procedure for all cases in which

"the cervix itself is the seat of the neoplasm." Much later (1881), Bardenheuer recommended the liberation of the cervix by a first step termed vaginal, and then the extirpation, by the abdominal route, of the uterus with its fibroids. Bardenheuer obtained six successes in seven operations, but these were very simple cases which could have been cured by any other method. For a long time few cases were published, which shows the opposition inspired by this application to fibroids of Freund's operation for cancer, which is to-day condemned.

Martin was one of the first to advise total extirpation. He performed supra-vaginal hysterectomy through the abdomen with a preliminary elastic

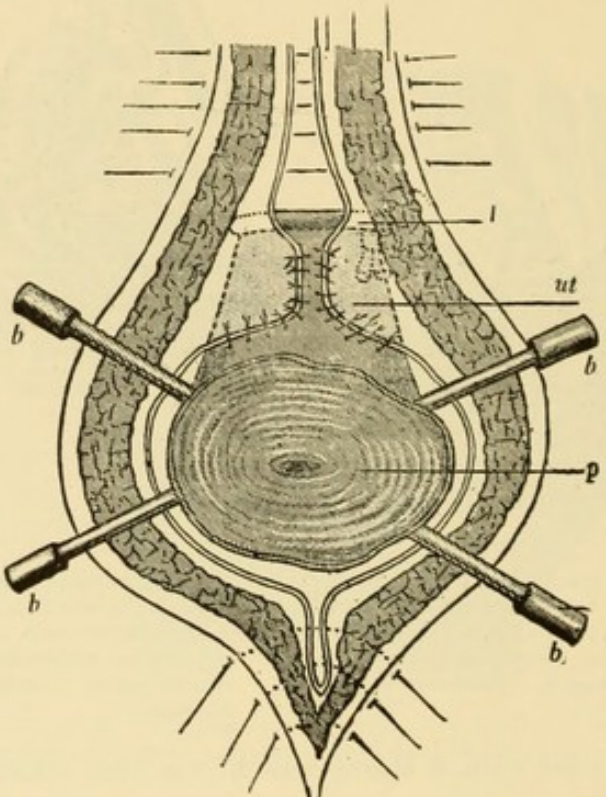


FIG. 191.—TREATMENT OF THE PEDICLE BY SÄNGER'S MIXED METHOD. Intraperitoneal sequestration of the pedicle, with elastic ligature. *l*, Elastic ligature; *ut*, posterior surface of the uterus; *p*, pedicle (section); *b*, pins.

ligature; then an assistant freed the cervix through the vagina. Finally, the surgeon completed the operation through the abdomen by tying the broad ligaments and separating the bladder.

The great multiplication of publications at the present day shows incontestably that this method, revived with an improved technique, is tending to replace the procedures of Hegar and Olshausen. Personally I am not far from considering it a matter of election, much more benign and more rational than that with the buried elastic ligature, much more in conformity with modern surgical principles than the extraperitoneal treatment of the pedicle. Is it then to be supposed that the latter method will completely disappear? I think not; but from the rank of the operation of election it must descend

to that of one of necessity; being applicable, for example, in cases which are too anæmic and too much enfeebled by severe hemorrhages or by an early cachexia.

Total abdominal hysterectomy is now practised according to two well-defined techniques. In the first, called *total abdomino-vaginal hysterectomy*, the surgeon works successively through the abdomen and the vaginа; in the

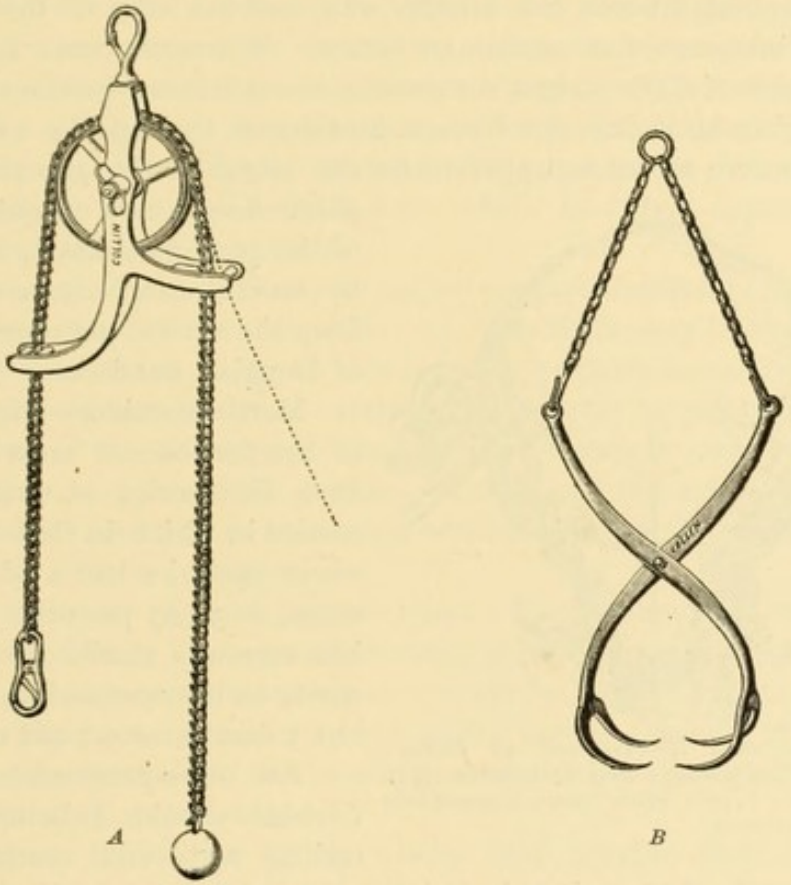


FIG. 192.—REVERDIN'S APPARATUS FOR RAISING FIBROID TUMORS. *A*, Pulley. *B*, Forceps to grasp tumor and then be attached to pulley.

second, or *total abdominal hysterectomy proper*, the entire operation is performed through the abdomen.

Total Abdominal Hysterectomy Proper.—This operation, first practised by Péan, has been well systematized by Martin, whose technique is as follows: The tumor being brought out through the abdominal incision, the uterus is drawn upon in such a way as to exert strong tension upon the floor of the pelvis. If the tumor is very large, it may be held up by means of Reverdin's ingenious apparatus (Fig. 192). Ligatures are then applied to the infundibulo-pelvic ligaments, which are divided. The broad ligaments are tied in sections from above downward; if bleeding occurs from the portion which is attached to the uterus, they should be compressed with a long clamp. When the broad ligaments have been ligatured down to the level of the cervix and in immediate contact with the vaginal vault, the posterior cul-de-sac is opened by a horizontal incision extending between the two

ligaments. Through the lips of this incision are then passed a number of sutures which unite the peritoneum to the vaginal mucous membrane. The cervix is now held in place by only its attachments to the bladder. The vesico-uterine cul-de-sac is incised horizontally and the bladder is dissected off with the fingers or a blunt instrument. The anterior cul-de-sac being open, the same procedure is carried out as in the posterior, uniting successively the vaginal mucosa, the bladder wall, and the edge of the peritoneal incision by interrupted or continuous suture. When the tumor has been removed the ends of all the catgut sutures are united into one bundle and brought into the vagina by means of a forceps introduced through the vulva. This simple manœuvre serves to approximate the edges of the gap made in the pelvic floor, and a complete closure of the peritoneal cavity is obtained by several catgut sutures passing from the vesical peritoneum to that of Douglas' cul-de-sac.

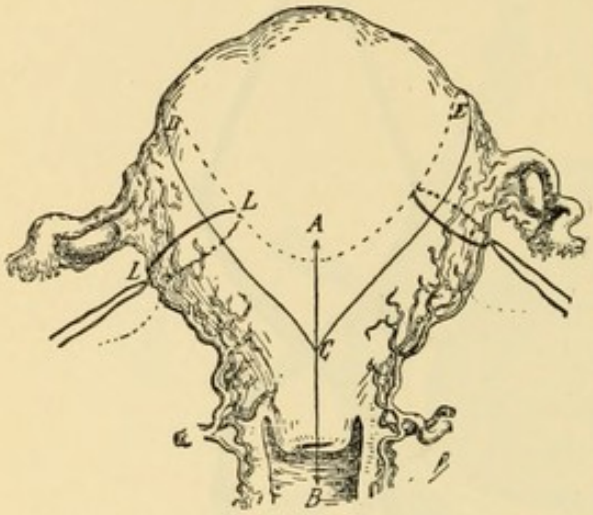


FIG. 193.—ABDOMINAL HYSTERECTOMY BY DOYEN'S METHOD. *A*, *B*, Longitudinal section of peritoneum; *C*, *D*, *E*, circular section; *L*, point where ligature is passed after decortication of the tumor.

Martin considers this occlusion of the peritoneum most important. In a first series of total hysterectomies in which he left the peritoneum open he had 13 deaths in 43 cases, or 30.23 per cent. Since he has carefully closed the peritoneal cavity he has operated 54 times with but 5 deaths, or 9.5 per cent.

The retro-peritoneal method of Chrobak should, I believe, be described with total extirpation, although it leaves the cervix; but the entire intra-abdominal portion of the uterus is removed and the cervical stump is covered with peritoneum, for which reason he has termed the procedure retro-peritoneal. The broad ligaments are first tied as for a total extirpation, and two peritoneal flaps are marked out upon the tumor, one larger than the other. These flaps are dissected off as far as the level of the insertion of the vagina upon the cervix. The entire uterus is then removed with the exception of a ring of cervix from one-half to one centimetre thick. The cervical canal and the cut surface of the cervix are thoroughly cauterized with the Paquelin cautery, and the cervical canal is drained with a strip of iodoform gauze. If the stump bleeds several sutures are passed through it from before backward. The broad ligaments are fixed above the stump by sero-serous sutures, and above all the peritoneal flaps are carefully brought together. The stump is thus covered by an intact peritoneal surface, and the unequal size of the flaps brings their line of suture beyond the limits of the cervical stump. The abdomen is completely closed.

Baer's method, which is much used in America, must be compared with that of Chrobak. F. Baer ties the upper part of the broad ligaments with silk, and divides the part tied between the ligature and a clamp placed close to the uterus. This done, he makes a circular incision through the peritoneum above the vesico-uterine fold. The peritoneum being separated from the anterior and posterior surfaces of the uterus down to the level of the cervix, he ties the uterine arteries included in the broad ligaments. Hæmostasis being thus assured, he resects the tumor as low as possible, and the two peritoneal flaps, anterior and posterior, immediately fall over the uterine stump. When they are sutured perfect coaptation is obtained and the peritoneal cavity is hermetically sealed. This procedure resembles in its principal points that of Chrobak, from which it differs especially in the greater size of the uterine pedicle.

Doyen's method is really only an ingenious combination of the technique of Martin with that of Chrobak, differing from them only in the absence of preliminary hæmostasis. Doyen ties separately the utero-ovarian (Fig. 193) and the uterine arteries, and re-enforces this ligature by placing two forceps upon the flaps of the broad ligaments inverted from above downward. These are thus carried outside of the peritoneal cavity and the serous membrane is carefully united above them by several sutures, completely closing the peritoneal cavity without drainage.

Total Abdomino-vaginal Hysterectomy.—Two methods are at present in favor. That of Péan, first applied in 1886, consists in removing the body of the uterus through the abdomen and the cervix by the vagina; the other, that of Bardenheuer, in removing the entire uterus through the abdomen, but securing hæmostasis of the broad ligaments either through the vagina or the abdomen alone, or combined.

(*a*) *Successive Removal of the Cervix and Uterine Body.*—When the abdomen has been opened and the fibroid tumor drawn out, Péan applies an elastic ligature below it and resects it. When only the lower portion of the body and the cervix are left, he binds the pedicle with a wire placed, according to circumstances, above or below the elastic ligature and fastened by means of a special ligator, that of Cintrat. He resects the stump as near as possible to the metallic loop after having carefully removed the mucosa, and reduces it into the abdomen, the incision in which he sutures. He immediately removes the stump by the vagina by morcellation and clamping the broad ligaments.

Péan claims a mortality of 2 per cent (1 death in 50 cases) for this operation, in a first series; and in a second series (1890 to 1894) 5.8 per cent (7 deaths in 120 cases).

Since 1890 Boldt had obtained three successes by the abdomino-vaginal method.

In France, the same technique has been employed by Bouilly in a case of fibroma with cancer of the cervix, and by Goullioud in a simple case of fibroids.

In 1888 Martin also combined the vaginal and abdominal routes for the removal of fibroid uteri. His technique differed from that of Péan only in the substitution of ligatures for forceps and in the removal of the tumor without morcellation of the pedicle.

Chaput takes out first the cervix through the vagina and the rest of the uterus through the abdomen. Guermonprez describes as probably new the following method of hysterectomy: 1. Section of the two broad ligaments stopping a short distance from the uterine arteries. 2. Transverse section of the vesico-uterine peritoneum, and separation of the bladder and uterus with the fingers as far as the anterior lip of the cervix. 3. Opening the vagina by a buttonhole incision running longitudinally in the median line and in its anterior wall. 4. Transfixion of the vagina, keeping in the antero-posterior plane, by means of a tunnelled sound which emerges in Douglas' cul-de-sac. 5. Hæmostasis assured before removal, by means of two large clamps.

(*b*) *Total Removal of the Uterus through the Abdomen.*—In 1881 Bardenheuer recommended first liberating the cervix by a step which he termed vaginal, followed by the extirpation of the uterus and its fibroids by the abdominal route.

Rouffart, like Bardenheuer, liberates the cervix by a preliminary vaginal step, and places hæmostatic forceps on the base of the broad ligaments which he divides; he then opens the abdomen and ties the portion of the ligaments which has escaped the clamps.

Jacobs proceeds in the same manner as Rouffart, but clamps the upper portion of the broad ligaments instead of tying them. When the tumor has been extirpated he replaces the clamp placed through the abdomen, by others introduced through the vagina. In order to avoid this manœuvre he has invented forceps with detachable handles which can be applied through the vagina to the jaws which are left in place.

Lanphear, after opening the abdomen, ligatures and divides the appendages; next, tipping the fundus of the uterus backward, he makes a transverse incision through the peritoneum and methodically detaches the bladder from the uterus; then he passes a finger into the vagina and perforates the anterior cul-de-sac with scissors. The uterus is now drawn strongly forward and the posterior cul-de-sac similarly treated. When this has been opened the uterus is left in charge of an assistant, who draws it upward and laterally; a clamp is then introduced through the vagina, leaving one hand in the abdomen to guide the jaws of the instrument, which are made to include all the soft parts attached to the side of the uterus. The clamp is then locked. The opposite side is treated in the same manner, and the uterus removed after dividing the soft parts close to the clamps.

Richelot has recently devised a method which he applies to all cases and which resembles those just described. He relies entirely upon the use of permanent forceps without ligatures and without closure of the vagina. By

this he seeks rapidity of execution and absolute exclusion of foreign bodies from the abdomen.

The first essential point, when the uterus has been brought out through the abdominal wound, is to perform a preliminary enucleation, if circumstances demand it, of all the fibroids which interfere with the beginning of the operation, by concealing the true pelvis, immobilizing the uterus, and distorting the broad ligaments. Large tumors in the lower uterine segment and filling the pelvic cavity are boldly attached by a median incision in their capsule, and are removed entire or by morcellation. The emptied uterus becomes flaccid; the upper border of the broad ligaments, which before reached the umbilicus, is lowered sufficiently in all cases to be seized with the forceps. An anterior peritoneal flap is then cut out to bring the bladder and ureters toward the pubis. Then the anterior cul-de-sac alone is opened with scissors close to the anterior surface of the cervix, so as not to be obliged to pull the uterus forward and dissect behind it, and thus early cause bleeding ffom the posterior vaginal incision.

After opening the cul-de-sac the broad ligament is held with the left hand and the end of a blunt-pointed scissors is pushed through its base, making a small opening close to the cervix, immediately above the vaginal insertion, internal to the uterine artery and well above the ureter with which it cannot interfere. The clamp curved on the flat, with jaws 9 or 10 cm. long and a great deal of "bow" in order to lock at the end as well as at the base, is introduced through the vagina, its posterior jaw passing through the small opening just made, and the whole ligament is easily seized after pushing the clamp upward.

The opening of the anterior cul-de-sac alone, the perforation of the ligament at its base, and the manner of applying the clamp are the characteristic points of this method.

When the two ligaments are clamped, the uterus is rapidly detached laterally, and the posterior cul-de-sac is finally opened. Richelot never leaves a drain or tampon in the supra-pubic wound, but carefully arrests the inevitable hemorrhage from the posterior vaginal incision by seizing bleeding points with two or three long-handled forceps introduced through the vagina. He then places in the vagina an anterior retractor and slides between it and the forceps a tampon of iodoform gauze exactly as far as the vaginal wound, then a second and a third below the first. When the abdominal wound is closed the immediate result is that of a vaginal hysterectomy, and the operation has lasted from thirty-five to fifty minutes.

IV. *Intra-ligamentous and Pelvic Fibroma—Decortication.*—Fibromata from the supravaginal portion of the cervix and the lower part of the body of the uterus grow below the peritoneum, which they elevate and unfold and are seldom covered by it completely, having a tendency to insinuate themselves into the cellular spaces of the pelvic floor. They may thus split the mesorectum up to the superior strait, or lift up the utero-vesical pouch and com-

press the bladder against the pubic bone; or, as in the great majority of cases, they may spread into the broad ligaments, whose folds they entirely efface. From the surgical point of view all these varieties belong in one natural group, characterized by extreme difficulty in forming a pedicle and intimate and extended connections with the walls and viscera of the lesser pelvic cavity.

When these tumors do not extend above the umbilicus, I believe that they

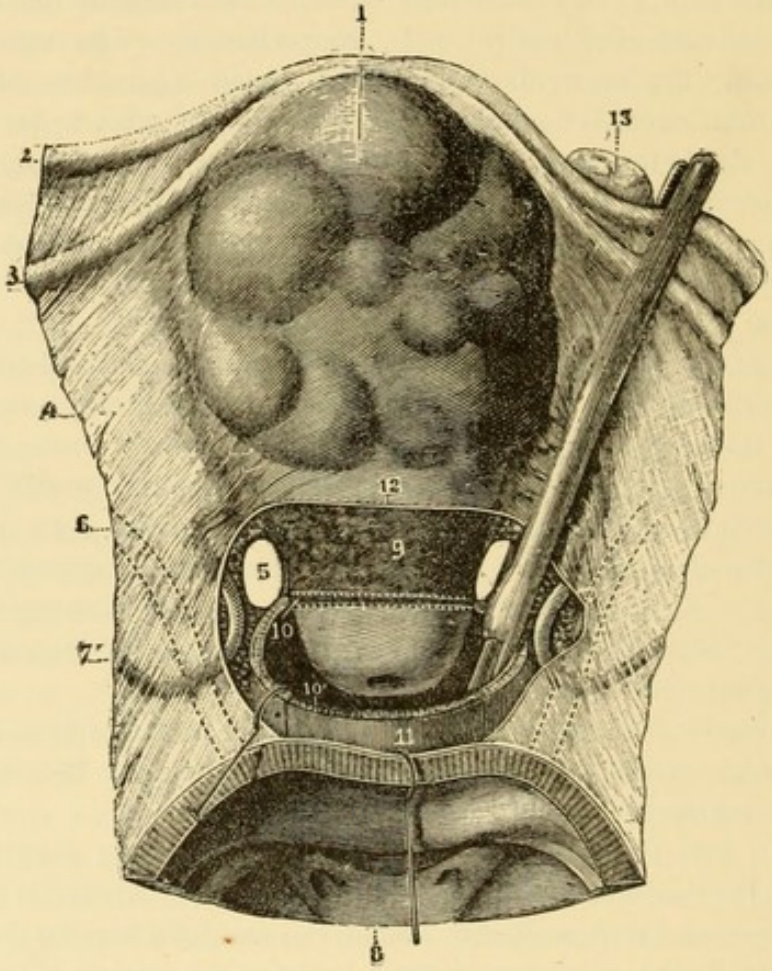


FIG. 194.—TOTAL ABDOMINAL HYSTERECTOMY BY RICHELOT'S METHOD. 1, Fibroid; 2, tube; 3, round ligament; 4, broad ligament; 5, orifice made at the base of the broad ligament; 6, ureter; 7, uterine artery; 8, bladder drawn toward the pelvis; 9, denuded surface of the inferior segment of the uterus; 10, 10', anterior vaginal insertion; 11, vagina; 12, section of anterior peritoneal flap; 13, ovary.

should be removed through the vagina by morcellation. According to their connections with the uterus, vaginal hysterectomy should be performed simultaneously with the extirpation of the fibroid, either as a preliminary step (to allow access to the tumor) or as a complementary procedure. In all cases the technique should be that which I have described. When, however, intra-ligamentous fibroids extend above the umbilicus, their surgical treatment is attended by the greatest difficulties. After opening the abdomen, if they appear too large for extirpation to offer real chance of recovery, we may perform castration (palliative) in place of extirpation (curative).

We must, however, recognize that in these cases it is not the hemorrhage which is the most important symptom, but the compression, and that therefore castration has but an uncertain value; if performed, it is only as a makeshift.

I propose to reserve the term "decortication" for the extraction of the tumor from its cellular bed, and the term "enucleation" for its removal from the uterine tissue; the use of the latter word for the two operations, so different in their natures, has given rise to great confusion. It is impossible

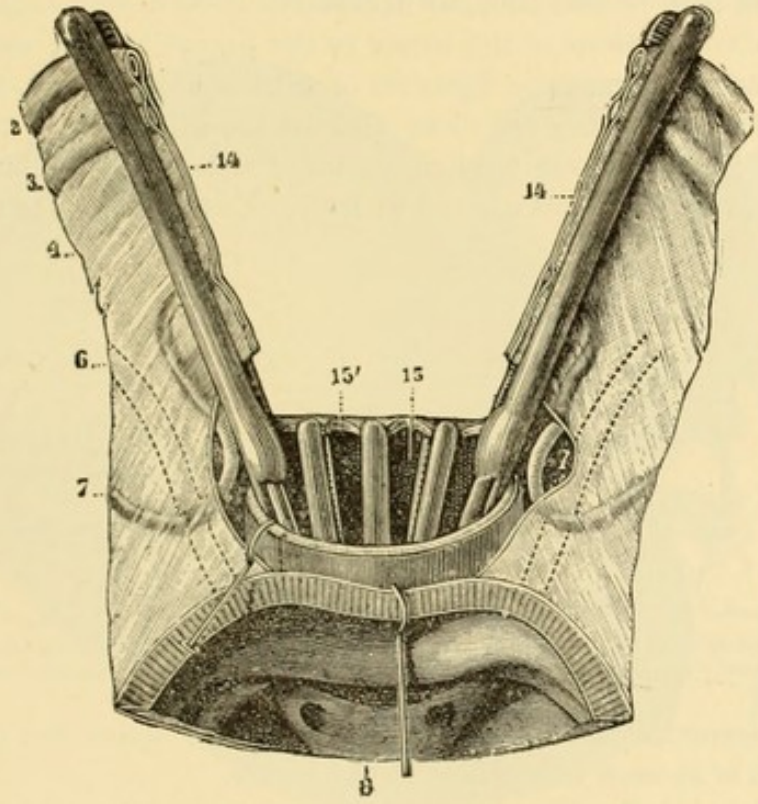


FIG. 195.—HYSTERECTOMY BY RICHELOT'S METHOD, OPERATION FINISHED. 14, Line of section of the broad ligaments; 15, hæmostatic forceps on posterior vaginal wall.

to give a typical description to cases which are beyond all rules and hence termed "atypical."

The application of the provisional elastic ligature is seldom possible, and then only on a part of the tumor. Redoubled care must be employed not to include the portion of the bladder which is generally elongated upon the anterior face of the uterus. If part of the tumor projects far into the peritoneal cavity, the ligature is placed as deeply as possible about this lobe, which may then be removed without fear. An attempt is made to enucleate the deeper parts by strong traction, the elastic cord following the diminution of the tumor and keeping up a steady and sufficient constriction upon the capsule as it is emptied. Very often it is necessary to begin the operation by ligation and section of the adnexa on the side where we are operating, at the same time placing a deep ligature on the corresponding trunk of the uterine artery.

It may occur that these manœuvres are impossible, and that we must proceed at once to the important step of the operation, namely, the free incision of the tumor's intra-ligamentous seat, whose lips are then seized by strong forceps, and the decortication accomplished with fingers and spatula. The operator keeps up strong traction with toothed forceps, carefully dissects out the neoplasm and applies clamps to bleeding points, without forgetting the position of the ureters; the tumor once removed, he sees the veins of the broad ligaments, which are at times enormous, and is surprised to require more ligatures than he had thought necessary.

When the connections of the tumor to the uterus are not extensive, it is sufficient to apply hæmostatic ligatures or sutures as necessary, and leave the organ in place; but if they are close and the bleeding is hard to stop, it is better to decide on supravaginal hysterectomy without further hesitation. It may occur that this happens almost without our knowledge, for at the end of

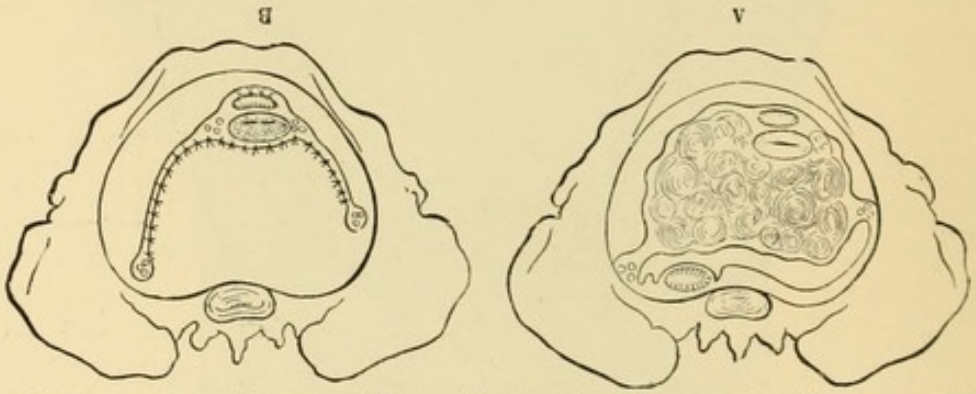


FIG. 196.—INTRALIG-AMENTOUS FIBROMA. *A*, Horizontal section to show the connections of the tumor; weight 14 lbs. *B*, Suture of the cavity resulting from enucleation of the preceding; drainage by the vagina; cure (Kaltenbach).

a laborious decortication we may reach, in a tumor which fills the pelvis, a pedicle which is at once recognized as the cervix.

The resulting cavity may be very large, with prolongations toward the rectum, bladder, or on each side of the vagina; its treatment may be according to one of the following plans:

If we feel perfectly sure that the operation has been aseptic, we may try for primary union without drainage. If the peritoneum has not been torn or contused, as is the case with small tumors and where the adhesions are loose, a few points of suture are placed in the membrane to unite it, the peritoneal toilet is then completed and the abdomen closed. If the pocket is very deep and the bleeding is free, we may make a continuous suture in terraces, which both unites the parts and stops the hemorrhage. Débris which may mortify should be excised.

This bold procedure is justified only in exceptional cases; if the cavity is extensive and we fear oozing, drainage is more prudent. It may be performed in two ways; Martin and Kaltenbach recommend the use of a cross tube through the vagina, passed through the cul-de-sac. Sänger, after dropping the pedicle left by the removal of a tumor from just above the cervix,

closed the abdominal walls and immediately opened by the vagina and packed with gauze the capsule filled with blood which projected into it; his patient recovered.

Drainage through the inferior angle of the abdominal wound is preferable in some cases, according to the situation of the cavity; it has the advantage of exposing less to infection. Terrier has recently treated in this way the cavity of a myoma of the broad ligament; recovery, with permanent fistula. H. A. Kelly decorticated a pelvic fibroma which had compressed the bladder, left open and drained the cavity, and then used weak carbolic injec-

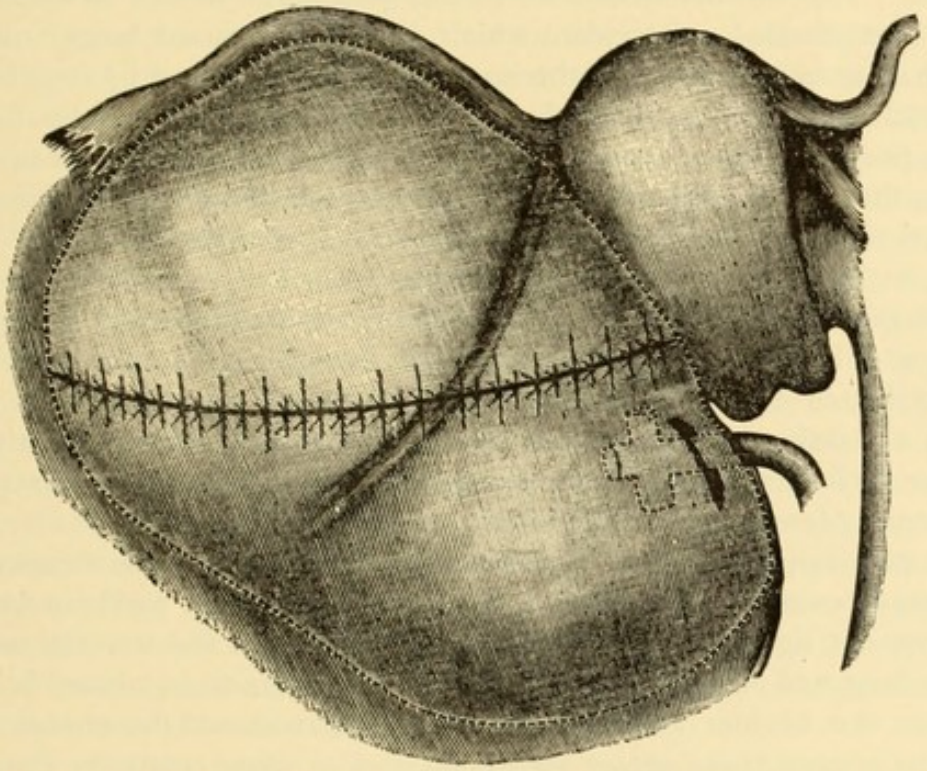


FIG. 197.—FIBROMA IN THE BROAD LIGAMENT; DECORTICATION AND SUTURE OF THE CAVITY, AND DRAINAGE BY THE VAGINA (MARTIN).

tions through the drain without fear of effusion into the peritoneum, which was closed off during the first days by adhesions. I prefer to employ iodoform gauze, as it is at once a hæmostatic and a capillary drain, and I have used it with success in one case of intraligamentous tumor which weighed fifteen pounds. Küster has also packed the cavity and united its edges to the lower part of the abdominal wound. The gauze should be withdrawn a little at a time and replaced by a drain at the end of a few days.

Tauffer has had curious success by partially resecting large fibromata of the ligaments, fixing the stump in the abdominal wound, and then treating it by strong cauterization with chloride of zinc.

Operative Accidents.—Hemorrhage is one of the most serious dangers, and has caused many deaths upon the operating table, but it may be avoided by the judicious use of the temporary elastic ligature. It must be noted

that we do not produce here, as in the application of the Esmarch bandage to a limb, an ischæmia of the tumor; this idea of L. Labbé's, though ingenious, is still pure hypothesis; and beside the almost insurmountable difficulties in application, it exposes to excessive manipulation, and without doubt to embolism. We must not be surprised, therefore, on cutting the tumor above the ligature, to see a large discharge of residual blood which has been imprisoned by it. If the case is one of telangiectatic tumor or if the broad ligaments are traversed by dilated veins (tubo-ovarian varicocele), the ligaments must be tied with the greatest care and cut only between two ligatures. The threads should be passed with a dull needle to avoid puncture of the vessels—an accident which has often caused large subserous hemorrhages, and to save time the ligatures may be replaced by long forceps.

In cutting the tumor above the ligature, the greatest care must be exercised to prevent the section from going too near the elastic band and thus allowing the escape through it of any part of the tumor's pedicle from the constriction of its circumference. The extra-peritoneal treatment of the pedicle, with the use of the elastic ligature, permits us to avoid all secondary hemorrhage, but with the intra-peritoneal method (suturing the stump with catgut or silk), this is not the case even though the uterine arteries be strongly ligated to right and left of the pedicle by passing a stout needle through a certain thickness of the organ. In spite of this precaution, we often see fatal hemorrhage from shrinking of the tissues and relaxation of the ligature a few hours or days later.

The possibility of wounding the bladder should always be remembered. The cases are numerous in which it has been lacerated, or partly included in the permanent ligature. If the viscus is elongated in front of the tumor it must be dissected off sufficiently to allow the ligature to be placed below it.

When the bladder is extensively wounded, it should be closed immediately by a continuous catgut suture on two or three planes. Catgut is preferable when the stump has been treated by the extra-peritoneal method, for silk is porous and may cause infection by absorbing the secretions from the furrow around the pedicle. When the stump is abandoned within the peritoneum, as in myomectomy, silk may be used. A soft catheter furnished with a tube forming a siphon should be left in the bladder for ten days after the operation. Leopold has had complete success with this method, and I have employed it in a case of bladder wound 12 cm. in length, which was perfectly cured although the patient removed the catheter after six days and caused a partial temporary disunion of the vesical suture, which was rendered aseptic by iodoform gauze placed in front of it. In a former case, which occurred in the course of an ovariotomy, in which the wound was enormous (20 cm.), I sutured its intra-peritoneal portion and maintained a small hole unsutured as a safety-valve; the patient recovered after a period of temporary fistula, which was easily effaced by freshening its edge.

Sänger adopted a different procedure in a case in which the elongated

bladder was taken for the pedicle of an ovarian tumor and included in the sutures, retaining these and losing the peritoneum around and above the vesical stump by sequestration similar to that employed for the uterine pedicle: cure without fistula. A permeable urachus, divided during the operation, has rarely caused fistula; these have, however, a tendency to heal spontaneously. It is well to carry the incision of the abdomen outside of this cord when it is encountered, and if slightly wounded, it should be sewn into the abdominal wall by one or two deep sutures. If the wound in it is very extensive, it may be closed by a few sutures and the patient catheterized every three hours to prevent distention of the bladder.

I am inclined to think that the ureter has often been ligated during hæmostasis of the stump which is returned to the abdomen, and in decortication of intraligamentous fibromata, and that many of the deaths attributed to shock are really due to this accident. The relations of these ducts should never be forgotten in placing deep ligatures on the sides of the uterine neck.

The intestines may be simply applied to the surface of a fibroma which splits the mesocolon, and it is then easy to separate them by the finger, or there may be firm union between them when the tumor derives its nutrient vessels from such adhesions, as I have observed in the case of a large subperitoneal fibroma with a narrow and small vascular pedicle. A thin layer of the tumor is then to be left adherent to the intestine, which if not too extensive may be folded upon itself and sutured (Fig. 175). If, however, a large surface of the intestine has thus been wounded, we take the risk of contracting the digestive tube by coaptation of the bleeding part; it is then better to touch it lightly with the thermo-cautery and fix it to the parietal peritoneum by a few catgut sutures, as near as possible to the abdominal drain. To simply abandon it within the abdomen would be to produce conditions that would favor an attack of ileus.

Causes of Death after Abdominal Hysterectomy.—Hemorrhage, septicæmia, and the complex syndroma called shock are the chief causes of death after operation; less often it is due to embolism, ileus, or tetanus.

I have already spoken of primary hemorrhage at the time of operation. In Schröder's method secondary bleeding is always to be feared and is announced by the extreme agitation of the patient, the accelerated, irregular, small pulse, and pallor of the integument and mucous surfaces. In other cases we may find a serous fluid oozing out between the sutures, or the patient describes a pleasant sensation as of a jet of hot water flowing through the abdomen. The blood may escape in great amount below the peritoneum between the broad ligaments, forming enormous retroperitoneal hæmatoceles, or it may accumulate in the seat of the enucleated tumor, projecting through the ecchymosed vagina and pressing it strongly downward.

If there is reason to suspect an internal hemorrhage, there should be no delay in opening the abdomen, both to tie the bleeding vessels and to remove the clots which form an excellent culture medium for the microbes which

enter from without, by the tubes, or from within, through the wall of the paralyzed intestine. O. Küstner reports a remarkable case which he saved in this manner, in which the bleeding came from the pedicle in the abdomen after ovariotomy. If the state of the circulation permits and the heart's action is not too much compromised, a litre of sterilized water at 38° C. (100° F.), containing chloride of sodium (6 : 1,000) may be injected by the cephalic vein. For this purpose we may use a small canula, passed through an alcohol flame, and a funnel of glass furnished with a rubber tube a yard in length, sterilized with boiling water. If the pulse is weak, and it seems dangerous suddenly to increase the contents of the vessels, injections of water and chloride of sodium, 100 to 200 gm. at a time, may be given into the subcutaneous cellular tissue; the fluid is very quickly absorbed.

Septicæmia may occur in several ways—either from defective asepsis during the operation or, more frequently, from germs introduced from without through the pedicle; hence the precautions recommended for destruction of the mucous membrane, careful junction of the surfaces to obtain complete occlusion, and the other methods of treating the pedicle.

The constriction of the suture does not account for the sloughing of the pedicle after it has been returned to the abdomen; to produce mortification, the action of germs is indispensable. If kept aseptic, the tissues deprived of their circulation undergo a granulo-fatty degeneration. The circulation may be re-established by the formation of adhesions or bridges of tissue above the pedicle, which is thus little by little encapsuled. There are records of a slow or secondary infection of the dropped stump by means of the sutures when they are of silk, or by the elastic cord. The germs may then come through the tubes or the intestine, following a temporary stasis of its contents; and in certain cases we must suppose a latent microbism. Whatever the origin may be, cases of death from pelvic inflammation and suppuration are not very uncommon.

Abroad, and also in France, death has been ascribed, after grave and protracted operations, to a combination of depression symptoms called "shock." There is no doubt that a number of such cases are to be attributed to hemorrhage, of which some surgeons are too unwilling to allow the importance; others may be due to septicæmia or acute uræmia from accidental ligation of the ureters or abolition of the function of kidneys already seriously impaired by the influence of traumatism and absorption of the anæsthetic. Degeneration of the heart (Hofmeier) may also be the cause in many cases (page 202), such myocarditis being more frequent than is supposed. Cohnheim has shown that persistent hemorrhage alone is enough to produce a fatty change in the cardiac muscle. Ungar and Strassmann have called attention to the action of the chloroform in these cases; and many authors have proved that the antiseptics act strongly on the heart. Some of these depression phenomena are due to the exposure of the viscera and the handling which they receive, as is evident from the experiments of Goltz on

abdominal shock and of Olshausen on evisceration. To these numerous causes of depression Landau has added chronic intoxication from ergot, producing enfeeblement of the heart, and a similar condition from iodine. These substances have at times been taken in very large quantity by hypodermic and intra-uterine injection, and their absorption may account for some of these symptoms.

To prevent shock I would recommend rapidity of operation, for the depressing effect in every laparatomy which lasts more than an hour is increased in high proportion. Contact of the intestines with the air must also be carefully avoided by protecting them with hot gauze compresses and closing the abdominal wound as soon as the tumor is drawn out of it. The incision should be as small as possible, passing the tumor as through an elastic buttonhole, and aiding its issue from the abdomen by movements of rotation upon its axis and by elevation through the vagina by the fingers of an assistant. For the depression and lowered temperature, we employ hot friction and hypodermic injection of ether, alternating every quarter of an hour with caffeine. If acute anæmia has helped to cause the accident, 100 to 200 gm. of the salt solution may be injected into the subclavicular dorsal region.

As embolism has produced death even during convalescence, we cannot insist too much on absolute rest, especially if the tumor was very vascular or the broad ligaments largely varicose.

Intestinal occlusion has been observed after hysterectomy, as after all other abdominal operations, but it must not be forgotten that some of the cases published under this head were only pseudo-strangulation from paralysis of the intestine, announcing a septic peritonitis which was unrecognized.

To prevent this terrible complication, we should be sparing of antiseptics within the abdominal cavity, if we do not abstain from them altogether; for they exert an extremely intense action upon the delicate epithelium, and predispose to plastic exudation. As little bleeding surface should be left in the peritoneal cavity as possible. The wound surface of the stump should be carefully covered with peritoneum; and the broad ligaments, if torn or divided in the process of decortication, must be secured with catgut sutures.

As regards the treatment of ileus, before reopening the abdomen we should try the method proposed by Bode and Leopold, of placing the patient upon her side and giving forced enemata of hot chamomile infusion, with the addition of oil and soap.

Mortality of Hysterectomy. Comparison of Results by Different Methods.—It is difficult to decide as to the gravity of the operation, as the majority of authors do not divide their cases according to systems which permit comparison. Thus supra-vaginal amputation should not be compared with decortication of a large fibroma; there is more difference between them than between amputation of the leg and the same operation on the thigh. But in default of anything better we must have recourse to statistics.

In my earlier editions I have given statistics compiled by Paul Wehmer and by Zweifel. Their results were almost identical. Wehmer gave a mortality of 24 per cent by the extra-peritoneal method; Zweifel found it to be 22.3 per cent. By the intra-peritoneal method, the mortality was stated by Wehmer to be 28.2 per cent; by Zweifel, a little higher, 32.7 per cent. The relative benignity of the first method seems to be strikingly shown by these figures.

The following objection has been made to these figures: Avowed partisans of the extra-peritoneal method, like Kaltenbach, Thornton, and S. Keith, are found also among those who perform the intra-peritoneal; and it is evident that the two methods cannot be equally favored in both the series, and, very probably, where the pedicle was abandoned within the abdomen, the case was more serious than those in which the favored method was employed.

In order to obtain statistics free from this objectionable feature I have taken the figures of surgeons (A. Martin, Schröder, Olshausen, etc.), who confine themselves exclusively to the intra-peritoneal treatment of the pedicle. I have done the same in the series relating to the extra-peritoneal method and have obtained the following figures, which demonstrate clearly the superiority of the latter method.

Extra-peritoneal method, mortality, . . 21.6 per cent.
Intra-peritoneal method, mortality, . . 25.79 "

This superiority is also confirmed by the latest statistics. A. Büchel gives the following figures: Fehling reported a mortality of 7.14 per cent in 14 cases with extra-peritoneal treatment of the pedicle. In 132 operations by the same method, by Hegar, Kaltenbach, Keith, Bantock, Fehling, and Fritsch the mortality was 12.9 per cent. Schröder, Ohlshausen, Martin, and Gusserow have employed the intra-peritoneal method in 133 cases, with a mortality of 30.8 per cent. Frommel, Landau, and Hofmeier, in 57 cases by this method had a mortality of 14 per cent.

The following statistics are published by Price:

EXTRA-PERITONEAL METHOD.

	Number of operations.	Deaths.
Chrobak	55	5
Ascher	5	2
Kaltenbach	22	1
Hegar	31	10
Schröder	34	7
Albert	50	3
Fritsch	33	6
Terrillon	26	3
Lauwers	13	0
Keith	38	2
Lawson Tait	88	16
Bantock	56	19
Spencer Wells	20	10
Thornton	54	20
J. Price	91	6
Cushing	25	5
Boldt	6	2
J.-B. Irisch	19	5
Mann	12	1
Mundé	12	4
	690	121

Mortality, 16 per cent.

INTRA-PERITONEAL METHOD.

	Number of operations.	Deaths.
Zweifel	50	6
Ascher	10	4
Kaltenbach	8	8
Leopold	22	5
Schröder	164	43
Martin	135	43
Brennecke	22	1
R. Dick	11	2
Fritsch	27	11
Terrillon	32	3
Lauwers	3	2
Spencer Wells	26	10
Cushing	3	3
Boldt	3	0
	516	144

Mortality, 28 per cent.

Tauffer in 51 hysterectomies had 12 deaths—22.5 per cent (extra-peritoneal); Fritsch in the operations in which he employed the extra-peritoneal method, a little modified to resemble Wölfler-Hacker's, had 23 cases, 5 deaths, and, by Schröder's method, 27 cases and 11 deaths; Albert in 30 cases had but 1 death by the extra-peritoneal method. C. Braun, in a series (1887 to 1890) of 38 hysterectomies with extra-peritoneal treatment, lost only 4 patients, or 10.5 per cent; in 2 hysterectomies with intra-peritoneal treatment he had 2 deaths; and Hegar, in his series from June, 1887, to May, 1889, comprises, besides 2 myomectomies for pedicled fibroma with cure, also 18 supravaginal hysterectomies for interstitial tumors with cure, and 12 hysterectomies for intra-ligamentous tumors with 2 deaths, one at the end of four months and the other at the end of five.

Terrier, in a series of 38 hysterectomies, with extra-peritoneal treatment of the pedicle, lost 15 patients, or 39.4 per cent. In 8 cases in which the pedicle was returned he had 4 deaths, or 50 per cent.

P. Segond has observed 9 deaths, or 45 per cent, in 20 cases in which he performed abdominal hysterectomy by the extra-peritoneal method.

Treub had only 5 deaths, or 8.7 per cent, in 57 cases in which he treated the pedicle by the intra-peritoneal method. The same method has given Richelot 3 deaths in 16 cases, or 18 per cent.

Leopold, employing both methods, has had 7 deaths in 34 cases, or 20.5 per cent, for the extra-peritoneal treatment of the pedicle, and 5 deaths in 22 cases, or 22.7 per cent, for the intra-peritoneal treatment.

Finally, at the Surgical Congress of 1891, Terrillon gave the statistics of his abdominal hysterectomies. In 54 cases he had had 6 deaths; the 54 cases were divided as follows: 28 in which the pedicle was returned (3 deaths); 26 by the extra-peritoneal method (3 deaths).

Personally, I have long remained a partisan of the extra-peritoneal method. At present I am inclined to favor total hysterectomy, which I believe to be the method of the future. We must not forget that each one of these methods has its own dangers. The presence at the bottom of the abdominal wound of a stump destined to slough is at the outset a decided disadvantage for the extra-peritoneal method, although the new dressing of

powder adopted by Kaltenbach lessens the inconvenience which might result from the mortification of the pedicle. It should also be noted of this method that the cure is slow and leaves a weak point in the abdominal wall.

But these disadvantages are more than equalled by the greater security. The certain hæmostasis by the constriction of the elastic ligature, and the free escape of secretions from the pedicle, remove the twofold danger of internal hemorrhage and peritoneal infection which always exists when the stump is abandoned in the abdomen, especially when the uterine cavity has been opened.

Neither of these methods should be absolutely proscribed, but one or the other should be selected according to the case.

The dangers of the intra-peritoneal method, which is evidently ideal in theory, are: Extreme vascularity, which renders control of the bleeding impossible without the application of so many sutures that they might cause mortification and septicæmia; opening of the uterine cavity, which would give access to germs from the vagina; in other words, there is danger with bleeding and with hollow pedicles: they are to be treated by the simple or the mixed extra-peritoneal method, which is designed specially to guard against such dangers.

For other cases the intra-peritoneal method may be chosen. In case of suppurating or gangrenous inflammation of the tumor, the extra-peritoneal method is the only one to be employed.

One may reasonably ask to-day whether these two methods which have so far divided the preferences of surgeons should not be replaced by total extirpation, not, however, that certain disadvantages of the latter procedure cannot be alleged, among others the greater duration of the operation and the danger of infection through the vagina. However this may be, in an important set of statistics embracing 434 cases borrowed from surgeons of all countries, one of my pupils has found a mortality of 15. per cent for the method of total extirpation by the combined route, and of 14.32 per cent by the abdominal alone. Delagénière has practised total abdominal hysterectomy 20 times with 1 death, or a mortality of 5 per cent. These figures, though notably inferior to those of the intra- and extra-peritoneal methods, should at least cause us to make great reservations in our present judgment.

The following table seems to me to condense the precepts which should regulate the choice of methods for the surgical treatment of uterine fibroids:

A. Fibroids with Vaginal Evolution.

Fibroids growing toward the uterine cavity.	1. Pediculated; removal with assistance of vaginal morcellation. 2. Submucous; removal with assistance of vaginal morcellation; complementary vaginal hysterectomy, if the uterus is perforated during morcellation, or if other interstitial fibroids exist.

B. Fibroids with Abdominal Evolution.

a. Fibroids not reaching the umbilicus.
1. Interstitial; vaginal hysterectomy by morcellation.
2. Developed into broad ligament; vaginal hysterectomy by morcellation.
3. Pediculated; removal by laparatomy.

b. Fibroids extending above the umbilicus.
1. Interstitial—General condition bad (heart and kidney lesions); supravaginal hysterectomy.
   - Long pedicle; Hegar's method.
   - Short pedicle; Wölfler-Hacker method.

General condition good; total abdominal hysterectomy.

2. Intraligamentous; decortication.
   - Suture of capsule without drainage, if little bleeding.
   - Suture and vaginal drainage or abdominal tamponnade of capsule, if bleeding.

Decortication and complementary hysterectomy, if the uterus is closely adherent to the tumor.

CHAPTER XII.

CASTRATION FOR FIBROMA.

Clinical experience has long demonstrated that the cessation of the sexual life in women is usually followed by a remarkable diminution in the symptoms caused by fibrous tumors; the bleeding stops and the tumor atrophies. To hasten the appearance of this favorable period we may produce an artificial menopause by removal of the ovaries.

The term castration has given rise to much discussion; it should be reserved for ablation of healthy ovaries to secure a functional modification. Hegar applies the term to any removal of ovaries, normal or diseased, which do not "form a notable tumor." This definition is insufficient, for then the operation would be called castration when performed for a cyst of the size of the fist, and ovariotomy when it was of the size of the head. Battey and the Americans call castration "normal ovariotomy" and "oöphorectomy." It is not well thus to confound operations in which the adnexa are removed, as the centres of morbid reflexes, hemorrhagic or painful, with those in which it is done for a pathological condition diagnosed before the abdomen is opened as in salpingo-oöphorectomy, generalized by Lawson Tait. The term castration is then to be used for the ablation of adnexa reputed normal, and it may be hæmostatic or analgesic. Oöphorectomy designates, like salpingo-oöphorectomy, extirpation of inflamed adnexa in salpingitis or ovaritis. Thus confusion is avoided.

Castration for painful dysmenorrhœa was done in 1872 at almost the same time by Hegar and Battey, and surgeons had begun to familiarize themselves with the operation when Trenholme published, in 1876, the first known case of castration for uterine myoma; a month after, Hegar performed it with the same object. There is no doubt that Hegar did not know of the operations of Battey and Trenholme when he conceived and executed his, although they had already been published, and it is largely due to his writings and to those of his pupil Wiedow that the operation has become general. In England Lawson Tait, and in France Duplay, Tissier, and Segond have promoted it.

It is not easy to formulate exactly the indications for this operation. Hegar recommends it in nearly every case in preference to hysterectomy, the graver operation, holding himself ready to perform the second if the first is not sufficient; he mentions the different forms of fibrous tumor for which he has successively practised it, and finds that there are no exceptions. Thornton has also had good results in cases of fibro-cyst. There is

no doubt, however, that there are cases in which the operation, though easy of performance, is dangerous from its consequences, and there are others in which the danger arises from the inherent difficulties of its accomplishment.

In the first class belongs castration for large solid or fibro-cystic tumors; for by the obliteration of the vessels, both blood and lymphatic, which it causes it may produce formidable and rapid changes in the fibrous mass. There may be œdema, as the result of the venous stasis or as the first stage of mortification, or embolism following thrombosis when the broad ligaments contain large vessels. The operation may also be dangerous from the risk of immediate hemorrhage when there are very vascular adhesions or when the alæ of the broad ligaments are effaced, as is the case with some intra-ligamentous tumors.

These considerations govern the operative indications, which may be thus stated: Castration should be employed in every case in which its performance is less grave than hysterectomy, and in which the latter is not specially indicated by compression phenomena.

With pedicled fibroma myomectomy is to be preferred for two reasons: first, because it is the less dangerous operation; and, second, because with this form of the tumor the bleeding is not the most important symptom, and it is against hemorrhage that castration is chiefly directed.

Interstitial fibroma with abdominal evolution and of small or medium size may be treated by castration if the only troublesome symptom is the loss of blood; and the same is true of pelvic and intra-ligamentous tumors at the beginning of their evolution.

Profound anæmia would be a strong indication for removal of the ovaries rather than of the uterus.

Castration is therefore contra-indicated with very large tumors, from the danger of œdema and mortification; with tumors of small size which give rise to compression symptoms; with fibro-cystic tumors, from the relative benignancy of hysterectomy and the rapid course of the neoplasm; and, lastly, with telangiectatic tumors, from the danger of thrombosis. These are the elements which direct the choice of the operation, but it is difficult to formulate them in a definite manner before the abdomen is opened. As certain authors have truly said, castration always begins as an exploratory incision, after which the connections of the tumor may be exactly defined and the dangers of operation settled.

It is then either an operation of choice, decided upon before the first incision is made, or one of necessity, undertaken during the operation, when the opening of the abdomen has demonstrated that the risk of the premeditated hysterectomy would be too great or that extirpation of the ovaries is both possible and of evident advantage.

Operative Technique.—The best time to perform the operation is during the week after the menses. The preparation for it and the rules for the abdominal incision are the same as in every laparatomy. Hegar advises

always to palpate the ovaries and make sure of their exact position before making the incision, but, while a useful precaution, it is not always possible to acquire positive ideas upon this point before opening the abdomen.

There are three ways of reaching the ovaries: by the median line, the lateral aspect of the abdomen, and the posterior cul-de-sac of the vagina; the first is the only really practical method in the great majority of castrations for myoma.

The lateral incision presents theoretic advantages, because we come directly upon the ovary which is often thrust outward by the projecting tumor; Hegar has employed it, following the example of veterinary surgeons. But it seems to have been abandoned owing to the real disadvantages which it possesses—the necessity of a double wound, the strong retraction of the lips, the great vascularity of the tissues in this region, etc. It would be only in the case of a tumor of great size with much lateral displacement that this incision would be necessary, and it is in just those cases that castration is a dangerous operation, not to be deliberately proposed.

The vaginal incision finds its proper indication in the case of the operation which I have called the analgesic, performed in the absence of tumor and when we can determine the prolapse of the ovary into the pouch of Douglas; but it is altogether unsuitable when there is a fibroma which has lifted the pelvic tissues above the level of the superior strait. Moreover, there is danger by vaginal touch, of confounding a small lobulated fibroma with a prolapsed ovary, and, lastly, there is the danger of hemorrhage from dilated vessels of the broad ligaments—a danger which is here of especial importance owing to the depth at which we are obliged to operate.

Oöphorectomy by a Median Incision. First Step—Opening of the Abdomen.—The incision is made at a greater or less distance from the umbilicus according to the height to which we suppose that the tumor has carried the adnexa, and should not extend more than about 8 cm., giving just room enough to pass one or two fingers. As soon as the peritoneum is reached, great caution is needed; a small incision is made in it with a bistoury held flat, and into this is passed a grooved director, and the incision is finished; thus we avoid wounding the intestine or the surface of the tumor, on which any scratch might cause copious bleeding.

Second Step. Finding and Removing the Ovary.—While the mesentery and intestine are held out of the way by a flat gauze sponge, the index and middle fingers of the right hand are passed deeply through the wound and down upon the fundus of the uterus to search for the ovary; as soon as it is found it is drawn with the end of the tube out of the wound between the two fingers; at the same time an assistant holds the lips of the incision together. To insure a stronger hold upon the ovary, a pair of forceps may be used instead of the fingers, and special forms of the instrument have been devised for this purpose, but a long and somewhat curved pair is all that is needed, passed beneath the ovary and the pavilion of the tube. A blunt

needle with a double thread is then used to tie off these parts, and for this purpose I am accustomed to employ Lawson Tait's knot (p. 48, Figs. 35 to 37), which is quickly tied and leaves but one knot within the peritoneum; but if the pedicle is very large, it is better to tie it with two crossed ligatures. It is well to include the tube in this ligature, for it is frequently the seat of chronic inflammation, and its complete removal contributes much to the cure of both pain and hemorrhage.

If the pedicle is very short, it is advisable to add to this ligature in mass (which may slip) separate ligatures for the vessels, which are to be carefully sought upon the surface of the section. We should also assure ourselves that the ligature has been placed below the ovary, and that no portion of the organ has escaped. The crushed and flattened form of the ovary is very remarkable in certain cases of fibroma. As an additional measure of safety, I prefer, with Hegar, to cauterize the pedicle with the thermo-cautery, producing a thorough destruction of the tissues; if there remains any vestige of the ovary, it will thus be sufficiently modified to insure its absorption. The operation is not successful if the least part of the organ is left to become, as P. Müller has shown, the seat of new cystic formations.

This cauterization may be performed on the flat surface of a forceps furnished with an non-conducting plate of ivory; Hegar has given to this instrument a double curvature, which is very convenient when the pedicle is deeply situated. Instead of cutting the parts away with the cautery, which is very slow, I prefer to use it only when the section is completed with the scissors, leaving a small stump, which I gradually dry up with successive applications of the cautery carried to a dull-red heat. This cauterization is at the same time antiseptic, hæmostatic, and destructive of the last portions of the ovary. When the ovary can be readily seized, I do not use the forceps, but grasp the organ with the left hand, cut off about three-quarters of the pedicle with the scissors, at the distance of 1 cm. from the ligature; then, holding the pedicle by the uncut portion, I cauterize the surface of the section with the thermo-cautery, and as the last thing complete the division of the pedicle with it.

The ends of the ligatures should not be cut until it is sure that there is no more oozing and that the threads are well placed; but if they are left to the end of the operation, with the idea of a final supervision, they may do harm by the traction which is exerted upon them.

The second ovary is removed in the same manner.

If the small incision which I have recommended is not large enough, it would be better to enlarge it either above or below rather than to use much force; but it is dangerous to carry this increase too far, or to divide the insertion of the rectus muscle, as has been advised. If the intestines are much in the way the patient should be put in Trendelenburg's position, which causes them to fall toward the diaphragm.

Tamponing the vagina or rectum to bring the ovaries out of the lower

pelvis is a procedure which is rarely needed in the removal of abnormal organs, for they are then more often found above than below the superior strait.

Evisceration, or the temporary extraction of the mass of intestines, which are wrapped in warm aseptic compresses, certainly gives a great deal of space; it is an unusual manœuvre but sometimes necessary. I shall refer to it more fully when considering the treatment of inflammatory lesions of the appendages by laparatomy.

In any case we should not imprudently bring the tumor out of the abdomen; it becomes congested and swollen and very difficult of re-introduction, which exposes to the risk of thrombosis and embolism; but there is no danger in turning it upon its axis in the abdomen to make the adnexa more accessible.

Adhesions between the ovary and tube and adjacent parts should, on account of the large development of the venous circulation which occasionally accompanies fibromata, be detached only with the greatest caution and as much as possible under the control of the sight.

When the broad ligament, especially the portion attached to the ovary, is very short, it forms an insurmountable obstacle to the success of the operation; the ligatures slip and it is impossible to form a pedicle. In one such case Hegar terminated the operation by hysterectomy in order not to lose the patient by hemorrhage. The bleeding may be arrested by a strong suture made like a hem in sewing, or, after the example of Hegar, an elastic ligature may be applied to the ovarian pedicle.

Some surgeons attribute great importance to ligature of the tubo-ovarian vessels even without removal of the ovary, believing that it causes fatty degeneration of the ovary or directly modifies the vitality of the uterus and favors atrophy of the tumor. Although such an "atrophy ligature" may be employed as a necessity when removal offers great difficulties or dangers, it would certainly be a mistake to advocate it as a matter of choice. Terrier is its avowed partisan, and Segond accepts it as an expedient to diminish the number of merely exploratory laparatomies; but this "expedient" does not appeal to me, and, while its usefulness is questionable, it does not seem to me harmless.

It seems to me much better to remove both ovaries, close the abdomen as soon as possible, and not wait to perform ligation of a vessel which shall produce a theoretical atrophy by lessening the afflux of blood. It has been claimed, however, that by this method unilateral castration has in certain cases an influence upon the development of a myoma which is on one side of the uterus. Removal of the ovaries is rational only when performed on both sides to produce an artificial menopause.

Unilateral castration appears to have had its rise from the necessities of operation rather than from theoretic conceptions; the latter have come afterward to make it legitimate. Sims, Battey, and their imitators are plainly following a mistaken path in praising it.

Third Step. Toilet of the Peritoneum and Suture.—This toilet is usually very rapidly made, except when there has been a rupture of a coexisting cyst in the tube or broad ligament. The threads passed through the abdominal walls at the beginning of the operation are removed, a continuous catgut suture of the peritoneum is made, and then of the muscular planes, ending with interrupted suture of the integuments by strong silk and a few supplementary sutures of fine catgut. If the lips of the wound are contused, it is well to leave a drainage tube between the muscles and the skin, which may be withdrawn at the end of twenty-four hours. Drainage of the abdominal cavity is not employed unless there has been an effusion of pus (pyosalpinx) or unless the operation has been very long and laborious; in the first case the peritoneum should be washed out with hot water.

After-treatment.—If there is a metrorrhagia a short time after the operation, hot vaginal douches and hypodermics of ergotin are to be employed. Strong compression of the abdominal wall must be kept up, on account of the presence of the tumor and the intestinal paresis which always follows a laparatomy. It is well also to keep the patient in a slanting position, by raising the pelvis, so as to cause the intestines to occupy the upper part of the abdomen. The second day a laxative enema should be administered to evacuate the gas.

Mortality and Results of the Operation.—Conforming to the method which I have adopted, I give the results obtained by surgeons of the greatest authority on this special subject. Hegar in 55 cases had 6 deaths (11 per cent), of which number 5 were from septicæmia (one case due to infection before operation), and 16 cases, or 29 per cent, presented complications of greater or less gravity, such as 3 mild cases of peritonitis, 7 of abscess, 4 of thrombosis of the lower extremity, 1 of pneumonia, and 1 of vesical catarrh: complete success in 33 cases. Deducting from these 55 cases the 6 deaths, and also 12 which were still too recent and 9 in which there was a simultaneous extirpation of a large pedicled fibroma, there remain 28 cases of castration operated on more than a year and a half. The following are the results as regards cure:

(*a*) *Hemorrhage.*—In 20 cases there was immediate cessation of the bleeding; in 4 cases cessation after certain irregular losses; in 1 case persistence of irregular metrorrhagia; in 1 case temporary menopause, then hemorrhage and fibrocystic development of the tumor; and in 1 case menopause, then hemorrhage with beginning enucleation of the tumor, which was finally extirpated by Fehling.

(*b*) *Tumor.*—In the same series of 28 cases there were 22 cases with diminution of the tumor; 3 cases with no change; 1 case, diminution doubtful; 1 case, appearance of a fibrocystic tumor; 1 case, secondary enucleation.

Thus it is plain that the menopause and atrophy of the tumor are not necessarily correlative; the bleeding may cease without any diminution in the size of the fibroma, but this is the exception. Two of Hegar's cases

became obese; another presented five years after the operation, which had been followed by the menopause and retraction of the tumor, a focus of parametritis coming from a blow upon the pedicle; and another was cured of a reflex chronic cough.

The care with which these cases have been observed, the absolute security of the name of Hegar, give to these figures a peculiar interest; it is necessary, however, to know the collected statistics of different authors. The following are taken from Tissier's recent series:

In 171 operations, 25 deaths—14.6 per cent. The causes of death were: In 12 cases septicæmia; in 1 case, embolism of pulmonary artery; in 1 case, cardiac debility, with death eleven days after the operation; in 9 the result was undetermined.

(*a*) *Results as to hemorrhage* in 146 cases: In 89, complete cessation; in 21, menopause after a period of irregular losses; in 10, return of the menses after a short respite. In this list are included 1 case of unilateral operation and 1 of ligature of one ovary; in 3, the statement is simply that the patient was cured.

(*b*) *As regards the tumor* (146 cases): Nine times, no change; 66 times, rapid diminution: 71 times, no note on the point.

Wiedow has published statistics, made with great care, in which no patient is reported under a year after operation. There are 56 cases, which agree pretty well with those of Hegar just given. In 39 there was a menopause with atrophy of the tumor; in 5 the menopause alone is noted; in 5 there were small irregular losses; in 1 there was menopause for three months, then partial enucleation of the tumor which was finished by the surgeon; in 1, amenorrhœa followed, then return of the menses with atrophy of the tumor; in 1 there were small losses lasting a day after amenorrhœal intervals of three months (no note as to the tumor); in 3 after menopause and atrophy for two years there was return of the hemorrhage and development of the tumor, which became fibrocystic in 1 case.

Lawson Tait has performed castration for fibroma 262 times, with a mortality which he puts at 1.23 per cent; but we have no precise information as to the curative effects of his operations. Fehling has a series of 8 cases with no death; in 5 the menopause was permanent; in 2, there were irregular hemorrhages at the end of one and two years; in all, the tumor diminished in size. Prochownik in 12 cases had no deaths; the tumors atrophied, and the return of irregular hemorrhages was exceptional. In 68 cases of uterine myomata treated by castration, Fehling and Kaltenbach had 4 deaths. Fifty times, that is to say in 78 per cent of the cases, the menopause occurred after the operation; 14 times menstruation persisted. In 94 per cent of the cases a notable diminution of the tumor was observed. In 4 women, the tumor continued to increase. Castration seemed to fail in the cases of submucous fibroids, and to give good results in the cases of interstitial fibroids growing toward the abdominal cavity. Segond has had 4 successes, without

a death; in 2 cases with immediate menopause and rapid atrophy. In 1 case the operation was unilateral, the menses became normal and painless, and the tumor remained stationary. In 1 case of eight months' standing there was hæmatemesis. Terrillon in 5 castrations for fibroma had 1 death at the end of two months from continued intestinal compression. It is very evident that in this case the castration was performed as a makeshift, on account of the great dangers of hysterectomy. The fatal termination cannot be attributed to the operation, but merely shows how powerless is castration to cause rapid diminution of large tumors in any case. In 4 other cases violent hemorrhages were arrested.

Bouilly has performed castration for fibroid tumors 26 times; he has had 6 deaths. In 18 cases he has obtained suppression of the hemorrhages and pains, and diminution of the tumor; in 3 cases the patients were only improved; in 1 case failure was complete.

As I have said above, I am abandoning castration more and more in favor of vaginal hysterectomy by morcellation in the conditions which I have pointed out, as I consider castration a last resort.

CHAPTER XIII.

FIBROUS TUMORS COMPLICATING PREGNANCY.

As is well known, pregnancy gives a lively impulse to the development of fibrous tumors, and often causes their œdematous softening. This phenomenon is the more marked as the connections of the tumor with the uterus are more intimate, and attains its maximum in the case of interstitial fibromata, single or multiple, with great increase in the uterine wall, as in those cases which have improperly been described as hypertrophy of the uterus. This sudden augmentation in the size of the tumor exaggerates any symptoms to which it may have given rise, the pain resulting from pressure on the sacral plexus becoming at times intolerable. Retroflexion of a gravid uterus with a fibroma causes symptoms of internal strangulation. When the tumor is pelvic, taking its origin from the supravaginal portion of the cervix, and developing below the superior strait, the compression signs are rapid and extreme; they may appear in connection with the bladder, the ureters, the rectum, the nerves or the vessels, and peritonitis may coexist. The most common and not the least grave result is abortion; and as involution is so much interfered with, immediate hemorrhage and septicæmia are both very likely to occur. Lefour in 307 cases found 39 abortions, ending fatally to the mother 14 times; Naus in 241 cases observed 47 abortions.

The treatment depends upon the nature of the symptoms caused and the seat of the tumor. If it is a pedicled or sessile subserous fibroma of the fundus we may hope that it will not interfere with the course of the pregnancy. If there is danger of inflammation or the transformation of the tumor into a fibrocyst, there is also a hope that it will disappear during the uterine involution, and we may therefore pursue the expectant treatment. In the case of pelvic fibroids, however, delay seems more dangerous; if they cause no very serious symptoms we may wait in the hope that they will either precede the fœtal head at the time of parturition, as has been observed, or else will ascend above the superior strait after the rupture of the membranes. All these results have been observed, and by the aid of the forceps and of version labor has been successfully terminated, even in desperate conditions. In such a case one should attempt to reduce the tumor by pressing it back with the hand in the vagina. Often the labor is accomplished only after a duration which results in a fatal exhaustion, if the woman does not die at once of the hemorrhage. These risks decidedly limit the advisability of the expectant method. When the fibroma is accessible its extirpation presents less danger than waiting.

Fibrous tumors of the cervix are of this class, and may often be enucleated either before or after parturition. Danyau removed one that weighed 650 gm. and measured 15 cm. in diameter. Braxton Hicks followed enucleation by the immediate use of the forceps and ended the labor without difficulty. J. F. Fry reports the curious case of a woman who had been delivered of nine children and in whom a fibroma of the anterior lip complicated each pregnancy. At the eighth, a portion of the tumor was removed with the écraseur; on the ninth, premature labor was produced and, immediately after the extraction of a living child, almost at term, the fibroma, whose base measured about 6 cm. in diameter, was enucleated.

Mundé advocates enucleation by the vagina in any case in which it can be accomplished; in sixteen cases which he cites the mothers died in only two, and the children were for the most part living; one of these was his own personal case.

When the operation is performed late in pregnancy, there may be no interruption of its course; Mayo Robson removed at the seventh month a fibroma of the cervix of the size of a cocoanut. The operation, performed with the galvano-cautery, was followed by such copious bleeding that many ligatures were required, but there were no complications and the patient went on to a normal delivery at term.

Polypi may be expelled before the fœtal head when their pedicle has been torn; of this Dubois and Dupaul have cited cases. To facilitate the delivery the pedicle may be cut. Fergusson's error, of placing the forceps on a large tumor, thinking that it was the fœtal head, should not be committed; his patient died from rupture of the uterus. If the polyp is recognized before term, it may be extirpated without interrupting the pregnancy; Felsenreich has recently published such a case in which the tumor was as large as a lemon.

Interstitial fibromata with an abdominal development are so nearly inaccessible that any operation for their extraction would be too grave, and we ask ourselves whether it would not be better to produce abortion. The feelings of the surgeon and his operative habits enter largely into the solution of the problem, though it must not be forgotten that even induced abortion is not free from dangers. If the placental insertion is at the seat of the tumor, the uterine tissue may not be able to contract after delivery, and thus formidable hemorrhage can occur. The patient is also exposed to the risk of puerperal septicæmia. Lefour, in a series of 23 induced abortions, observed 3 deaths. Tarnier, in 7 cases in which the labor was normal, has seen death of the mother once, of the child three times. In 6 cases terminated by the forceps, it was fatal to 4 mothers and 4 children. In 6 versions, 3 were fatal to the mother and 3 to the child. And 5 women who had fibromata died before parturition; once induced abortion was followed by success, and once embryotomy caused the death of the woman. Süsserott, in 147 cases of pregnancy complicated with fibroma, which he collected, describes 20 in which the forceps

were applied, with death of the woman 8 times and of the child 13; in 20 versions, death of the woman 12 times and of the child 17; artificial extraction of the placenta 21 times, death of the mother 13 times; in all 78 women, or 53 per cent, and 66 per cent of the children died.

It must be remembered that induced labor may cause the expulsion of a non-viable child, that it does not relieve the compression very much, and that, if we have to perform hysterectomy afterward, we have exposed the life of the patient twice instead of once; these are the reasons why most surgeons prefer early interference. Supravaginal amputation is evidently better than the Cæsarean operation, which Cazin has performed with success in the seventh month. This author has collected 28 cases of Cæsarean section which were rendered necessary by the presence of a fibroma of the uterus; only 4 of the women were saved, 15 children were born alive, 8 were extracted dead; of the other 5 no information is given. Sänger has recently collected 43 cases of this operation for fibroma, in which 7 women were saved, or 83.7 per cent. Tuffier has published one fatal case.

When it is decided to practise hysterectomy, if the fibroma is situated in the middle of the fundus or is pedicled, the partial operation of myomectomy, which does not interfere with the pregnancy, should be attempted. When it is sessile and there is need of cutting away the uterine tissue in the neighborhood of the tubes, myomectomy is attended by great danger of hemorrhage, while the supravaginal operation (Porro's) is rendered easy by the relaxation of the ligaments caused by the pregnancy.

Synopsis of Published Results.

I.—SIMPLE MYOMECTOMY; UTERUS NOT REMOVED.

Author.	Date of Operation or Publication.	Month of the Pregnancy.	Anatomical Condition.	Result.
Péan	Clin. Chir., Dec. 15. 1874, vol. i., p. 679.	Fifth.	Fibrocystic tumor.	Recovered; abortion the day after operation.
Thornton	Obst. Trans., June 4, 1879.	Seventh.	Tumor pedicled.	Death, seventh day.
Schröder	Nov. 16, 1879, cited by Hegar, *loc. cit.*	Fourth.	Tumor pedicled; multiple.	Recovered; normal labor.
Hegar	Jan., 1880; Operat. Gynäk., 3d edition, p. 475.	Third.	Tumor pedicled; soft; peritonitis.	Death, third day.
Studgaard	Dec. 19, 1882, cited by Hegar, *loc. cit.*	Three and a half.	Tumor pedicled.	Recovered; pregnancy not disturbed.
Frommel	Münch. med. Woch., 1882, No. 52.	Fifth.	Fibroma size of a child's head.	Recovered; pregnancy not disturbed.
Martin	Ber. klin. Wochen., 1885, No. 3.	Sixth.	Myomectomy, with conoid excision of fundus alone.	Death, seventh day, of hemorrhage after abortion.
Landau	Ber. klin. Wochen., 1885, No. 3.	.....	Myoma, on right side as large as infant's head; on left, as an egg.	Recovered; normal labor.

Author.	Date of Operation or Publication.	Month of the Pregnancy.	Anatomical Condition.	Result.
Ogden.....	Can. Pract., April, 1885; cited by Van der Veer, Amer. Journ. Obst., 1889, vol. xxii, p. 1138.	Not given.	Interstitial myoma, removed by enucleation; pregnancy not diagnosed.	Recovered; abortion twelve days later.
Barnes	1885 (cited by Routier, Ann. de Gyn., March, 1890).	Third.	Pedicled myoma.	Death.
Martin	Ber. klin. Wochen., 1886, No. 29.	.....	Large tumor with large pedicle.	Recovered; delivery at term.
Martin	*Ibid.*	Fourth.	Large tumor on anterior face and smaller tumor.	Recovered; abortion.
Martin	*Ibid.*	Three and a half.	Tumor at fundus of uterus; large pedicle.	Recovered; delivery at term.
Gordon	Bost. Med. and Surg. Journ., Oct., 1889.	Third.	Fibroma.	Recovered; pregnancy continued.
Routier.....	Bull. Soc. Chirurg., Nov., 1889.	Third.	Subserous myoma with large base.	Recovered.
Homan	Bost. Soc. for Med. Improvement, in Bull. Med., Dec. 30, 1889.	Third.	Fifteen-pound fibroma	Recovered; aborted.
A. Bergh.....	Hygeia, 1889, Bd. li., No. 5, p. 292.	Fourth.	Two tumors, the larger size of two fists; enucleation.	Recovered; normal labor.
Frommel	Verh. der deutsch. Gesellsch. f. Gyn., 1894, p. 325.	Sixth.	Interstitial myoma removed by enucleation.	Death on the third day from hemorrhage.
Flaischlen.....	Cent. für Gyn., 1892, p. 185.	Third.	Pediculated myoma.	Recovered; delivered at term.
Rosner	Przeghad Lekarski, 1892, Nos. 39–41.	(?)	Interstitial myoma removed by enucleation.	Recovered; aborted.
V. Strauch.....	St. Petersb. med. Woch., 1892, No. 10.	Fourth.	Interstitial myoma enucleated.	Recovered; pregnancy continued.
Frommel.....	Münch. med. Woch., 1893, No. 24.	(?)	Fibroma in broad ligament enucleated.	Recovered; pregnancy continued.
Mackenrodt.....	Cent. für Gyn., 1893, p. 211.	Third.	Pediculated fibroma.	Recovered; pregnancy continued.

II.—Supravaginal Amputation of Gravid Uterus.

Author.	Date of Operation or Publication.	Month of the Pregnancy.	Anatomical Condition.	Result.
R. Barnes	St. George's Hosp. Rep., 1874–76, vol. viii., pp. 91–95.	Third.	Fibroma concealing pregnancy.	Death.
Kaltenbach	Mar. 2, 1880; cited by Hegar, *loc. cit.*, p. 475.	Fifth.	Interstitial myoma at fundus; weight 3,500 gm.	Recovered.
Wasseige	March 18, 1880.	Fifth.	Interstitial myoma of fundus; weight 4,500 gm.	Death, sixth day.
Nieberding.....	Feb. 10, 1882.	Fourth.	....	Death in forty-nine hours.
Schröder	Jan. 10, 1883.	Third.	Interstitial myoma of size of adult head.	Recovered.
Schröeder.....	June 29, 1884.	Third.	.....	Recovered.
Waiter	Brit. Med. Assoc., Liverpool, 1883.	Fourth.	Colossal tumor.	Death, ninth day.

Author.	Date of Operation or Publication.	Month of the Pregnancy.	Anatomical Condition.	Result.
Savage	Bristol Med. Journ., June, 1882, vol. ii., p. 423.	Fourth	Interstitial myoma, nine pounds.	Recovered.
H. Agnew	Brit. Med. Journ., June 1884, vol. i., p. 458.	Sixth.	Pelvic fibroma.	Death on the third day.
Alex. Patterson	Glasgow Med. Journ., April, 1885.	Fourth.	Fibroma concealing pregnancy.	Recovered.
Etheridge	Am. Journ. Obst., 1887, vol. xx., p. 69.	Third (useless attempts to induce abortion had been made).	Fibrocystic tumor.	Death on eleventh day of peritonitis.
Karström	Hygeia, April, 1887; analysis in Cent. f. Gyn., 1887, No. 34.	Fifth.	Intraligamentous; pedicle lost; drainage.	Recovered.
Freund	Unpublished case cited by Van der Veer, *loc. cit.*	Eighth.	Fibroma concealing pregnancy.	Recovered.
G. G. Bantock	Brit. Gyn. Journ., vol. ii., p. 63.	Third.	Fibroma concealing pregnancy.	Recovered.
G. G. Bantock	Am. Gyn. Soc. Trans., 1887, p. 211.	Fourth.	Interstitial fibroma.	Recovered.
G. G. Bantock	Brit. Med. Journ., 1888, p. 1331.	(?)	Multiple fibromata.	Recovered.
Hofmeier	Die Myomotomie, p. 76.	Third.	Fibroma; pregnancy suspected.	Recovered.
Tauffer	Cent. f. Gyn., 1887, p. 119.	Second.	Fibroma; fœtus dead and macerated.	Recovered.
Kaltenbach	Cent. f. Gyn., 1887, p. 435.	Second.	Fibroma disintegrating; fœtus macerated.	Recovered.
K. Thornton	Brit. Med. Journ., June, 1888, p. 1331.	Fifth.	Sixteen-pound myoma.	Recovered.
Meredith	*Ibid.*	Fifth.	Enormous fibroid; twin pregnancy.	Death on the third day.
Meredith	*Ibid.*	Second.	Fibroma size of adult head.	Death on the sixth day.
Fritsch	Volk. Samml. klin. Vort., 1889, No. 339.	(?)	Fibroma of rapid growth.	Recovered.
More Madden	Lancet, 1889, p. 271.	Fourth.	Very large pediculated fibroma.	Death.
F. Barnes	Brit. Gyn. Journ., 1889, p. 315.	Fifth.	Enormous fibroid.	Recovered.
D. Van Ott	Arch. f. Gyn., Bd. xxvii., p. 88, 1890.	Ninth; 263 days.	Large fibroma of supravaginal portion of cervix; intraperitoneal treatment of pedicle.	Recovered; living child.
A. Martin	Naturf. Versamml., Heidelberg, 1889; Cent. f. Gyn., 1890, p. 67.	Fourth.	Tumor of lower part of uterus.	Recovered.
Kaschkaroff	Cent. f. Gyn., 1890, No. 49, p. 890.	Third.	Subserous fibroma; hydramnion.	Recovered.
Wyder	Arch. für Gyn., 1891, t. xli., p. 222.	Third.	Multiple fibroid.	Recovered.
F. Chrobak	Cent. für Gyn., 1893, p. 345.	Sixth.	Enormous fibroid.	Recovered.

Most of these cases relate to operations done before the ninth month; if Porro's operation is attempted, the prognosis is very grave, but, as an im-

portant consideration, there is the chance of saving both mother and child. This operation should be undertaken a few days before the expected time of parturition, never just at term, for fear of being surprised by labor. The operative procedure which seems to promise the greatest immunity from hemorrhage and septicæmia, which are much to be feared when the uterus is gravid, is the extraperitoneal ligature of the pedicle.

Guermonprez recently performed a total abdominal hysterectomy for a uterine fibroid at the ninth month of pregnancy with successful results to mother and child.

CHAPTER XIV.

PATHOLOGY, SYMPTOMS, DIAGNOSIS, AND ETIOLOGY OF CANCER OF THE CERVIX UTERI.

THE word cancer should have clinically a meaning synonymous with malignant neoplasm. A malignant character, displayed by uncontrollable invasion, reproduction, and generalization, is encountered in many species of tumor which are anatomically distinct, whose profound study interests the pathologist more than the surgeon, but yet furnishes certain indications which are useful in the matter of prognosis.

Pathological Anatomy.—The great predisposition of the cervix to the development of cancer has been noticed by all observers. Is there anything in general anatomy which will explain the fact? Cohnheim has supposed that the embryonal cells (embryoplastic cells of Ch. Robin) which have not been absorbed in the formation of the organs, and which are found scattered through the connective tissue or gathered in islands at certain points, may be the matrix tissue of carcinoma. These tumors are found most frequently in the nests of embryonal cells which define the natural orifices, where there is a more or less irregular involution of the blastodermic layers; the cervix uteri, developed relatively late, at the expense of the Müllerian ducts, belongs in this class of congenitally vulnerable points. The presence of two varieties of epithelium at the external os and the consequent plastic polymorphism which results may also be a factor in their production. There remains unexplained, however, the exciting cause of the neoplasm; the repeated afflux of blood upon which Cohnheim lays so much stress does not account for it.

In epithelioma of the mucous membrane it is evident that the heterologous formation proceeds from the epithelial cells, either of the rete Malpighii or from the cylindrical cells within the cervix which have passed the external os, or from the glandular cells. In cancer of the uterine parenchyma, the histogenic origin of the cells of the neoplasm is very obscure. Virchow derives them solely from the connective-tissue cells, which accords with Cohnheim's hypothesis, and the latest researches of Ruge and Veit go to support the idea. According to these observers, cancer is usually a transformation of these connective-tissue cells, sometimes into a papillary or cauliflower form. The connective tissue becomes vascular and returns to the embryonic condition, and the cells take on an epithelial character; exceptionally an adenoma, also the product of these epithelial elements, may become cancerous.

Anatomical Forms.—From the clinical point of view, when these tumors are seen at the start, and before they have altered the primitive aspect of the parts by their spread to adjacent structures, we can distinguish four classes:

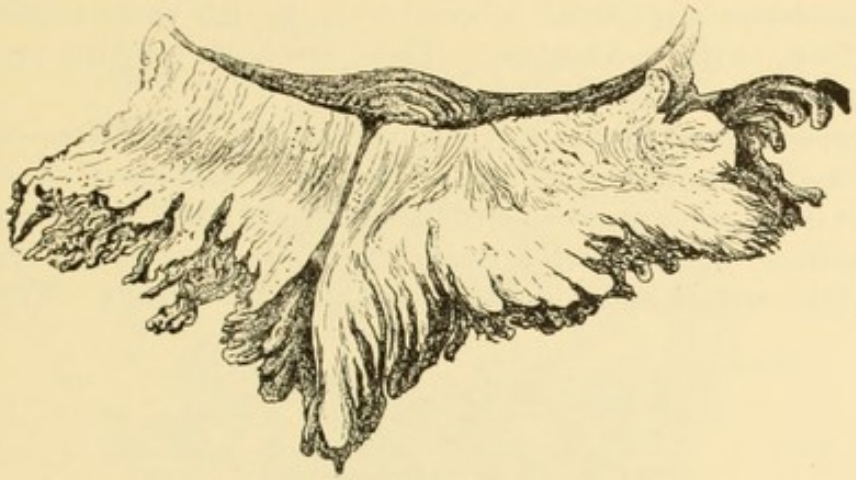


FIG. 198.—PAPILLARY CANCER OF THE CERVIX; PAVEMENT EPITHELIOMA OF THE EXTERNAL OS. Section, natural size.

(1) the papillary, (2) the nodular, (3) of the cervical cavity, and (4) the vaginal.

1. *Papillary Form* (Syn.: Superficial cancer of the cervix, vegetating or cauliflower cancer).—This form begins on that part of the cervix which is below the vaginal insertion, and may remain for a long time limited to it. Often it starts from cylindrical epithelium which has invaded the external surface, as we have seen in the case of metritis; this, without ulceration, though at first benign, is transformed into an epithelioma. It may take on a fungous appearance, the os and the healthy lip being hidden beneath it,

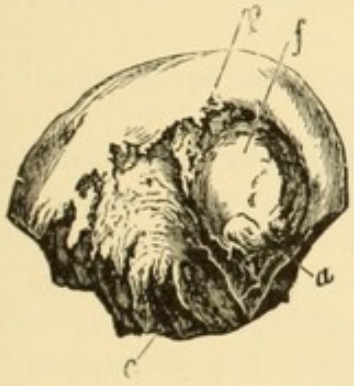


FIG. 199.—CANCER OF THE CERVIX, NODULAR FORM. *f*, Zone of intact pavement epithelium; *f'*, cancerous nodule; *a*, external os; *c*, cervix.

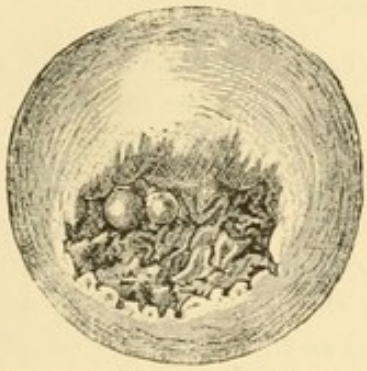


FIG. 200.—BEGINNING CANCER OF THE CERVIX, ULCERATIVE FORM.

and for a long time show no tendency to spread; but there comes a time when it attacks the cul-de-sac, involves it both superficially and deeply, and passes on to the peri-uterine tissues; or the extension may take place along the cervical canal.

There is always an accompanying lesion of the mucous membrane of the

body of the organ; Abel in seven cases from Landau's clinic found in three a sarcomatous degeneration, and in two others an interstitial endometritis which appeared to be developing toward sarcoma. He states that the malignant degeneration is produced concomitantly, though under a different histological form, in the two regions. These assertions of Abel are strongly disputed and are not generally admitted.

2. *Nodular Form* (Syn.: Parenchymatous cancer, cancerous nodosities, circumscribed or infiltrated cancer).—This form starts as one or several nodules in the mucous membrane of the cervix, on either the external or the internal surface, with ulcerations only late in the disease. By its progress it destroys the mucosa, and thus a cancerous ulceration results. Then nodules

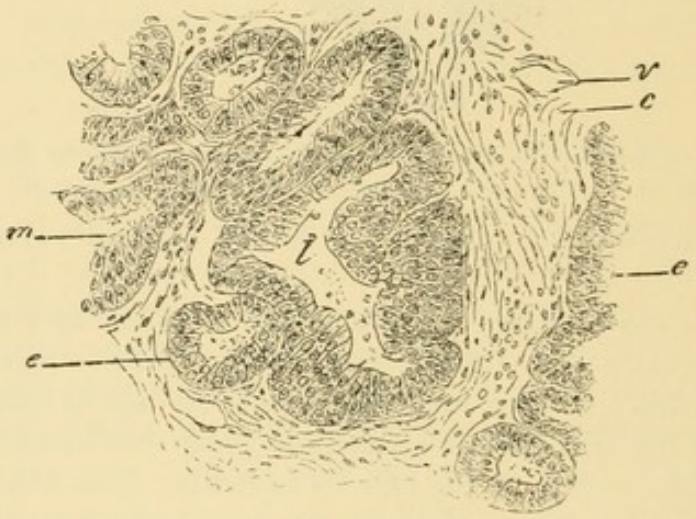


FIG. 201.—CYLINDRICAL EPITHELIOMA FROM THE UPPER PART OF THE CERVIX, INVADING THE FUNDUS (× 150). *m*, *e*, Hypertrophied glands of the body of the uterus, like those of chronic metritis; *t*, enlarged glandular cavity, the walls showing many layers of epithelium; *e*, adjacent gland wall, in a similar state; *v*, vessels; *c*, connective tissue (Cornil).

in the cervix and body fuse with the first, and soon the whole organ and the adjacent tissues are involved.

3. *Cancer of the Cavity* (Syn.: Cancer of the cervical mucous membrane, boring or eating cancer).—This form develops at first in the cervical mucous membrane, or just below it, by an infiltration which soon ulcerates and causes a slow destruction of the part by erosion; there are cases of this kind in which the cervix becomes a mere shell, and, with the retraction which is noticed as in the case of cancer of the breast, it may nearly disappear. The body of the uterus is early involved, then the peri-uterine connective tissue, and the vagina last or not at all.

4. *Vaginal Form.*—This is far more unusual than the others. It begins in the posterior cul-de-sac as certain cancers of the tongue start from the floor of the mouth, and invades equally the cervix and the adjacent portions of the vagina, producing extensive ulcerations.

Histological Varieties.—The three kinds which are most often found are: (1) Pavement epithelioma; (2) cylindrical epithelioma; (3) carcinoma or

atypical epithelioma. In France since the writings of Ch. Robin, Cornil, and Malassez, the epithelial origin of cancer is the most favored doctrine,

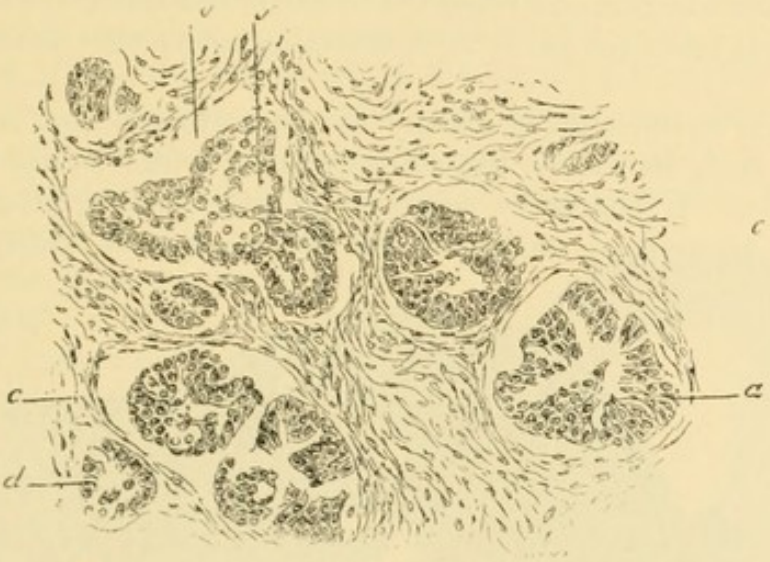


FIG. 202.—CYLINDRICAL EPITHELIOMA OF THE BODY, EXTENDED FROM THE CERVIX (× 150). *c*, *c*, Connective tissue; *a*, cavity full of cells, the external layer being cylindrical. These cells have a tendency to become detached from the wall, well seen at *o*; *f*, cavity with mucous cells, and large cells in mucous degeneration (Cornil).

and carcinoma is considered as an alveolar epithelioma, a particular kind, an evolutionary stage of epithelioma, and not as a neoplasm developed from the first at the expense of the connective-tissue cells.

Pavement epithelioma, lobulated or tubulated, is seldom general, though Virchow has observed it. The cylindrical form has the most frequent metastasis.

Pavement epithelioma is often found in the superficial forms, capillary

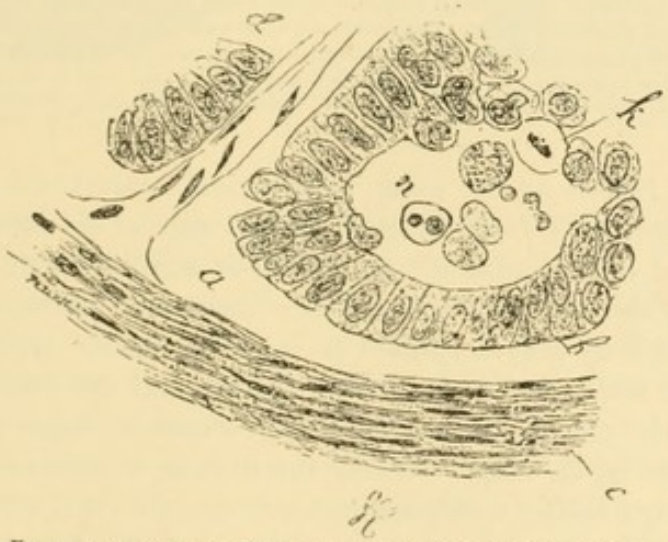


FIG. 203.—CYLINDRICAL EPITHELIOMA OF THE BODY, EXTENDED FROM THE CERVIX (× 400). *b*, Single layer of epithelium; *k*, cells showing karyokinesis; *n*, free degenerating cell; *d*, adjacent alveolus (Cornil).

and vaginal; the variety called lobulated is formed by cellular masses which separate the still evident muscular bundles, and which may undergo either

a mucous or corneous change. Tubulated cancers are formed of cylinders stuffed full of epithelial cells which anastomose and penetrate between the muscular trabeculæ that still resist the invasion, and on section we see in the lumen of such tubes pavement cells becoming cubical and others deformed by pressure.

Cylindrical epithelioma is usually the form which begins in the cervix and spreads along its cavity, and resembles that of the uterine body (Figs. 201, 202, 203). It begins by a typical glandular proliferation (adenoma) and ends as an atypical (malignant adenoma), which is simply an epithe-



FIG. 204.—CARCINOMA, OR ATYPICAL EPITHELIOMA. Section of one of the nodules of Fig. 199. On the median edge of the section the pavement epithelium ceases and is replaced by an erosion presenting a structure almost papillary and more or less ramified glands. The stroma is formed of fibrous bands which divide the alveoli of different sizes, and these again are subdivided by smaller bands. The alveoli are filled with polymorphic cell elements ; the exact origin of the cell nests is difficult to determine ; they are apparently from glandular cavities, of which some are covered with a single layer of cylindrical epithelium. These cavities are transformed to solid cords by the proliferation of the cells; the normal glands can be followed from the surface up to the middle of the cancerous nodule (Wyder).

lioma. Cornil insists on the great histological resemblance between glandular endometritis and certain developmental stages of cylindrical epithelioma.

The atypical epithelioma, or carcinoma of most German authors, is not clearly distinguished from certain forms of tubulated pavement epithelioma; it is characterized by polymorphism of its cells, which correspond to those of the alveolar wall or to those of the gland, and by their disposition in masses within the alveoli, whose walls are formed by anastomosing bands of connective tissue (Fig. 204). When the fibrous stroma is small in amount and the cells are swollen and predominant, the tumor is called encephaloid (Fig. 207); when they are hard and dry, it is called scirrhus (Fig. 199).

Extension.—At an advanced period of the disease the characteristics peculiar to each form are lost in the destruction and grave symptoms caused by this extension, either to the vagina, the body, the connective tissue of the

pelvis and the broad ligaments, the ureters and bladder, the rectum, the peritoneum or lymph nodes.

Extension to the vagina may be found at the outset, may occur rapidly in the papillary form, and may reach the vulva (Fig. 205).

Invasion of the body occurs late in the papillary form, but it should not be forgotten that the mucous membrane of the part may also undergo a degeneration of an intensely inflammatory nature by which it is made very liable to invasion. The body of the organ is very soon involved in the case of tumor of the cervical cavity, and in the nodular form may be infected from the first.

Czempin has seen, during a total hysterectomy for a cancer of the anterior lip of the cervix, a circumscribed carcinomatous nodule in the posterior vaginal wall at the exact point where the cervix rested upon it. It was evidently a case of infection by contact.

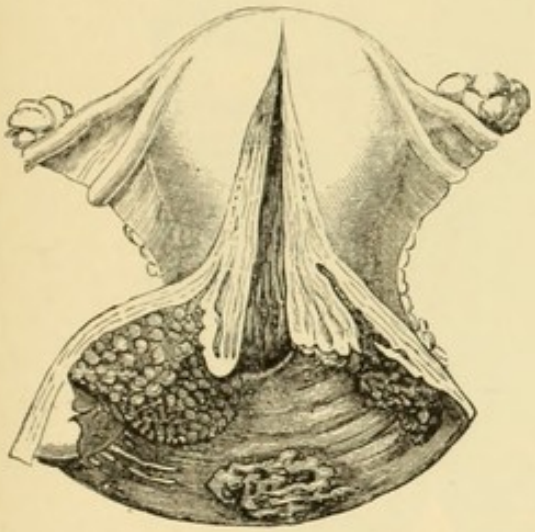


FIG. 205.—EPITHELIOMA OF THE CERVIX EXTENDING TO THE VAGINA; PAPILLARY FORM.

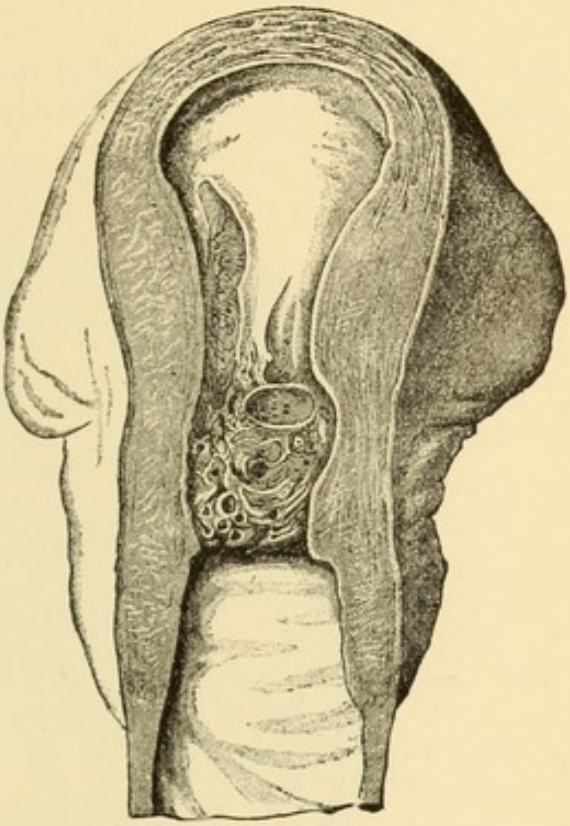


FIG. 206.—EPITHELIOMA OF THE CAVITY OF THE CERVIX. On the left is an extension toward the fundus of the uterus.

In a uterus which I removed by the vaginal route, a cylindrical epithelioma of the body coexisted with a squamous epithelioma of the cervix (Fig. 206). A distinct band of healthy tissue could be seen, by the naked eye, separating the two neoplasms.

The pelvic connective tissue may be invaded from the cul-de-sac, the cervix, or the fundus; the uterus is then imprisoned, as if glue had been poured about it and had hardened. The broad ligaments become thick and shortened, and toward the end the vessels and nerves of the lower pelvis, especially the branches of the sacral plexus, may be involved, when we observe œdema and intense pain.

The ureters are often involved, for instead of merely pushing them out of the way, as does a fibroma, the neoplasm assimilates them little by little; occasionally the walls of these ducts may be ulcerated through, and thus a fistula produced. Most frequently the ureter is constricted; its calibre being diminished at the lower end, the duct is dilated up to the pelvis of the kidney by the constant accumulation of urine under high pressure. The great frequence of renal disease in cancer of the uterus has been known for a long time, and recently made the subject of special study. Lancereaux

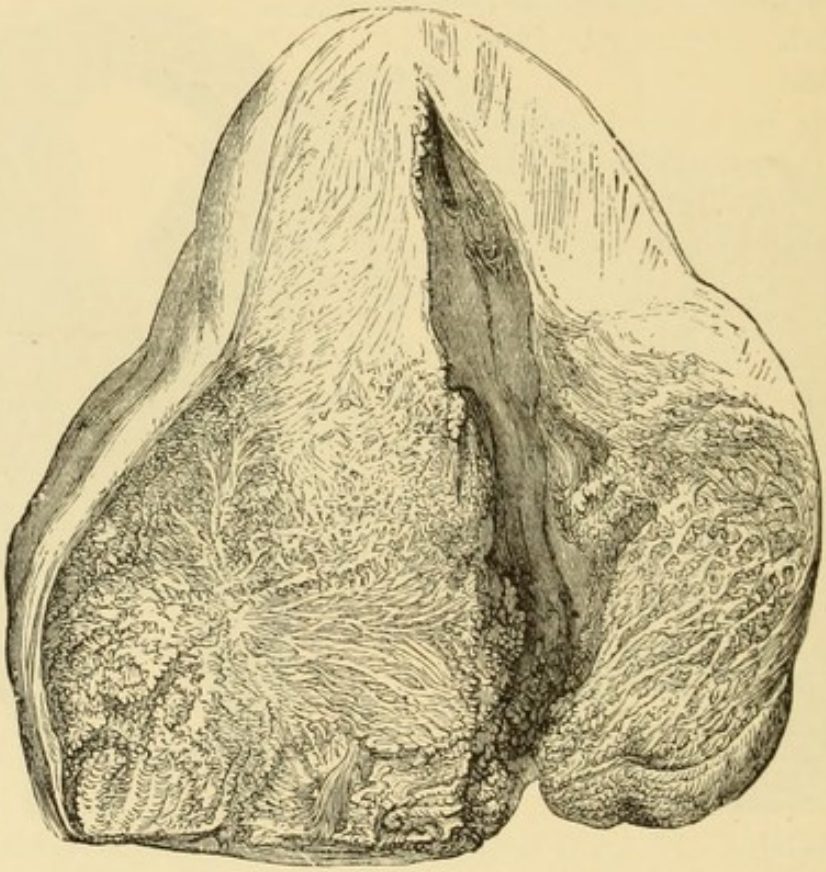


Fig. 207.—Encephaloid Epithelioma of the Cervix Invading the Body of the Uterus.

asserts that this ascending nephritis is constant when the disease is at all advanced, and during twenty-five years I have never seen it absent at autopsy, unless the patient had died prematurely from metrorrhagia.

The experiments of Straus and Germont on the effects of ligation of the ureters in animals, which confirm and explain the older observations of Aufrecht in Germany and Charcot and Gombault in France, clearly explain these lesions. They found that ligation produced a progressive atrophy of the kidney which destroyed the distinction of cortical and medullary portions, and that the papillæ and pyramids disappeared. These lesions closely resemble those found at the autopsy of women dead of cervical cancer. The ureters are dilated to the size of the external iliac artery, or even to that of the small intestine; their walls are thickened and at times tortuous; the

pelvis of the kidney is distended, especially at the lower part, and of a conical or pyriform shape. When its dimensions are very large, it forms a tumor which, according to Rayer's comparison, is covered by the remaining portions of the kidney as with a helmet.

The characteristic lesion is in the modifications of the pyramids and papillæ; the papillæ become flattened and their apices depressed, so that where there was a projection a hollow is formed. Later there is no trace of secreting tissue left, but in its place a fibrous membrane limiting a cavity crossed by the columns of Bertini, which persist for some time, so that the kidney has a multilobed and cystic aspect.

The cellular tissue which unites bladder and cervix may be invaded, then the bladder. Soon after there is a catarrhal inflammation produced; small

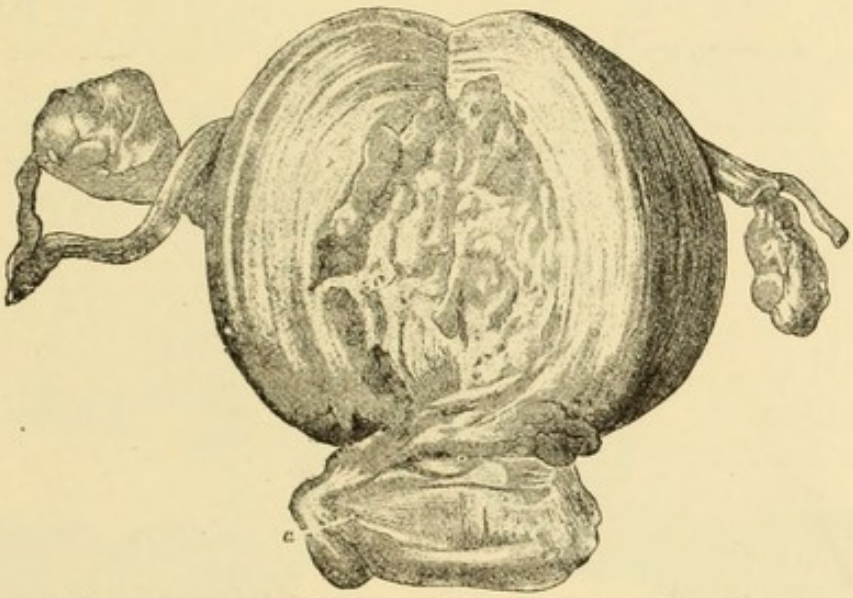


FIG. 208.—PAVEMENT EPITHELIOMA OF THE CERVIX AND CYLINDRICAL OF THE BODY SEPARATED BY A ZONE OF NORMAL TISSUE. *a*, Point from which tissue was taken for histological examination.

sections of the bladder wall may slough or be eaten through by the morbid tissue, which penetrates the vesical cavity and establishes a fistula.

Ureteritis and septic pyelonephritis are some of the first and gravest consequences of the bladder invasion; its result may be miliary abscess of the kidney, but this is less common than interstitial nephritis. In their statistics, which cover 51 cases, Caron and Féré found suppurative pyelitis and miliary abscess 7 times; in all the others there were only mechanical lesions, such as dilatation of the ureters, hydronephrosis, and nephritis. Lancereaux, in 23 cases, has not described suppuration of the kidney even once.

We would expect that the heart would be influenced by this kidney lesion, and in certain cases there is found hypertrophy of the left ventricle, as Traube's theory requires. This theory is that the kidney lesion destroys a certain number of arterioles and lessens the circulatory domain, augmenting thus the inter-arterial pressure; to this is added the functional insufficiency

of the kidney, which causes the retention in the blood of an abnormal amount of water besides the excrementitious matters; the cardiac hypertrophy is the direct necessary consequence of these two factors. In a work intended to support this theory, Straus cites two cases of cervical cancer with secondary nephritis and great hypertrophy of the heart; four similar cases are published by Artaud, and still others by Weill and Thouvenet in their theses. But in 1884 Lancereaux published a memoir based on twenty-three cases of his own observation, in which he reaches the opposite conclusion. In these

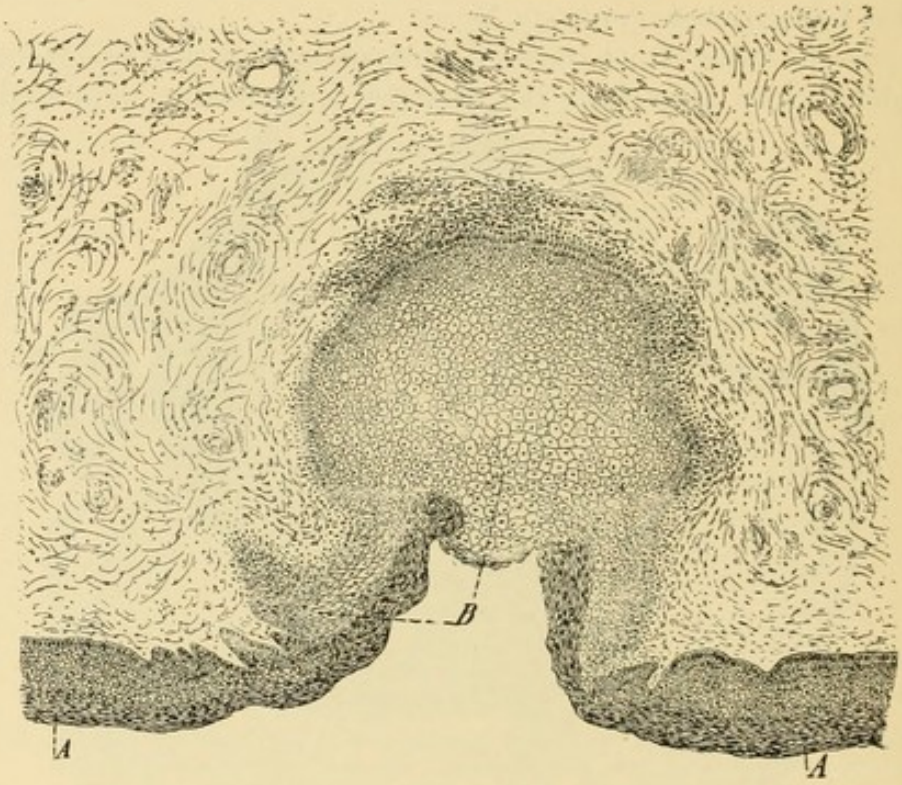


FIG. 209.—NODULE OF PAVEMENT-CELLED EPITHELIOMA (Fragment from cervix, Fig. 208) *A*, Normal pavement epithelium; *B*, bud of pavement-celled epithelioma.

twenty-three autopsies the heart was weighed and all its details carefully examined, and in twenty-one it was either normal or small and atrophied. Often it was soft and covered with fat on its anterior and basal surfaces. In only two cases was there any increase in weight and volume, and then there was also an arterial lesion (aortic endarteritis or insufficiency) to explain the hypertrophy. This important series seems to be demonstrative. It is thus probable that the cardiac lesion accompanies the nephritis of cancer only exceptionally, in cases in which the latter is of very rapid development. There is still another lesion of the heart which is at times found at the autopsy of cancer of the uterus, which Lancereaux calls "verrucous" endocarditis, and which he found twice among his twenty-three cases. Under this name he describes a special vegetating form of endocarditis which differs entirely from the ordinary inflammation which is present in cases of cachec-

tic disease like tuberculosis; but the exact nature of the vegetations is not decided; probably they are of microbic origin.

The rectum is seldom involved and fistula of it is rare.

The peritoneum resists the ingrowth of the neoplasm by the production of adhesions which limit the disease to a small focus; thus it occurs that the rectovaginal pouch appears to be so far from the vaginal cul-de-sac when we perform hysterectomy.

In very advanced cases we find the vagina transformed into a cloaca, opening both into the bladder and into the rectum; above, the lower pelvis



FIG. 210.—PORTION MARKED *A* IN FIG. 209, HIGHLY MAGNIFIED.

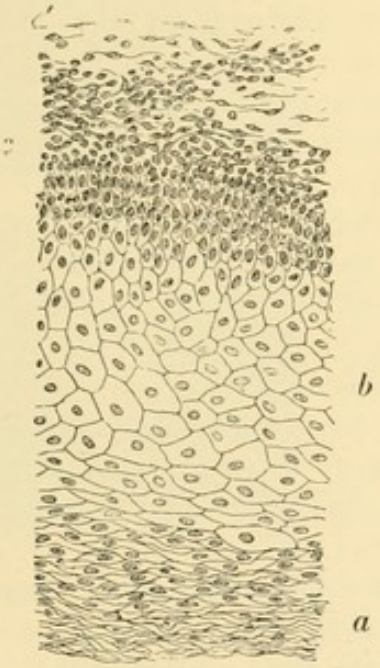


FIG. 211.—PORTION MARKED *B* IN FIG. 209, HIGHLY MAGNIFIED. *a*, Flat cells of the superficial layer; *b*, mucous cells with large amount of protoplasm; *c*, indifferent cells; *d*, connective tissue.

is filled with a cancerous mass in which the fundus and adnexa can be recognized only with difficulty, being covered by adherent coils of intestine, which may also be perforated.

Lastly, there may be metastasis to distant organs, as the liver, kidney, stomach, and lungs.

The iliac, prevertebral, and inguinal ganglia are often involved. The inguinal ganglia, contrary to the general opinion, may be involved without disease of the vagina. The lymphatics of the cervix communicate with those of the body, and these again with the inguinal ganglia through the lymph vessels which accompany the round ligaments. This was described first by Mascagni and rediscovered by Poirier. Troisier has recently called attention to the adenopathy of the left subclavicular region which is at times produced, independently of the invasion of the lung and the prevertebral ganglia, in general or abdominal cancer, but especially in uterine. It is probable,

as Troisier supposes, that this isolated manifestation is due to direct infection of the ganglia by reflux of the lymph from the thoracic duct where the ganglia empty into it by short trunks. This curious anatomical fact is at the same time a valuable contraindication to operation.

Among the deuteropathic and distant lesions may be noted fatty degener-

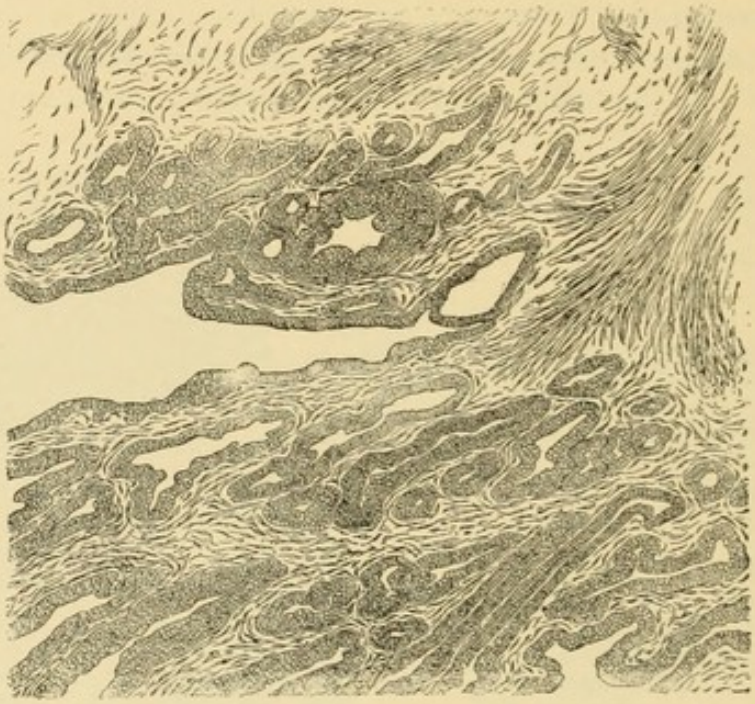


FIG. 212.—CYLINDRICAL-CELLED EPITHELIOMA OF THE BODY (from Fig. 208).

ation of the liver as described by Leca. It appears that the septic material absorbed by the organism from the ulcerating surfaces acts like a steatogenic poison on the liver, as do alcohol and phosphorus. This fatty degeneration of the liver was long ago described among other surgical septicæmias by Verneuil.

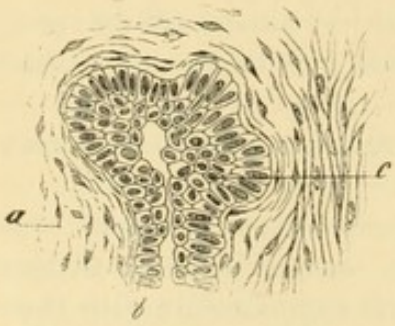


FIG. 213.—CYLINDRICAL-CELLED EPITHELIOMA OF THE BODY OF THE UTERUS (a point in Fig. 212 highly magnified). *a*, Connective tissue; *b*, cylindrical cells; *c*, central polymorphous cells.

Symptoms.—The onset of the disease is insidious, and there may be a long period during which it is latent and the patient preserves every appearance of health with a lesion already far advanced; for this reason it is unusual to observe the initial symptoms. The attention is first attracted by a small loss of blood at some other time than the regular period, after some exertion, especially coitus. But this accident, often happening in women who are approaching the menopause, is taken for an unimportant irregularity and passes unnoticed until by its repetition it becomes alarming. At other times these hemorrhages occur with some

regularity every month and are viewed with satisfaction as a return of menstruation and the index of renewed youth.

The early bleeding does not come from an ulcerated surface, but is due to the complicating metritis, or simply to the congestion caused by the presence of the tumor; the process may be compared to the hæmoptysis of the first months of pulmonary tuberculosis.

At the same time leucorrhœa without any special characters appears; then the pain, the reflex phenomena from the digestive tract, the circulation and the nervous system, produce the pathological cycle which I have described in the chapter on metritis as the uterine syndroma. But the diagnosis must not be made without local examination, in which the touch recognizes the induration, or papillary and ulcerated condition, of the cervix, and the speculum demonstrates the livid aspect of the tumor, the yellowish surface of the ulcerations, and the cauliflower or fungous vegetations.

Soon after follows the second stage, which may be called the period of acme, when all the symptoms are present; the hemorrhage becomes more frequent, there is a reddish discharge with a stale odor, or fetid and disgusting, and so copious and acrid that it causes erythema of the thighs and pruritus vulvæ, which are very distressing. At the same time the pain, chiefly lumbar, is very severe, and with it there are neuralgic radiations in different directions. By touch the vaginal pouches may be found free, but they are often already invaded, the uterus remaining movable or becoming more or less fixed by extension of the morbid process to the pelvic cellular tissue. The results of the local examination by touch are far more trustworthy than by the speculum; it is surprising, if the usual order is reversed, to see how the finger discovers alterations incomparably more extensive than those which can be seen. A cervix which seems to be a little swollen and ulcerated by the speculum is felt by the finger as a large tumor deeply changed by an already advanced process.

The digestive symptoms, anorexia, constipation, meteorism, etc., have by this time become of great importance and interfere with the general nutrition. With this condition begins the third stage, or the cancerous cachexia; the skin having a pale yellow tint which Barnes attributed to the absorption of fecal matters retained by the obstinate constipation (copræmia). The skin is also peculiarly harsh and dry. At this time also there may be present painful cystitis, intolerable neuralgia from compression or invasion of the nerves, phlegmasia alba dolens, and fistulas; local examination revealing wide extension of the neoplasm to the adjacent parts. There may coexist with all this successive attacks of subacute uræmia, and on analysis of the urine the excretion of urea is found to be subnormal, due not so much to the general enfeeblement as to insufficiency of the renal filter; the sign of these attacks is an exaggeration of the stomach disorder with vomiting.

The uræmia gradually becomes chronic and constitutes an actual source of comfort to the patient, as it blunts both intelligence and sensibility.

After a few days in this condition, indifferent to all surroundings, semi-comatose and hardly responding to questions, the patient quietly dies; this is the usual history, convulsions of an eclamptic form being rare. I have seen one case of uræmia with dyspnœa. Peritonitis by extension or perforation, or embolism may cause a speedily fatal termination. It is evident that septicæmia may enter largely into the production of the later effects; and if there is no proper treatment of it, this alone may be the cause of death.

Complicating Pregnancy.—Conception may occur with cancer of the cervix, as is proved by many cases, although the conditions are very unfavorable to fecundation. It often happens that women return to their physician with a new pregnancy in whom a cancer had complicated the previous one. Cancer predisposes to abortion. In one hundred and twenty women with cancer of the cervix treated during pregnancy by Lever at Guy's Hospital, forty per cent aborted. Hanks thinks that the abortion occurs most often in the third month, and that if the patient passes this period in safety the chances are that labor will take place at full term.

Chantreuil cites three cases of prolonged pregnancy, the most interesting being a case of Menzies of Glasgow. At times there is a series of ineffectual efforts at expulsion occurring at intervals and exhausting the patient, and in one of these the uterus may be ruptured.

The prognosis for a woman with cancer is always aggravated by pregnancy, for abortion may cause a fatal hemorrhage or septicæmia, and when the case goes on to full term the labor is dangerous; Herman found 40 cases of death in labor in 137 of this kind. The older statistics show an even higher mortality, Chantreuil giving 25 deaths for 60 labors, and West 41 in 75. Among 128 children of cancerous mothers only a few were born alive.

Diagnosis.—I have already given the differential diagnosis between cancer before the ulcerative period and chronic metritis, and between cancer after ulceration and catarrhal metritis of the cervix (page 300). Stratz lays much stress upon the yellow color and the brilliant granular aspect of non-ulcerated cancer. In all doubtful cases a section should be cut and examined microscopically. If we are forced to wait, the course of the disease will remove the doubt; almost always where the nature of the disease is uncertain, it is not cancer.

The benign vegetations observed in vaginitis with mucous patches and papilloma could not be confounded with cancer; their multiplicity, their dissemination, and the characteristic cock's-comb aspect will prevent error, while the purulent excretion of vaginitis is very different from the reddish, fetid discharge characteristic of cancer.

A circumscribed, cancerous nodule in the cervix may be difficult to distinguish from a small myoma, though the latter is more clearly defined and there is no sign of infiltration or inflammation about it; the mucous membrane is not adherent to the fibrous tumor, as it is to the cancerous.

Certain cylindrical epitheliomata of the cervix present a polypoid appearance which might be confounded with benign mucous polypi; in such cases the cancerous nodules of the uterine body and neck begin to project toward the exterior. A decision may be reached by dilatation and intra-uterine touch, or, if necessary, by exploratory curetting.

All these considerations apply to cancer at the very first; later on in the course of the disease, the invasion of adjacent parts, the progress of the ulceration, the frequent hemorrhage, and the abundant fetid discharge render the diagnosis easy. There is, however, an affection with which it may be confounded, namely, sloughing fibroma of the cervix, or polyp of the body arrested by strangulation or adhesions at the external os, which is dilated and partially effaced when the fibroma has been altered by spontaneous decomposition or by the application of caustics. Hemorrhage, fetid discharge, and a fungous or sphacelated appearance of the neoplasm all concur in making the case uncertain; the patient, exhausted by profound anæmia, seems to present the cancerous cachexia. There is but one symptom which removes the doubt, but it is pathognomonic; we should always seek for the external os, and in the case of a fibroma it will be found as a thin continuous collar about the tumor, and the tip of the finger may be introduced between the morbid mass and this diaphragm; frequently, also, the tumor is firm and free from ulceration along its margin. In one case of this kind I operated successfully and enucleated a sphacelated intracervical fibroma in a patient who had been sent away by a distinguished physician as afflicted with incurable cancer.

The following are exceptional forms of malignant disease of the cervix: Hegar found a very rare form in an old woman, the hypertrophied cervix projecting beyond the vulva, with no ulceration. Eckhardt observed in a young woman of nineteen years a considerable hypertrophy of the cervix which seemed to immediately precede its cancerous degeneration. Schröder found on autopsy a cancer of the upper part of the cervix, intracervical, of which there was nothing to be discovered externally. Sarcoma of the cervix has been exceptionally observed, but so rarely that it cannot be considered a clinical entity; its variable manifestations might render diagnosis difficult.

Spiegelberg described in 1878 a curious case which he called sarcoma colli hydropicum papillare (dropsical papillary sarcoma of the cervix) in a young woman of seventeen years. There was a papillary tumor of the anterior lip which returned six months after ablation and filled the whole vagina like a hydatid chorionic mole; the microscope demonstrated that it was a sarcoma with œdematous infiltration of its stroma. The same author observed a similar case in a woman thirty-one years old in 1878; and Winckler cites a case of Sänger's which resembles it.

Ludwig Pernice has given a description of a striocellular myosarcoma of the uterus, in the form of a bunch of grapes, in a nullipara who had suffered from hemorrhage for six months. The tumor started from the external os

and was of the volume of about 10 cm. in all diameters, with lobules of a violet color filled with a gelatinous fluid; it was removed by the bistoury. On examination it proved to be a sarcoma mixed with striated muscular fibres of an embryonic appearance. Two months afterward it returned and was removed again, this time being nearly half as large as at first; and in nine months more the patient returned with a tumor which reached almost to the epigastrium. Exploratory laparatomy was performed and death fol-

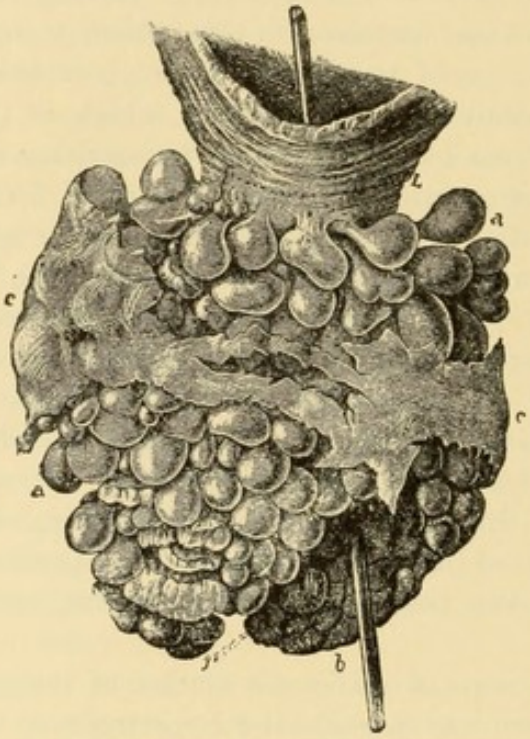


FIG. 214.—MYXO-SARCOMA OF THE CERVIX (PERNICE). *L*, Line of excision; *a*, *b*, lobules of the tumor; *c*, shreds of an enveloping membrane.

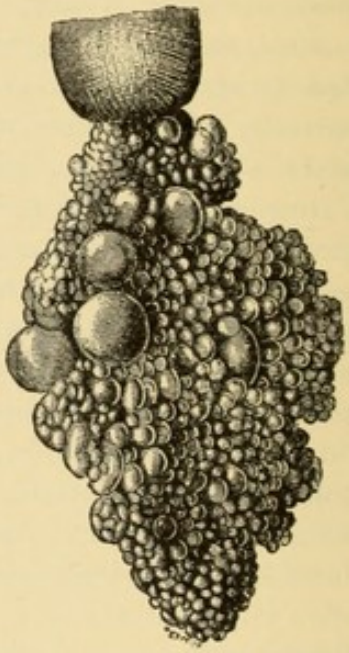


FIG. 215.—FIBRO-ADENOMA OF THE CERVIX (THOMAS).

lowed from pneumonia; the microscope showing that both the second and the third tumors were sarcomatous, but without any sign of myxomatous degeneration.

Mundé has described a tumor which was evidently malignant and which he considered a myxo-adenoma transformed into a myxo-sarcoma, in a patient of nineteen years who had suffered from intense leucorrhœa and complete amenorrhœa for two years. The vagina was filled and the hymen protruded by a friable tumor composed of lobules of the size of a muscatel grape; on removal by the snare its centre was found to be fibrous, and it proved to have started from the cervix, in places showing a myxomatous degeneration of the vaginal cul-de-sac. One month and a half later it returned. Histologically it was composed of a multitude of myxomatous cysts, in whose fibrous stroma there were many lymph corpuscles and sarcomatous cells. It seemed to Mundé that it was a case of malignant degeneration of a tumor which was at first benign.

Thiede has described under the name of fibroma papillare cartilaginescens a tumor observed in a woman of forty years, lobulated and spongy in appearance, taking origin from the mucous membrane of the cervix. Its ablation was followed by recurrence and death. On section there were found islands of hyaline cartilage in a stroma rich in dilated vessels, but none of the characters of a sarcoma. To this may be compared Rein's case of what he calls an arborescent enchondromatous myxoma of the cervix, found in a patient of twenty-one years, the tumor being lobulated and soft. It was removed entire, but rapidly returned, and caused death. On section the soft tissue was found to be subdivided by bands of fibrous structure surrounding masses of aspect and structure like Wharton's jelly, and in the middle of these myxomatous portions there were nodules of hyaline cartilage.

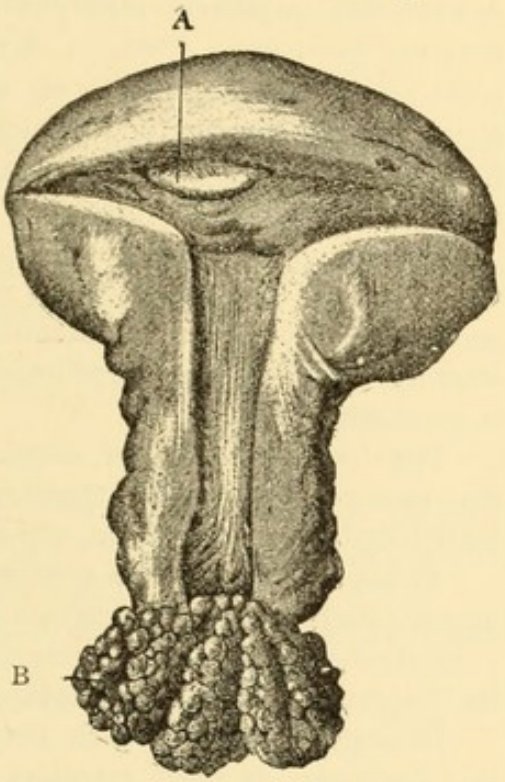


FIG. 216.—RACEMOSE POLYP OF THE CERVIX. *A*, Glandular hypertrophy of the fundus of the uterus of the same benign nature as the polyp, *B*.

Lastly, Winckel describes a myxomatous adenoma of the cervix which he removed from the anterior lip of the uterus of a woman forty years old, with rapid recurrence and invasion of the vaginal pouches, when the patient passed out of his observation. On section the tumor was full of alveoli containing mucus, and, the microscope proved that it had probably been at first an adenoma which then became transformed into a sarcoma and then underwent myxomatous degeneration. This singular hybrid neoplasm established, according to this author, a transition between epithelioma and sarcoma.

All of these rare cases deserve mention, but their differences interest the pathologist more than the clinician; they are all malignant tumors and may be called cancer. The racemose polypus of the cervix, which I observed in a young girl suffering from intractable hemorrhages, and for which I successfully performed hysterectomy, is very different histologically, though of very similar appearance. Histological examination showed the neoplasm to be a glandular hypertrophy of benign character (adenoma). A similar growth existed at the fundus of the uterus (Fig. 216).

An important part of the diagnosis is the determination of the tumor's extension. Bimanual palpation, with systematic infra-traction of the uterus, will furnish the needed information on this point, and, if necessary, anæsthesia may be employed to facilitate the examination, which is so important from the operative point of view.

Prognosis.—Cancer in all its forms runs a fatal course, but some forms develop more slowly than others; for example, scirrhus cancer of the cavity.

The average duration of the disease is from sixteen or seventeen months, according to Courty, to twelve months; but Simpson says two or two and a half years, and Fordyce Barker up to three years and eight months. Arnott, who has published scanty but well-studied statistics, assigns to carcinoma (of the cavity?) a duration of fifty-three to fifty-four weeks, and to epithelioma (papillary) eighty-two to eighty-three weeks; cases of longer duration have been cited. Courty speaks of a woman who lived seven to eight years, Fordyce Barker of one who lived eleven years, after the first signs were discovered, and Emmet asserts that he has seen life prolonged from five to eight years; these cases may be compared to certain forms of atrophic scirrhus of the breast.

The age of the patient is of great importance. Generally, cancer at the age of twenty or thirty develops more rapidly than at the time of the menopause; with tumors of a galloping course, where there is rapid return even after hysterectomy performed under the most favorable conditions, the patient is generally young.

The form of the tumor should also be considered in the prognosis. It may take years to develop those of the cavity and the hard variety with but little bleeding or vegetation, especially if the patient is of advanced age.

Etiology.—Women are more subject to cancer than men, and it is the uterus which is most frequently attacked. This fact has been proved beyond doubt by Sir J. Y. Simpson's statistics in the "Annual Report of the Registrar-General for England" of the years 1847–61.

During the period which may be called the uterine life of the woman this frequency is most manifest; that is, from puberty to the menopause, when it attains its maximum. After the uterus, the breast is most often attacked.

Race, heredity, age, and environment are general predisposing causes: the influence of race in the United States, where it can be well studied, is to the benefit of the negress, in whom cancer of the uterus is so rare while fibroma is so common. According to Chisholm's statistics, nearly one in every hundred whites die of cancer and only one in three hundred blacks, both sexes included.

The force of heredity has been disputed. In collecting the statistics which he first published, Schröder found in 948 cases that this factor could be determined in only 78. I have seen many incontestable cases.

The period at which it most frequently develops is between the ages of forty to fifty years. Examples are known of very early development of cancer of the cervix. Ganghoffer records the case of a child of nine who for two years had had losses of blood together with an ulcerating tumor which filled the vagina. The child died of variola a few days after its excision and cauterization. Microscopic examination by Chiari proved it to be a medul-

lary carcinoma, probably from the glands. The principal statistics are combined in the following table by Gusserow, who has added to his own results those of Lever, Kiwisch, Chiari, Scanzoni, Säxinger, Tanner, Hough, Blau, Ditrich, L. Meyer, Lebert, Glatter, Beigel, Schröder, Schatz, Winckel, and Champneys—in all 3,385 cases:

AGE AT WHICH CANCEROUS DISEASE BEGAN.

17 years	1 case (Glatter).	40 to 50 years	1,196 cases.
19 "	1 " (Beigel).	50 " 60 "	856 "
20 to 30 years	114 "	60 " 70 "	340 "
30 " 40 "	770 "	Above 70 "	193 "

Insanitary environment, with privations leading to poor nutrition, favor the development of cancer, so that it is most often observed in the lower classes of society; the opposite is true of myoma.

Schröder has drawn up comparative statistics of the cases he has seen in hospital and private practice, which are of great interest:

	Myoma.	Cancer.
In 14,000 hospital cases	285 (2.0 per cent).	
" 16,800 " "	...	603 (3.6 per cent).
" 9,400 of private practice	537 (5.7 ")	209 (2.2 ")

Martin has made a similar list, and finds that three per cent of his hospital cases were cancerous, and a slightly larger proportion myomatous; in his private practice the results were like Schröder's.

Local predisposing causes which have been mentioned are laceration and metritis of the cervix.

CHAPTER XV.

TREATMENT OF CANCER OF THE CERVIX.

THE treatment of cancer may be divided into two sections, according as it is palliative or radical; the latter is possible only when the tumor is limited to the uterus itself without invasion of other parts. Palliative treatment is addressed to cancers which have passed beyond the limits of the organ in which complete ablation would be either impossible, too dangerous, or useless.

I. CANCER OF THE EXTERNAL OS NOT INVOLVING THE VAGINAL CULS-DE-SAC.

Until recently no attempt was made toward a radical cure of uterine cancer unless the neoplasm was limited to the vaginal portion of the cervix, and in such cases intra-vaginal amputation was performed. The operation has given good results in the hands of Verneuil, who uses the écraseur; C. Braun, who employs the galvano-caustic loop; Byrne, who advises the galvano-cautery; and Schröder, who advises a cutting instrument, which I consider both quicker and safer. Very brilliant results have been credited to both these methods, but in many of the older cases there is an uncertainty of diagnosis. Pawlik's statistics from Braun's clinic cover about twenty years: In 136 intra-vaginal amputations of the cervix by the galvano-caustic loop, 9 died from the operation (6.6 per cent); 33 cases were followed more than one year (24 per cent); 26 more than two years (19 per cent); 2 were still exempt at the end of twelve years, 1 at the end of nineteen and one-half. Verneuil in October, 1888, reported 22 operations by his method, with 1 death. Polaillon, who used the galvano-caustic loop, had 1 death (from chloroform) in 200 cases. Marchand, in 12 cases, 4 by the écraseur and 8 by the galvanic loop, had 1 death from opening the peritoneum and peritonitis. Terrillon had 7 cures. Adding one case of Schwartz's we obtain 60 amputations of the cervix, with 2 deaths from operation (3.33 per cent). Among these Verneuil has 1 case of cure of seven years' standing, 1 of five years, and 1 of three years; 2 of six years and three years, respectively, presented a return of the disease in the pelvic ganglia. Polaillon gives 1 case of cure after seven and 1 case after five years; Marchand, 1 case after seven and 1 after five years; Schwartz 1 after four years.

I consider the employment of the bistoury superior to all other methods of excision, for it permits an operation which is throughout intelligent and not mechanical, and by it the ablation may be carried as far upward as may

be necessary. I therefore use the cutting instrument according to the rules already given under the treatment of metritis. As I have said before, when the lesion is cancerous, no matter how small, I perform total hysterectomy.

I consider it preferable to amputation of the cervix even in very circumscribed cases of cancer, as it alone assures the removal of the entire affection. Furthermore, the mortality of hysterectomy has been so greatly reduced that it differs but slightly from that of amputation of the cervix. I shall return to this subject in greater detail in the succeeding paragraph.

II. Cancer of the Entire Cervix, without Extension to the Culs-de-Sac.

In this condition intravaginal amputation will not suffice, for it does not include the whole of the disease. We therefore practise the supra-vaginal excision, a conical excision similar to that which Huguier long since applied

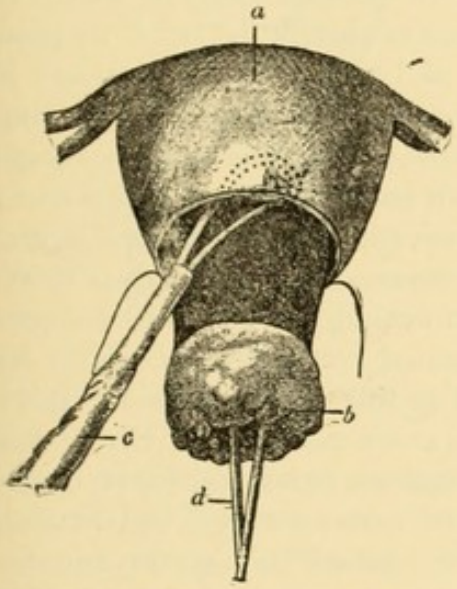


Fig. 217.—Byrne's Method of Supra-vaginal Amputation of the Cervix. *a*, Body of the uterus; *b*, cancerous cervix; *c*, galvano-caustic knife; *d*, forceps with divergent jaws for fixing the uterus.

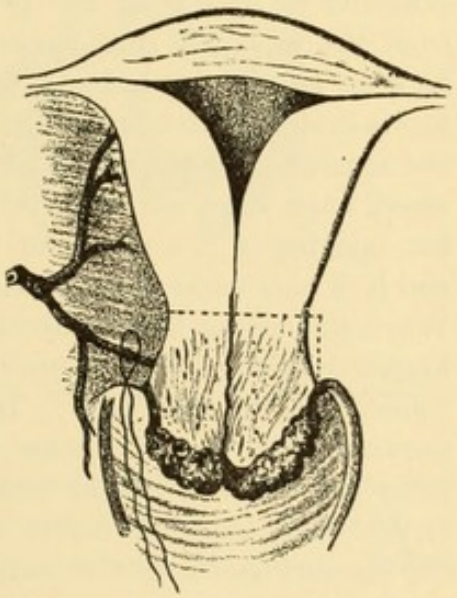


Fig. 218.—Supra-vaginal Amputation of the Cervix, showing the Extent of the Excision and the Ligature of the Lower Branch of the Uterine Artery.

to another affection, and which many surgeons independently of each other have practised under different names. Koeberlé has "for nearly twenty years" performed a conical excision with the bistoury, using a sound in the cervix as a guide, and "roasting" the stump with the thermo-cautery. Baker, of Boston, also employs the "high amputation," followed by the hot iron, and Ely van de Warker does the same, cauterizing with chloride of zinc. J. Byrne amputates the cervix by means of a galvano-caustic loop which he handles as a bistoury (Fig. 217).

Schröder has made the operation general, and best described the indications and technique under the name of supra-vaginal amputation of the cervix.

According to him there is a fundamental difference between cancroid (epithelioma) of the cervix and all other forms of cancer. He believes it to be a local affection, with no tendency toward propagation to the body of the organ if the cervix is freely excised, the limits of the disease being passed by from 1 to 1½ cm.

The technique is as follows: The diseased cervix is brought down to the vulva by Museux forceps and a strong loop of thread is passed through and above each of the lateral culs-de-sac (Fig. 218). These loops serve to draw the parts down, and to compress the uterine artery.

A transverse incision is then made across the anterior cervico-vaginal junction, at least 1 cm. from the diseased part, extending into the connective tissue. The bladder is then easily separated over a large extent by tearing the loose connective tissue between it and the cervix. The forceps are then elevated so that the posterior cul-de-sac is exposed, and a transverse incision made through the vagina as before, with usually some difficulty in separating the peritoneum from the posterior vaginal wall. If from the extent of the disease we are obliged to make this latter incision high up on the vaginal wall, the peritoneum is likely to be opened, and if this is avoided, there is still the danger of wounding it in several points during the separation of the vaginal tissues. The serous membrane is easily recognized, even when not wounded, from its bluish and transparent appearance; but opening it is a matter of indifference when the operation is antiseptic, and it is only necessary to close it with a few sutures and cut the ends short. When the vagina is thus divided in front and behind, the incisions are prolonged laterally till they meet, and the separated cervix detached from its connections by the finger. It is difficult to do this on the sides, for there the connective tissue is dense and the vessels enter the uterus. Before the latter are cut they should be tied, a second ligature being applied if necessary. Then when the cervix is free enough, its anterior wall is incised with the bistoury as far as the canal, and sutures are passed through the anterior cul-de-sac and along the posterior wall of the bladder, traversing the uterine wall and coming out in the cervical canal (Fig. 219). These are then tied, embracing the parts deeply and closing the wound in the connective tissue so that the cut surface of the anterior vaginal wall is applied to the cut surface of the cervical mucous membrane. Then the posterior lip of the cervix is divided, the sutures preventing the stump from escaping upward, and sutured in the same manner. The union of the parts is then completed by lateral sutures, and the entire bleeding surface closed by ligatures placed as deeply as possible.

This operation permits the complete removal of most of the vaginal cul-de-sac, the entire cervix, and a part of the uterine body; Schröder has also excised at the same time the upper portion of the vagina.

Hofmeier has published the results of Schröder and some of his assistants from the beginning of 1879 to the end of 1884; in 105 partial extirpations

there were but 10 deaths, or 9.5 per cent, and the final results were excellent. This series has been completed up to 1891 by Winter; it includes all the supra-vaginal amputations for cancer performed at the gynæcological clinic of the University of Berlin under the direction of Schröder and of Olshausen. One hundred and fifty-five such operations have given 10 deaths, a mortality of 6.5 per cent; none of the last 64 cases died. The remote results were: 80 recurrences, 57 during the first year, 10 during the second, 5 during the third, 5 during the fourth, and 3 during the fifth; 52 were reported as free from recurrence, and of these, 49 had been operated

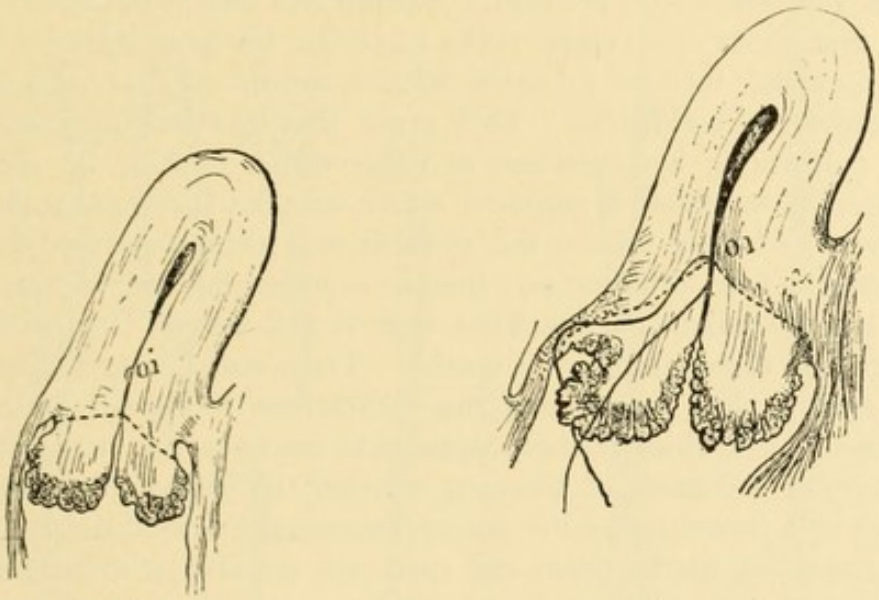


FIG. 219.—AMPUTATION OF THE CERVIX. *a*, Intra-vaginal operation; *b*, supra-vaginal operation, showing line of incision and suture; *oi*, internal os.

upon more than two years before. In Germany this operation has been performed by Gusserow; in America by Baker and Reamy; in England by Spencer Wells and Wallace; and in France by Koeberlé, Marchand, Buffet, Tédenat, etc.

Combining the statistics of Hofmeier and Winter, Gusserow, Baker, Reamy, Wells, and Wallace, we obtain 287 cases, with 18 deaths, or 6.2 per cent; those of Hofmeier and Baker, which alone are complete from this point of view, show more than 50 per cent of cures after two years. I find, with Barraud, that this proportion is "truly too fine," completely disagreeing with the general prognosis of cancer. It seems to me that it affords the best demonstration of the numerous errors of diagnosis which lie hidden in this extraordinary series, upon which many of the arguments against early hysterectomy have been based.

In spite of the ardent discussions in France and elsewhere, surgeons are not agreed in the choice between total and partial excision, and it is probable that the opinion of the majority of the partisans of the latter operation would be modified if it were demonstrated that the mortality of hysterectomy

is not sensibly higher than that of excision of the cervix; however, this demonstration is to-day complete. The gloominess of the early statistics was due in part to the inexperience of many of the operators, the performance of radical operations in unsuitable cases, and the absence of a perfect technique. Since these causes of failure have disappeared, the mortality has fallen to 5.88 per cent in France. Leopold from 1883 to 1889 did 80 vaginal hysterectomies for cancer, with only 4 deaths, or 5 per cent; the last 52 of this series were followed by cure. Dmitri Ott, of St. Petersburg, had 30 cases without a death. Schauta has performed 65 of these operations with 5 deaths, or 7.6 per cent. Fritsch had had 7 deaths, or 11.6 per cent in a first series of 60 cases (1883 to 1887); his new statistics (1887 to November, 1889) include 41 cases with 2 deaths, or only 4.9 per cent. These examples are eloquent. They prove that by attacking cancer at the first and performing hysterectomy in cases which used to be treated by partial excision, we obtain a mortality which does not surpass that of cervical amputations. I cannot repress the thought that hæmostasis and antisepsis are far easier in total hysterectomy than in supra-vaginal amputation; and in fact the last operations of this kind, both in and out of France, have not given more than eleven per cent of deaths. The great argument against early hysterectomy is thus ruined and the indications for speedy interference strengthened. The chief of these appears to me to be the impossibility, in the majority of the cases, of knowing whether the disease is circumscribed or whether it is travelling by the mucous membrane toward the body of the uterus. Examinations by touch and speculum are always uncertain on this point and expose us to cruel mistake. I have recently seen a case of this anatomical condition which escaped clinical examination where, after performing total hysterectomy for an epithelioma which seemed confined to the lower part of the cervix and for which either the high or the low amputation appeared suitable, it was easy to determine on the extirpated tissues the presence of a band of neoplasm reaching up toward the fundus.

A second, more unusual mode of hidden propagation where there is a small cancer in the cervix, is by the formation in the body of the organ of a series of metastatic nodules not admitting diagnosis upon the living patient. Cases of this kind have been cited by Ruge, Binswanger, Düvelius, Terrier, Strotz, Abel, Flaischlen and others. Let me also call to mind the observations of Abel and Landau on serious changes in the uterine mucosa with epithelioma of the cervix; for while it is not proved that these alterations are sarcomatous, yet they undoubtedly produce a *locus minoris resistentiæ* and favor recurrence.

III. Cancer of the Cervix, with Extension to the Body of the Uterus, without Invasion of the Adjacent Tissues.

In cases of this character there is but little discussion concerning the best method of treatment, the majority of gynæcologists favoring the performance of total hysterectomy by the vagina.

This operation is not of recent origin, having been known for nearly half a century under the name of colpo-hysterectomy. It fell into disfavor on

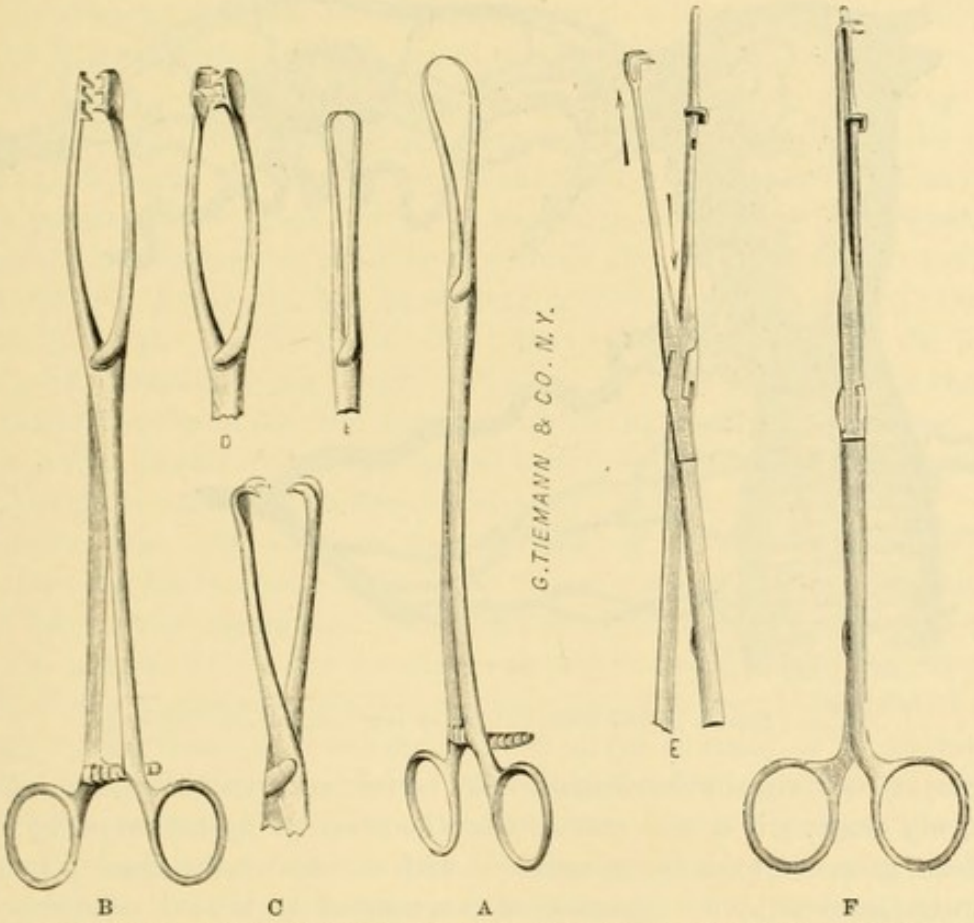


Fig. 220.—Various Models of Prehension Forceps for Grasping the Cervix Uteri in Hysterectomy. *A*, *E*, Hook forceps; *B*, *D*, flat with internal teeth; *C*, with blunt hooks (Collin); *F*, *F*, with gliding hooks (Collin).

account of its excessive mortality until recently, when Czerny prepared the way for its revival, after the greater dangers of total extirpation by the abdominal method (Freund, 1878) had made it necessary to seek other means of relief.

Colpo-hysterectomy or Vaginal Hysterectomy—Method by Forcipressure.—Before operating it is necessary to make certain, by careful examination of the patient, that the uterus is movable and the broad ligaments free from disease; for this purpose bimanual palpation, rectal touch, and downward traction with fixation forceps are indispensable. At times, in doubtful cases, to overcome the contractions of the abdominal muscles and render the

tissues lax, or to eliminate timidity in a nervous patient, it is well to make a preliminary examination under chloroform.

Another preliminary precaution consists in as complete disinfection as possible of the vagina for several days before the operation by free irrigation with sublimate solution (1 : 5,000) twice a day, and the application of iodoform tampons in the interval.

Three hours before the operation the patient should take a large, simple enema, and immediately beforehand an assistant who is not to have any part

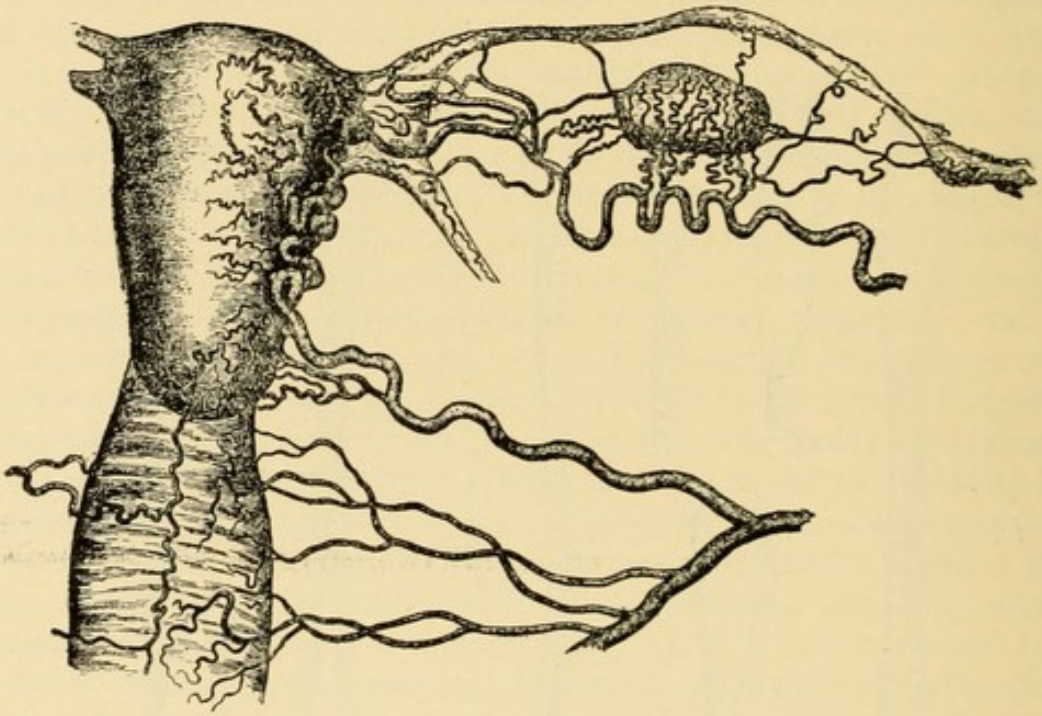


FIG. 221.—VESSELS OF THE UTERUS; UTERINE AND UTERO-OVARIAN ARTERIES.

in the hysterectomy should determine by rectal touch that the large intestine is entirely empty; if it still contains fecal matter, an injection of hot water is at once given and the fæces removed with the aid of the finger; then the rectum is cleansed by an injection of a saturated boric-acid solution. The bladder is to be emptied at the beginning of the operation by one of the assistants.

The patient in anæsthetized and placed in the dorso-sacral position, an assistant on each side taking one of the flexed thighs under his arm while his other remains free to assist. The fourchette is depressed by a univalve speculum and the lateral parts held aside by retractors. The cervix is seized with Museux or other fixation forceps (Fig. 220) and continuous irrigation of the field of operation gently begun (Fig. 9, p. 14).

By means of a sharp curette, all fungosities are removed, in order to diminish as much as possible the chance of infection. The cervix thus cleansed is seized firmly with tenaculum forceps and drawn down to the vulva.

First Step. Vaginal Incision.—The surgeon incises the cervix circularly, as far as possible from diseased tissue, and if necessary, completes this circular incision by two lateral, extending from the base of the broad ligaments to the circular incision.

Second Step. Liberation of the Bladder and Rectum.—The bladder is carefully separated from the cervix by means of the thumb-nail, aided by scissors if necessary, but using these prudently and keeping close to the uterus. This separation should be carried as far as possible. In the same way the posterior vaginal mucosa is freed with the fingers, and the peritoneum of Douglas's cul-de-sac is broken through with a retractor, or cut with scissors if it protrudes freely between the borders of the wound.

Third Step. Liberation of the Cervix and Preliminary Clamping of the Uterine Arteries.—The hemorrhage from the vaginal incision usually bleeds little, and is never sufficient to necessitate special hæmostasis. The oozing ceases spontaneously when the two uterine arteries have been clamped. To do this without danger of injuring the ureter the operative field is freely exposed by two retractors, one protecting the rectum behind, the other the bladder in front. A clamp with short jaws is then placed upon the base of each broad ligament, close to the uterus, and a single incision with the scissors, on each side, severs the portions of the ligaments they enclose. The cervix is thus liberated, and two lateral incisions transformed into an anterior and a posterior valve, which are successively resected.

Fourth Step. Hemisection and Tipping of the Uterine Body.—When the cervix has been removed, the body tends, when drawn upon, to tip into one of the culs-de-sac, generally the anterior. No positive rule should be followed in regard to this, but the uterus should be brought into the cul-de-sac toward which it naturally inclines. This tipping is greatly facilitated either by Doyen's hemisection if the body of the uterus is small, or by diminishing it if the uterus is of large size. Personally I avoid as far as possible an extensive morcellation in cases of cancer, from fear of infecting the peritoneum with fragments of the neoplasm. During hemisection or morcellation the anterior cul-de-sac is opened, and the fundus of the uterus appears, with the upper border of the broad ligaments.

Fifth Step. Hæmostasis of Broad Ligaments.—The healthy or but slightly diseased appendages are easily brought into the operative field. Clamps with short jaws are placed external to them upon the upper border of each broad ligament, whose final hæmostasis is thus accomplished in successive stages by short forceps applied from above downward.

If removal of the appendages offered great difficulties, on account of adhesions, etc., one should not delay for this complementary step, for it is better to run the risk of some subsequent accidents, usually not serious, than to complicate the operation. Brennecke has reached the conclusion that removal of the appendages is of but slight importance, as they will soon atrophy. The experiences of Grammatikati and the observations of Glae-

vecke, however, seem to indicate that ovulation continues, but that it is tolerated by the peritoneum.

The completeness of hæmostasis should then be ascertained. The forceps placed upon the broad ligaments are united in a right and left lateral bundle. A strip of sterilized or iodoform gauze is passed beyond the jaws of the forceps into Douglas' cul-de-sac and gently packed. The vagina is tamponed with strips of gauze, and the vulva is closed with a pad of absorbent cotton held in place by a T bandage.

The final treatment is very simple. If the iodoform tampons are not saturated with blood, they are left in place four days; then they are removed. The strip which acts as a drain is withdrawn at the end of the first week, for the peritoneal wound has then long been closed by exudation. It is none the less necessary to be very careful in the use of vaginal injections—not to employ them under eight days and then with but little pressure, keeping the fourchette depressed (sublimate 1 : 5,000). The patient may leave her bed at the end of three weeks. For the first twenty-four hours the patient takes nothing but a little ice, to control vomiting from the chloroform. At the end of the third day I gave a laxative enema. Convalescence should be without any elevation of temperature.

I have described the technique which I have adopted and which I recommend. I will now describe the method of hysterectomy with ligatures which is still generally employed abroad; and will then indicate, in the form of an appendix, the principal modifications in the operative technique to which the names of their originators give weight.

Operation by Ligature (Martin's Method). First Step. Opening Douglas' Pouch and Vagino-peritoneal Suture.—The cervix is drawn strongly forward so as to stretch the posterior vaginal pouch as much as possible, which is then incised transversely down to the peritoneum, across its whole width. The index finger of the left hand is passed into this opening, and with a strongly curved needle a series of sutures is inserted throughout the whole extent of the section, taking in the entire thickness of the tissues up to the peritoneum and including it. By this procedure we obtain a perfect hæmostasis of the vaginal vessels, which are often the source of bleeding troublesome by its persistence, and the cellular interstices are closed and protected from laceration during the subsequent manœuvres (Fig. 222).

It may happen that the posterior vaginal insertion is very thick, or that the cul-de-sac of Douglas is partially closed by adhesions; in these instances, where the dissection must be carried very high, it is well to insert two superimposed planes of suture.

Second Step. Hæmostatic Suture of the Pelvic Floor [Ligation of the uterine artery].—The needles are now changed for those which are less elliptical, stronger, and of greater length; Deschamps' pointed needles are the best for this special step. With them two large sutures are placed on each side of the opening, which include the posterior part of the lateral vaginal

pouches in mass, going deeply to seize the inferior branches or the trunk of the uterine artery, at the base of the broad ligament. During this manœuvre it is best to place the index finger in the opening, and press the base of the ligament strongly forward so that it is carried in front of the needle (Fig. 223).

The needle enters two centimetres from the angle of the wound, while the finger feels for its point, and it emerges about one centimetre from its point

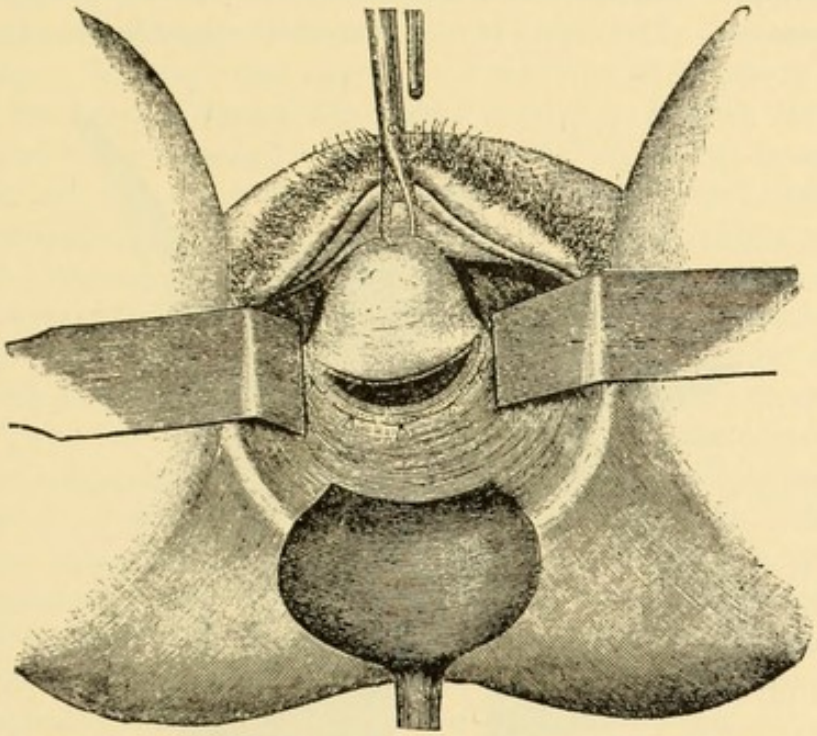


FIG. 222.—VAGINAL HYSTERECTOMY. First step, opening the posterior cul-de-sac and suture of the peritoneum to the vaginal mucosa (Martin).

of entry. Very strong silk is used for this suture, and tightly tied. One or two other points are then sutured in a similar way, the first being anterior and very near the cervix; and thus all the vessels are obliterated before the early steps of the operation are completed. There is no danger of including the ureter, as it is situated more in advance, and also is strongly drawn upward by the traction upon the cervix.

Third Step. Complete Circumcision of the Cervix and Liberation of the Bladder.—The cervix is carried backward to stretch the anterior cul-de-sac, and the incision of the vagina completed in front, using great care to keep as near the uterus as possible, so as not to injure the bladder, and yet to avoid the diseased tissues. For the same reasons the edge of the knife is to be directed obliquely toward the cervix. When the vaginal incision is accomplished, the knife is laid aside and the part dissected from the bladder with the finger; occasionally the scissors will be needed for this part of the operation. We need to remember that the extent and strength of these connections vary much in different subjects. At the end of a short interval the

finger appreciates the lack of resistance before it, which indicates that the peritoneum has been reached and the limit of the attachment of the bladder; the serous membrane may sometimes be seen at the bottom of the wound, recognized by its bluish appearance. Many surgeons incise it at this moment. The dissection should not be carried farther forward without arresting the hemorrhage, which is very slight, by points of suture placed on the cut surface of the tissues.

Fourth Step. Displacement Backward of the Uterus and Ligation of the Broad Ligaments.—The cervix is now free to its upper limit. It should be

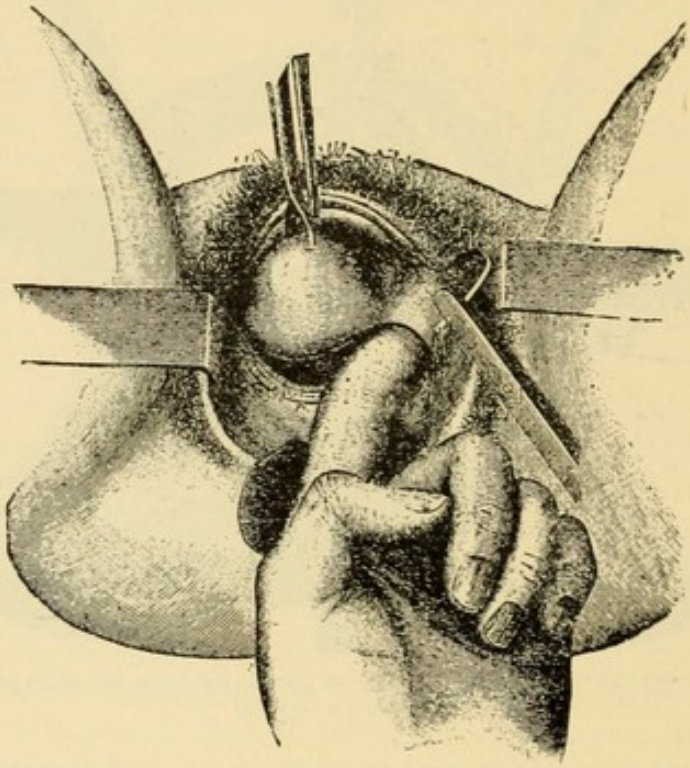


FIG. 223.—VAGINAL HYSTERECTOMY. Second step, ligation of the uterine artery (Martin).

drawn well forward, while the posterior portion of the wound is depressed with a single blade or retractor, and then the uterus is seized behind with a curved Museux forceps and made to turn over within the wound, the forceps on the cervix being first removed.

At times there is some difficulty in effecting this manœuvre, most often because the cervix is not entirely freed from its connections—a procedure which must be completed as soon as the ligation of the pelvic floor has rendered the parts exsanguine.

Different instruments have been invented for this inversion of the uterus; Martin employs a sound introduced into the cavity; Quénu uses a double-branched hook. These instruments have become absolutely useless on account of the adoption of morcellation.

When the uterus has been inverted, the superior portion of the broad ligaments is found below and their base above. They should be ligated in three

parts unless there is any need of intercrossing the threads for a chain suture. The left ligament is first tied and cut. Before detaching the uterus completely the last portion of the ligament is to be united by single sutures to the commissure of the vaginal wound. The right side is then treated in a similar manner, and the operation is terminated by severing the last bands which retain the uterus, particularly the peritoneum of the anterior cul-de-sac, which has been so far retained as a barrier against possible infection from the inverted cervix. The wound is then cleansed with great care by small tampons of antiseptic cotton.

Fifth Step. Drainage and Dressing.—One point of suture in each commissure of the vaginal wound diminishes it enough without closing it entirely. Before tying the sutures Martin places in Douglas' cul-de-sac a rubber tube in the form of a cross and packs the vagina loosely with iodoform gauze. Complete occlusion of the wound, as recommended by Mikulicz at the Berlin Surgical Congress in 1881, has justly few partisans to-day.

Modifications of the First, Second, and Third Steps.—Fritsch begins by a dissection of the lateral cul-de-sac, searching for the uterine artery and tying it; then he proceeds to the dissection of the bladder, and ends by the incision of the rectovaginal pouch. Olshausen defers the opening of the cul-de-sac as long as possible, for fear of infecting the peritoneum. Schatz reserves the separation from the bladder for the final step. Sänger and other authors advise the operator to open the vaginal pouches by means of the actual cautery, but this makes subsequent dissection difficult, and is without real advantage. To prevent hemorrhage from the ulcerated surface of the cervix, Fritsch places an elastic ligature at its base before dissecting. Müller compresses the abdominal aorta during the operation.

It is sometimes necessary in cases with very narrow vagina or introitus, as from the presence of the hymen, from senile atrophy or circular bridles, to obtain greater working room by incising the perineum and afterward suturing it. I have obtained great assistance from this procedure.

For fixation of the cervix, which is so easily torn, many different forms of forceps have been invented. Brennecke's model is introduced into the cavity of the cervix, and then the hooks are made to project and implant themselves in the healthy tissue, so that there is no fear of their tearing out. The Museux forceps which are exactly apposed, and the bullet forceps seem to me to be sufficient. Müller, after ligation of the broad ligaments in mass, divides the uterus into halves, and extracts each separately.

Modifications of the Fourth Step.—Billroth, Leopold, and Olshausen do not employ the inversion of the uterus, but by strong traction pull down the organ and detach it by degrees, carefully ligating each portion of tissue before dividing it, thinking that the inversion leads to infection of the wound; but this danger is almost wholly prevented if the cervix has been curetted and disinfected at the beginning of the operation. Czerny, Fritsch, and Demons revolve the uterus forward—a procedure which is rendered easy by

the frequent presence of anteflexion and the fact that the resistance of the round ligaments does not have to be overcome. Martin and Schröder reverse the uterus posteriorly, but, as I have already said, no formal rule can be adopted.

For hæmostasis of the broad ligaments, Olshausen employs the elastic ligature, making an opening in the peritoneum with a blunt bistoury and passing the elastic band with a Deschamps [Peaslee's] needle. Hegar and Kaltenbach also recommend provisional elastic ligature of the ligaments in mass, securing permanent hæmostasis by partial silk ligatures as soon as the uterus is detached. This I consider a useless complication. C. E. Jennings has made a provisional ligature of the ligaments in mass with a loop of carbolized silk, fastened with the aid of a perforated shot which is crushed; he then uses either ligatures or permanent forceps.

Modifications of the Fifth Step.—With the object of preventing recurrence by free excision of the adjacent tissues, it has been proposed to terminate the hysterectomy by cutting away a part of the vagina or of the broad

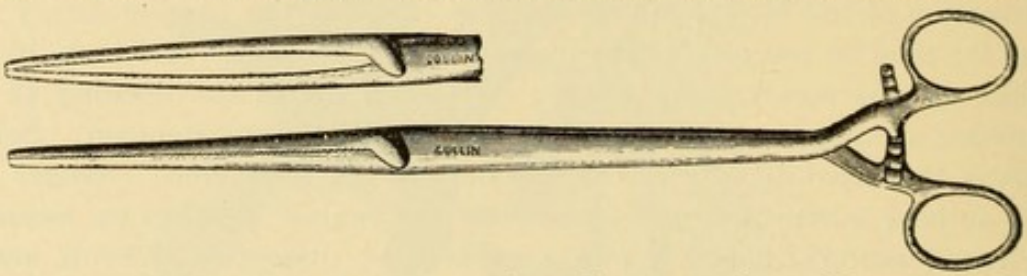


Fig. 224.—Bowed Forceps for Compression of the Broad Ligaments in Vaginal Hysterectomy (Doyen).

ligaments. Richelot advises the first, even when the vaginal wall is healthy, as a complementary step which is easily executed at the end of the operation. Pawlik still more boldly extirpates the parametrium, after placing sounds in the ureters so that they may be recognized and avoided; he has operated three times in this manner, but his final results are not published. It is doubtful whether these modifications are really useful, and it is certain that they are more or less dangerous.

The question of drainage is not definitely settled. In France the majority of operators leave the wound open and introduce one or two rubber tubes. In England glass tubes are more used. Martin employs a rubber tube made in the form of a cross, which has the advantage of being easily retained in place, and removes it on the third or fourth day. But in Germany most surgeons close the peritoneal wound; Kaltenbach, Mikulicz, Tauffer, v. Teuffel, Schede, etc., declare in favor of this method, while Czerny and Fritsch reject the suture. I think with Demons, Bouilly, Terrier, and almost all French surgeons that it is more prudent not to close the wound completely, but to diminish it. The discharge of serum and blood which is so frequent in the first few hours shows that this is not an unnecessary precaution, for in spite of all our care the wound may be infected with cancerous material.

Decortication of the uterus, the old method of Langenbeck, who operated thus on a prolapsed uterus in 1813, has been revived by certain authors, among whom are Lane and Franck. It is only a useless complication.

Operative Accidents.—I have already spoken of hemorrhage and the means of avoiding it.

The ureter may be wounded by the bistoury, a ligature, or the grasp of a forceps; it is also in great danger from forcipressure. It has been included in the forceps of very distinguished operators. When the accident is not mortal, it usually ends in the establishment of a ureteral fistula.

To avoid such injury to the ureter we must keep very near to the cervix, the uterus should not be inverted until it is freed from its attachments up to the peritoneum, and, lastly, no long forceps should be deeply placed on the broad ligament.

The bladder has been opened by the bistoury and torn through by the finger, the accident being almost unavoidable if the operation is performed for cancer with large extension anteriorly (which should contraindicate any operation). We must never forget to catheterize the patient at the beginning of the operation and so make certain that the bladder is empty and least liable to injury.

When the bladder has been cut or torn, it must be immediately closed with sutures. Such cases have recovered without fistula, and, if not, they are easily treated later. In every case a soft catheter is to be retained in the bladder for several days.

The rectum should not be opened except by an actual fault of the operator, unless it is invaded by the disease, in which case the radical operation would be more injurious than useful. It has been wounded by the forceps, both by being seized in their jaws and from simple pressure effects.

Mortality.—The mortality has fallen considerably during the last few years. In 1884 F. Brunner collected in his inaugural dissertation all the cases then published and found, before 1877, 33 cases with 82 per cent of deaths, and, after 1877 till February, 1884, 146 cases with 32.9 per cent of deaths. Mundé, in 255 cases from both continents since 1879 (the time when Czerny made known his operation) up to 1884, found 72 deaths, or 28 per cent. W. A. Duncan, in 276 cases since the beginning of 1885, found 28.6 per cent; and Hache, who used the excellent tables of S. Post with good effect, and added other cases, bringing the record up to the beginning of 1887, gives for this period a mortality of 24.47 per cent.

These figures have only a historical interest, for, in order to appreciate the gravity of colpohysterectomy, we must eliminate the older cases and confine ourselves to those of later years, in which the technique was perfected and the operators had acquired a large experience. It is just, also, in an exact estimate, not to include isolated cases by surgeons more or less incompetent. In the statistics of Duncan (1885) there were 276 cases of seventy-one operators, and thirty-five of these surgeons had performed the operation

but a single time. With such elements we are likely to obtain the inherent mortality of the operators and not of the operation. The rule established by Tait seems reasonable; it consists in adopting as the criterion the results of surgeons of average ability and experience, and thus all new operations should be judged.

Following this rule, Martin obtained the list given below of operations up to the end of 1886:

Fritsch	60	operations with	7	deaths,	10.1	per cent.
Leopold	42	" "	4	"	9	"
Olshausen	47	" "	12	"		
Schröder and Hofmeier	74	" "	12	"		
Staude	22	" "	1	"		
A. Martin	66	" "	11	"		
	311		47, about 15 per cent.			

But, as I have said above, these results, though recent, are still too ancient for our purpose. The latest statistics which I have examined give 5 per cent as about the correct mortality; the last series of 80 operations which Leopold had gave 4 deaths, or 5 per cent; Kaltenbach, in 53 cases, had 2 deaths, or 4 per cent; D. de Ott is still more fortunate, having operated 30 times without a single death; and the same is true of 25 consecutive cases of Péan's which were successful. After these figures, there is no need, it seems to me, of further discussion as to whether this operation is applicable to every case in which cancer has been diagnosed. It cannot be denied that we may thus perform a radical operation; why, therefore, should it not be adopted, since it is as benign as the partial operation? Consequently there is to-day, on the part of many surgeons, a reaction against amputations of the cervix in cancer: Schatz, Gusserow, Martin, Kaltenbach, Sänger, Fritsch, C. Fenger, Bouilly, Terrier, etc., have thus expressed themselves categorically. I also believe that hysterectomy is the operation of election when the diagnosis of cancer is certain. Therefore I have written (without always having been understood), "the more limited the disease, the more extensive should be the operation." In thus removing the whole of the uterus the result is certain, there is no opportunity for the disease to recur locally, and we avoid also ganglionic engorgement and invasion of the adjacent tissues, both of which have occurred where the treatment has been palliative and only partial destruction attempted. In other words, we simply apply here the rules which are accepted for external or general cancer.

Causes of Death after Vaginal Hysterectomy.—These may be arranged under three principal heads—hemorrhage, shock, and septicæmia.

Hemorrhage may occur during or after operation. Primary hemorrhage is always the result of an operative fault, and may be certainly avoided by clamping the tissues in small sections before dividing them. By using

clamps with short jaws, the hemorrhages, which were formerly frequent when the operation was performed with very long-jawed forceps, have become quite unusual.

Secondary or rather continuous hemorrhage has been observed in cases of excision for cancer in which the parts adjacent to the uterus were involved and all of the disease could not be removed.

In case of secondary bleeding, which is a comparatively rare accident, the vagina should be packed with tampons of resin-iodoform gauze if the hemorrhage is not alarming. If, however, it is dangerously free, the bleeding vessel should be found and tied or controlled with forceps.

Shock.—Under this vague and general name are grouped factors the most diverse. In the first place, exhaustion from a hemorrhage whose importance has escaped the attention of the operator may be one of the causes of the accident, for, unless the hæmostasis has been carefully performed step by step, certain vessels may bleed continuously during the whole of the operation, and this condition is the more serious when the patient has been already exhausted, or when it continues for a long time.

Another cause of shock is acute uræmia, depending upon alteration of the kidneys. It is well known how frequently compression of the ureters causes disease of these organs. Many cancerous patients live with the minimum of uropoietic function in a kind of unstable equilibrium, and, if this precarious condition is overbalanced by some disturbance, the uræmia which has been threatening develops with great rapidity. Thus the chloroform [or especially ether] absorbed during the time of anæsthesia may during its elimination by the kidney cause a fatal congestion of these organs; hence the mortality of prolonged narcosis. The uræmia may be due to absorption of the wound secretions, whose elimination encumbers the renal filter and monopolizes the small portion of healthy tissue which sufficed for the normal requirements of the economy. Many cases of death from so-called shock are plainly due to uræmia, generally of the comatose form, as appears both from the clinical details and from the autopsy records. It may also have been caused by the unfortunate application of a ligature to an unrecognized ureter. To avoid such accidents, we should never perform hysterectomy on a patient who presents symptoms of albuminuria or whose urine contains a largely diminished quantity of solids. If, however, in spite of unfavorable conditions, we decide to operate, the gravity of the prognosis should be recognized and the operation be performed as quickly as possible with the shortest convenient duration of the anæsthesia. I keep my patients on a milk diet for the first few days after the operation, quite as much to facilitate diuresis as to supply aliment.

Septicæmia.—One of the chief causes of this accident is the infection of the wound in its deeper portions by either the fluids or the débris of the cancer. This condition may be escaped by following the rules which I have described and advised—preliminary curetting, scraping the fungous portions,

continuous irrigation during the operation, and avoidance of morcellation as much as possible.

Survival after Hysterectomy.—Although the operation is of very recent date, a number of reports have been collected upon the subject, the most extensive of which is that furnished by Hache. A résumé is given in the following table, which I cannot reproduce without remarking that it unfortunately refers to a series of relatively ancient cases of operation in which it was performed too late, with no real chance of permanent success. It gives, therefore, too gloomy an idea of the actual results, but it is a valuable document by which to appreciate the progress accomplished since 1866.

ULTIMATE RESULT IN 150 CASES AFTER HYSTERECTOMY.

Time since operation.	Lost to view before recurrence.	Dead, or with return.	With no recurrence.
Three months	5	23	122
Six "	6	20	96
Nine "	5	10	81
Twelve "	2	9	70
Eighteen "	10	8	52
Two years	14	0	38
Three "	21	0	17
Four "	10	1	6

By these figures we may appreciate approximately the proportion of survivals and recurrences in one hundred operations during what may be called the initial period of hysterectomy (up to 1886). To determine this proportion, it is necessary, as Hache asserts, to consider all patients lost to view less than a year after operation as having had a return of the disease immediately after their last examination. For those who were observed more than a year, Hache includes among recurrences a majority of those who have been consequently lost to view. The following results, therefore, may be considered a very pessimistic interpretation of the preceding statistics:

In 100 Cases.—Twenty-three succumbed to operation; in 15 the disease returned in the first three months; in 13 between three and six months—which is 28 in the first half-year; in 13 between six and twelve months, that is, 13 in the second semester; in 10 between one and two years; in 10 in the second year; 26 were still in good health at the end of two years.

In determining what percentage of the patients had a recurrence in the number of those who survived at the end of each of these periods, Hache found that the chances of return were about equal during the first two periods of nine months, with a gradual decrease thereafter. This result is evidently due to incomplete operation and the immediate return of a neoplasm which has been simply resected. There is still another factor, which is the very rapid course of certain cancers, especially in young women. As a striking example of this, two patients of Tillaux and one of Tédenat had a return of the disease at the end of six weeks, three months, and five months.

I have observed a case of rapid return in a woman of thirty-eight years with a tubular epithelioma of the cervical cavity; the origin of the disease seemed to have been only five months before the operation, and, although the diseased portions were entirely removed, the return was very rapid, and the patient succumbed five months after the hysterectomy.

A valuable report is given by A. Martin in the memoir which I have cited. In the series which he reports is included the practice of certain German gynæcologists up to the end of 1886, with the following results as regards survival without return:

Recurrence.	Leopold, 56 cases.	Schröder, 62 cases.	Fritsch, 53 cases.	Martin, 56 cases.
In one year	16	20	17	35
In one and a half years	9	10	..	32
In two years	5	7	7	25
In three "	2	4	2	20
In four "	..	..	..	5
In five "	..	..	..	3
In six "	..	..	..	2

Percentages derived from the above table:

Recurrence at end of one year	42.5 per cent.
" " " one and a half years	33.1 "
" " " two years	21.2 "
" " " three "	13.5 "
" " " four "	2.4 "

The first observations of vaginal hysterectomies performed in France were discussed at the Société de Chirurgie in October, 1888, and are too recent to form a satisfactory analytical table. The last statistics communicated to that society at the end of 1891 furnish valuable data.

P. Segond has operated upon 25 cancers of the cervix, with 7 deaths from operation; 4 patients died at the end of first year; 3 were living with a recurrence; 2 had been operated upon more than one year before; 3 were living without recurrence, 1 since November, 1888, the 2 others since October, 1889, and April, 1890. The last 6 operations were of recent date (August, 1891).

Terrier had performed hysterectomy in 29 cases of cancer of the cervix from June, 1885, to September, 1891; he had observed 6 deaths from operation. One patient had had no return after more than six years and five months, 2 had lived four and a half years, 2 others three years and three and a half years, 3 two to two and a half years; all others died within from one month to one year. In 3 cases cancer of the body and of the cervix coexisted. Terrier had observed 1 death from operation among these; the 2 others lived eight and thirteen and a half months respectively.

In 1888 Bouilly had practised 20 hysterectomies with 7 deaths. From 1888 to 1892 he performed this operation for cancer of the cervix 19 times with 7 deaths; 3 of his patients remained cured after four and a half years,

the others after nearly four and more than three and a half years respectively.

Richelot in 47 operations had 3 deaths from operation; 1 occurred after two months from the repair of a urinary fistula. In 2 cases the diagnosis was doubtful; 3 patients had disappeared. Ten times hysterectomy was of value only as a palliative measure directed against the rapid spread of the disease; 28 patients remained: 11 had had recurrences, 1 at the end of five and a half years, the others after an average of one year; 17 remained cured: 2 after seven years, 1 after four years, 2 after three and a half years, 4 after from two to three and a half years, 1 after seventeen months, 7 others after less than one year.

I have had one cure lasting two and a half years, and one of three years' duration, but recurrence then took place in each.

Kaltenbach has had 2 deaths from operation in 49 patients surgically treated during a period of four and a half years; 25 had a return of the growth within between three and a half to sixteen months; 1 after one and a half years; in 7 no recurrence was noted at the end of one year.

Tannen reports 43 new cases operated upon by Fritsch between 1887 and 1889, with 3 deaths, or 6.9 per cent. Recurrence had not taken place in 48.7 per cent at the end of three years; in 45 per cent after four years; in 36 per cent after five years.

Gusserow has had 7 deaths from operation in 67 vaginal hysterectomies; 56 patients were seèn again; 16 who had been operated upon between eight years and ten months previously were free from recurrence; 10 were still free after less than six months; 23 cases had recurred.

One of the most important sets of statistics is that of Leopold, who had treated 80 cases of cancer by vaginal hysterectomy, only 4 dying as a result of the operation. It includes his cases for five and a half years. At the time of Münchmeyer's publication, 14 of the 76 women cured had died, 10 of these from a recurrence of the neoplasm. Since then 17 others had died, leaving 45, 37 of whom were seen by Leopold and 8 of whom had written to him. These 45 cases are classified as follows:

Free from recurrence more than:

Two weeks after operation,	45 of	80 patients	.....	56.25 per cent.
Three " " "	34 "	58 "	.....	58.6 "
Four " " "	25 "	42 "	.....	59.5 "
Five " " "	18 "	30 "	.....	60. "
Six " " "	6 "	9 "	.....	66.6 "
Seven " " "	2 "	2 "	.....	100. "

Hofmeier, Schauta, and Olshausen, who consider freedom from recurrence at the end of the second year as establishing the therapeutic value of total extirpation, have given the following figures as representing the proportion of complete cures: Hofmeier places it at 24 per cent according to Schröder's operations, and at 47.3 per cent from his own statistics. Ols-

hausen has been able to follow 155 of 235 cases operated upon in four and a half years, with a mortality from operation of 12.8 per cent. More than two years after the surgical treatment, no recurrence had taken place in 41 of these, or 26.4 per cent.

Krükenberg has published the results of 217 vaginal hysterectomies by Schröder, Olshausen, and Hofmeier for cancer of the cervix. Twenty-five, or 12.7 per cent, died as a result of the operation; 188 patients were seen again and freedom from recurrence was noted:

At the end of	one year	in	110	of	188	cases,	or	58.5	per cent.
"	" two years	"	63	"	141	"	"	44.7	"
"	" three	"	42	"	112	"	"	37	"
"	" four	"	26	"	88	"	"	29.5	"
"	" five	"	9	"	51	"	"	17.6	"

Zweifel published in 1892 a series of 77 vaginal hysterectomies for cancer with 4 deaths from operation, or 5.5 per cent. Of 12 patients operated upon in 1887 and 1888 all had recurrences; of 13 operated upon in 1889, 7 were free from recurrence; of 12 treated in 1890, 7 had not had a return; in the 14 patients operated upon in 1891 the growth had not yet reappeared.

Martin has performed 77 new vaginal hysterectomies for cancer since 1887, with 10 deaths, or 13 per cent.

I consider it better to use the term durable than that of final cure as recurrence is still to be feared. It would seem illusory to speak of an absolute cure of cancer of the uterus more than of other malignant neoplasms. I believe one must mistrust the original diagnosis in patients who remain free from recurrence. To me, hysterectomy is merely a palliative treatment whose results are of greater or less duration; the average being, in my experience, hardly more than one year, after which time the disease reappears and leads to death within a year at the latest. In young patients and those with the papillary or proliferating form, recurrence is often extremely rapid. One is, however, none the less authorized to perform hysterectomy as to amputate the breast and dissect the axilla, an operation whose prognosis is certainly more serious. Recurrence is always to be feared in either case; but a cure, though temporary, is still a cure.

It is interesting to examine the reports of survival after partial operation (supra- and intra-vaginal), and to compare them with those of total ablation of the uterus. But before reporting on the principal documents which we possess on the subject, I must remark that this unequal parallel should not be made the basis of conclusions without some reservation. In what cases do we always amputate the cervix? For cancer at its beginning. In what cases do we ordinarily perform hysterectomy? For cancers which are well advanced, having already reached the body of the organ. In the first case, there are many chances that the disease has not infected the lymphatics, but very few in the second. Why should we then be surprised if return is less rapid where amputation of the cervix has been so fortunate as to remove all

of the disease? But who shall say that all the cases of permanent cure would not have been increased in number if those treated by partial operation had been submitted to total ablation of the organ? May not those cases be unrecognized in which, with appearance of the disease limited to the cervix, the mucous membrane of the body is invaded by propagation, and also those in which the uterine parenchyma contains distant secondary nodules?

The comparison which we would like to establish between the results of partial and total ablation, as regards permanence of cure, would not be a just one unless it were derived from two series of patients in exactly similar conditions, with affections of equal development. But how shall we construct such a parallel with the aid of published series of total hysterectomies which refer in the great majority of cases to disease which has passed freely beyond the cervix, which appear in the list of the less serious cases, and yet which render the final table discouraging? For this reason I have thought that the value of the actual statistics on this special point should be contested.

The most important papers on the subject are those of Schröder, Winter, Verneuil, and of Byrne.

The first in date, and not the least curious, is the former, which gives all the total hysterectomies and partial amputations of Schröder's clinic from 1878 to 1886. The following table gives the comparative number permanently cured by the two methods:

At the end of	first year,	partial operation, 114 cases, 49 cures	51	per cent.
		total hysterectomy, 46 cases, 20 cures	63.6	"
" "	second "	partial operation, 102 cases, 38 cures	46	"
		total hysterectomy, 40 cases, 7 cures	34	"
" "	third "	partial operation, 76 cases, 24 cures	42	"
		total hysterectomy, 31 cases, 6 cures	26	"
" "	fourth "	partial operation, 59 cases, 19 cures	41.3	"
		total hysterectomy, 18 cases, 0 cures	0	"

It is evident that an enormous advantage lies with the second year after amputation (supra- and intra-vaginal taken together). At the end of three years 24 patients out of 76 had no return of the disease, and at the end of four years 19 out of 39: but may that not be due simply to the fact that they were operated upon before the lymphatics were infected?

The results of Verneuil are no less remarkable. The intra-vaginal operation with the écraseur, in his hands, gave the following proportion of recurrence and periods of respite: In 21 operations there were 10 cases of rapid return; in more than 9 of these Verneuil recognized by immediate examination that the ablation had not been complete. In 6 other cases there was no return up to the time when the patient was lost to observation in perfect health, three years and more after the operation. Two cases, which are still alive but afflicted with a return in a distant part, presented an apparent recovery after three years. Lastly, in 3 cases the patients were actually in good health after five years, seventeen months, and three months.

Winter has lately published the immediate results of partial amputation,

according to Schröder, in 155 cases; there were 10 deaths from operation, or 6.5 per cent; after two years 38 per cent remained cured; 26.5 per cent had had no recurrence after five years.

J. Byrne has published, in a recent paper, the results of his own experience for more than twenty years. He has operated upon 81 cases of cancer of the cervix and has always performed partial removals with the galvano-cautery. He has noted that the neoplasm had not recurred after more than 17 years in 1 patient, after 13 years in another, 11 years in 2, 7 years in 6, 5 years in 8, 4 years in 6, and after more than 3 years in 11 cases.

In contrast to this series, which appears to prove the therapeutic superiority of the partial operation, the results of Martin's experience should be cited. A pupil of the school of Schröder, he began to perform supra-vaginal amputation of the cervix in cases of epithelioma in which it was theoretically indicated, but his results were deplorable: Among twenty-eight patients, two alone remained without recurrence. He then adopted early hysterectomy, with decided improvement in his ultimate results.

In the presence of such contradictions, and the absence of rigorous means of comparison, I must persist in considering the value of these statistics as very slight, for the conclusion appears to me paradoxical that partial excision of the tissue about the neoplasm is as efficacious as ablation made as free as possible.

Recently, surgeons have devised several new methods of penetrating the lower pelvis. Otto Zuckerkandl has proposed division of the recto-vaginal septum, making a transverse incision which will comprise all the space between the sciatic tuberosities, instead of being limited by the vaginal walls Frommel has adopted this procedure with success, and claims that it allows the surgeon considerably to exceed the usual bounds of hysterectomy. Sänger, on the contrary, who performed the operation only on a cadaver, rejects it completely.

The para-sacral or para-rectal incision of E. Zuckerkandl and Wölfler furnishes a method of hysterectomy for difficult cases. It consists of a deep incision, either on the left side or upon the right. The latter surgeon makes his incision from a little higher than the articulation of the sacrum with the coccyx, beginning from 1 to 2 cm. outside of that point and cutting downward with a slight external concavity which corresponds to the tuberosity of the ischium, to a point 2 to 3 cm. from the fourchette. In this way the ischio-rectal fossa is opened from below; then a part of the gluteus maximus is resected (Wölfler then extirpates the coccyx, which E. Zuckerkandl preserves), the sacro-sciatic ligaments and the levator ani are incised, and the rectum detached from the vagina. The culs-de-sac of the latter canal are then incised and the hysterectomy is performed according to the rules already given. The operation is terminated by exact occlusion of peritoneum and vagina and drainage of the para-sacral wound, which is partly closed by sutures. Wölffer has employed this method upon the living subject, for ex-

tirpation of the rectum and also the uterus, while E. Zuckerkandl has limited his researches to the cadaver.

It seems to me bolder and yet more rational to employ the preliminary operation devised by Kraske for reaching the cancerous rectum deeply within the pelvis. It consists not only in resection of the coccyx, as Verneuil and Kocher have done, but also of the lowering of the sacrum, thus creating a very large opening where one can manœuvre with ease.

The patient is placed in right lateral decubitus, and starting from the point of the coccyx an incision is made by the side of that bone for about ten centimetres, curving outward to end at the middle of the sacro-iliac symphysis (Fig. 225). The coccyx is cleared of the periosteum and extirpated, and at the same time the lower portion of the sacrum is detached and removed

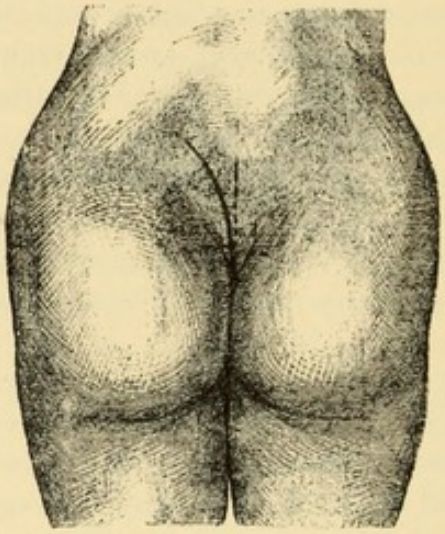


FIG. 225.—HYSTERECTOMY BY THE SACRAL METHOD. Line of incision. (The dotted line shows the central axis of the body.)

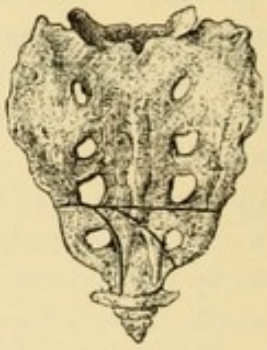


FIG. 226.—LINES OF RESECTION OF THE SACRUM.

with a strong cutting forceps, first laterally, and then, if necessary, by a transverse section. To procure space enough without injuring any important nervous branch it is sufficient to carry this section just below the third sacral foramen (Fig. 226). The rectum, which it is well to pack with iodoform gauze, is then displaced laterally, and the peritoneum incised in Douglas' pouch. An enormous opening is thus produced (Fig. 227), through which can be seen a large portion of the anterior abdominal wall between symphysis and umbilicus above the bladder.

The first anatomical experiments in the application of this method of Kraske's to hysterectomy were made by C. A. Herzfeld, of Vienna, but Hochenegg recorded the first operations upon the living subject. One of these was by Gersuny, who was thus able to extirpate a very large uterus with a cancerous ganglion buried in the subperitoneal cellular tissue; the other was by Hochenegg himself, who removed both the uterus and a cyst of the ovary as large as the fist, which was adherent. Both cases recovered, but the second developed an intestinal fistula.

A modification of the preceding method was adopted almost at once by Hegar. It consists in making only a temporary section of the coccyx and lower portion of the sacrum, and laying them to one side, without complete extirpation. When the hysterectomy has been performed, the flap containing the bone is returned to its place. Hegar had in one case a necrosis of the displaced bone, and in another it remained movable. Roux and Terrier followed Hegar's example for the extirpation of a voluminous cancer which could not be removed through the vagina. In his second case, as the vagina was very narrow and there were reasons to fear adhesions between it and the bladder, Roux elevated the osteo-cutaneous flap as one opens a door, by transverse section of the sacrum with a cutting forceps, and sutured it for the time to the buttock. After ablation of the uterus the vagina was sutured,

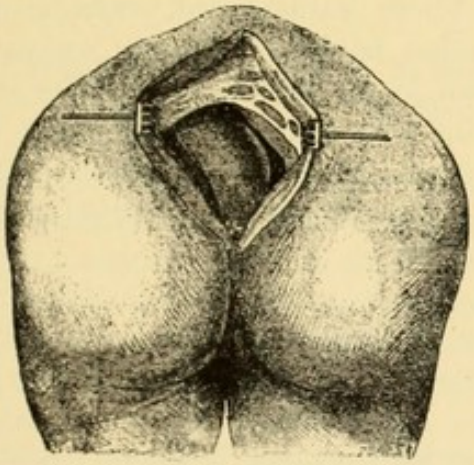


FIG. 227.—HYSTERECTOMY THROUGH THE SACRUM; OPENING OBTAINED BY PRELIMINARY OPERATION.

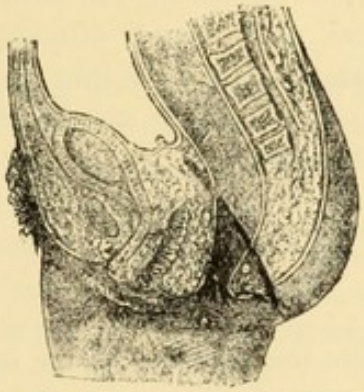


FIG. 228.—HYSTERECTOMY THROUGH THE SACRUM; CLOSURE AND DRAINAGE OF THE WOUND.

the flap replaced, and the wound tamponed with iodoform gauze and closed at its extremities. Both patients recovered.

Hochenegg advises not to proceed to detachment of the vaginal culs-de-sac until the peritoneal wound has been closed by sutures; in this way we avoid as completely as possible infection of the serous membrane by the tumor. With the same object, and to render the occlusion more complete, von Beck dissects a layer of peritoneum from the anterior face of the uterus.

Zinsmeister has described a certain difficulty in finding the peritoneal pouch at the bottom of the wound, but this seems to depend upon the fault, in the operation, of not carrying the incision far enough downward; it should be prolonged almost to the anus.

The relations of the rectum make it preferable to operate upon the left side, for then that organ is more readily seen, and consequently there is less risk of injury if it has been moderately filled with tampons. Rectal wounds, however, constitute one of the dangers of the operation and require immediate suture (*suture à étage*). The ureter may also be cut; if that happens, it is made to empty into the rectum or the vagina. If into the latter, its lower portion is to be closed after establishing free communication with the

bladder. This is better than establishing a urinary fistula through the wound.

After having carefully sutured the base of the wound itself, then the peritoneum (before extirpation of the uterus), then the vagina (when the extirpation has been accomplished), the external wound is partly closed, leaving an opening large enough to permit drainage and antiseptic tamponing of its cavity—that is, of the "dead space" which always remains. The tampons should be left in place from six to eight days, then renewed and gradually decreased in quantity as the cavity fills up. It would be dangerous to make complete occlusion without some certain means of issue for the wound secretions.

There is no doubt that preliminary resection of the coccyx and sacrum greatly facilitates excision of cancer, which, without that, could be removed only through the abdomen. I consider, however, that the vaginal route, aided by forcipressure and morcellation, amply suffices for the removal of all cancerous uteri which demand radical treatment, and I believe it may be boldly stated as a principle that no cancer of the uterus, whose extirpation through the vagina is impossible, should be submitted to any other than palliative treatment.

IV. Cancer of the Cervix, with Suspicion or Certainty of Deep Extension.

When the mobility of the uterus is lessened, and bimanual palpation discloses a tumefaction and puffiness at the sides of the organ, two hypotheses are possible: perimetritis with adhesions, or extension of the cancer to the pelvic cellular tissue and broad ligaments. In the first case operation would be difficult and possibly dangerous, especially if there were purulent foci as in an unfortunate case of Le Bec; in the second case it would be both dangerous and useless. It would be better to refrain from interference, however great may be the resources offered by the sacral method.

The operative prognosis is doubly aggravated in cancer with extension. Martin had 32 per cent of deaths in such cases instead of the 16.92 per cent which he obtained in cancer limited to the cervix. The cases which increase the mortality of our statistics are very frequently of this kind. Removal of the uterus from the midst of a deep cancerous focus has been improperly described under the name of palliative hysterectomy, just as the name of irregular supra-vaginal amputation has been given to hysterectomy which it becomes necessary to leave incomplete after an exploratory dissection. This is an abuse of scientific language which is much to be regretted, for it seems to justify the operation where it is formally contra-indicated. An operation of this kind, when it does not kill the patient, which is often the case, is far less palliative than simple curetting followed by cauterization.

V. Cancer of the Cervix Invading the Vagina Primarily or Consecutively.

This invasion is an absolute contra-indication to any radical operation; for it is either an indication of the extension of an advanced cancer, which has probably already infected the lymphatics, or it is the result of the so-called vaginal form of cancer of the cervix, for which I have proposed the name "*liminaire*," and which has an invincible tendency to extend to the vagina and recur fatally in that situation. It is then rationally the whole of the vagina rather than the whole of the uterus which should be removed. Here the curette and cauterization are the best palliatives.

VI. Cancer of the Cervix Extending to Vagina and Bladder or Rectum.

In spite of advice to the contrary from distinguished surgeons, to attempt a radical operation under these conditions, and for this purpose to remove the uterus and invaded portions of rectum or bladder, seems to me a fatal delusion. The operation certainly is feasible, but the recurrence, or, better, the immediate local multiplication, is fatal after a brief delay, for a cancer so far advanced has certainly infected the lymphatics. Moreover, the gravity of hysterectomy is much increased in such cases, and we may therefore demand whether it is well to expose the patient to dangers so great for benefits so precarious.

In the last three categories which I have passed in review I have described only a palliative operation capable of removing the two great causes of exhaustion of the patient, namely, the hemorrhage and the fetid discharge. For this purpose it is necessary rapidly to break down and remove the ulcerating masses which cause these symptoms. The best instrument for this is the curette, and beyond all others the cutting spoon of Simon (Fig. 229). With this instrument the largest mass of fungous growth may be rapidly removed; the smaller vegetations being followed into the crevices with smaller sizes of the curette. The position of the bladder and ureter must be noted beforehand and the greatest caution observed in extensive lesions. If we penetrate into the cavity of an invaded uterus we must, to avoid perforation, be careful to attack its surfaces obliquely and not perpendicularly.

As soon as the surfaces have been cleaned, Martin, after freshening their edges, reunites them to produce primary union, though it seems to me that the cases which permit the application of this ingenious method are very rare and that it is very inconvenient. I much prefer to follow the curettage with the energetic application of the rose- or olive-shaped actual cautery, by which the neoplastic processes are followed up and destroyed in the midst of the healthy, more resistant tissue. This procedure is practically that which has

given such good results in the hands of Koeberlé and Baker, and which Schröder also recommends; I have obtained great benefit from it.

This method of treatment may be repeated at intervals of a few weeks or months. If we operate rapidly, after application of cocaine to the vagina, and under continuous cold irrigation, anæsthesia may be omitted, which is desirable, as the patients are usually much exhausted and have more or less

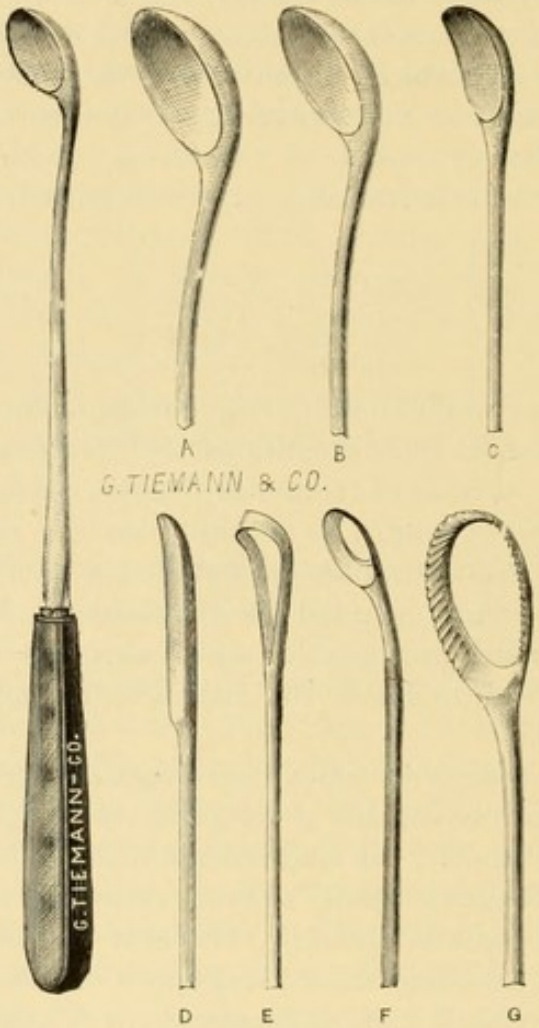


FIG. 229.—CUTTING CURETTES. *A*, *B*, and *C*, cutting spoons of Simon; *D*, Récamier's cutting curette; *E*, Sims' model; *F*, fenestrated curette with malleable handle; *G*, Thomas' serrated curette.

advanced kidney lesions. The operation causes but little pain, and only the preparation for it is somewhat appalling.

After the curettage a tampon of iodoform gauze is placed in the cavity produced by the excision, and renewed at the end of two days. Injections of sublimate 1 : 5,000, which appears to me the best, may also be employed. As soon as the granulations at the base of the vagina begin to secrete with some abundance I apply a small disc-shaped tampon wet with chloride of zinc (1 : 10), kept solidly in place and isolated by a large tampon of iodoform gauze saturated with bicarbonate of soda, the vagina being carefully tamponed with cotton so as to avoid any displacement. This dressing should be

renewed every second day, and each time preceded by abundant irrigation with sublimate.

Chemical Cauterization.—Various agents have been employed for this purpose, such as nitric or chromic acid, a 1 : 5 alcoholic solution of bromine, etc. The vagina must always be protected by tampons wet with a saturated solution of bicarbonate of soda. Canquoin paste has its ardent defenders, but numerous accidents, such as perforation, peritonitis, etc., due chiefly to the employment of caustic arrows (*flèches*), have caused these to be almost entirely abandoned; chloride of zinc, however, managed with care, may render real service. The first to apply this caustic to the treatment of cancer of the cervix were Maisonneuve and Demarquay. Marion Sims, to whom many authors give the credit of the procedure, really came after them, and Van de Warker imitated the latter in his special technique without citing him; more recently, Fränkel has recommended this agent again. Its application is as follows: The diseased surface is scraped with the curette, and the bleeding stopped with the cautery, though its action is not carried very far. Then a small tampon of cotton is placed on the cervix after being wet with a solution of chloride of zinc (⅔), and this is left in place from twelve to twenty-four hours. To neutralize the effects of this acid caustic on the vagina, Fränkel, following the example of Sims, superposes a tampon wet with bicarbonate of soda, and anoints the vulva with vaseline containing the same (⅓). The eschar is detached in about ten days.

[I have seen very satisfactory palliative results from chloride of zinc used as follows: A sufficient number of very thin discs of cotton about one inch in diameter are soaked in a saturated solution of the zinc chloride, squeezed flat and dried. A number of larger tampons are prepared in the same manner from a saturated soda solution. The cancerous growth is rapidly and vigorously curetted until firm tissue is reached, when hemorrhage, until then profuse, usually ceases. The thin caustic discs are then carefully packed over the whole of the raw surface and the vagina carefully and firmly tamponed with the soda cotton. If the zinc cotton is used wet, it is difficult to prevent the caustic from running on to the vaginal walls and causing disagreeable sloughing. The slough caused by this treatment is deep and follows up the diseased tissue; it is dry and leathery and usually separates in from seven to ten days, leaving a very clean granulating surface.

The first tampons are to be removed on the second day, and the parts dressed with iodoform gauze until the separation of the slough is completed.]

As an injection for disinfection in cases of very fetid discharge we may use a solution of permanganate of potash, about 10 to 20 : 1,000 (a solution which should have a cherry-red color) or a dilute Labarraque's solution, and besides employ the curette followed by the cautery, or chloride of zinc, for destruction of the fungosities.

Against the hemorrhage, which will be diminished by the foregoing measures, we may apply tampons wet with perchloride of iron and then dried, after

having dusted them with iodoform; but the hot iron energetically employed is the best means. Ergot is almost without effect, but something may be done with digitalis.

Erythema of the vulva may usually be prevented by extreme personal cleanliness, bathing with white wash (liq. plumbi subacetatis), and inunction of borated vaseline as a protection from the vaginal discharge.

Gastric symptoms are to be treated by tonics and bitters, such as wine of quinine, wine of colombo, bitter tincture (Baumé's) in doses of two or three drops before each meal, tincture of nux vomica in ten or fifteen drop doses in the same way, or amorphous quassin in pills of 1 cgm. twice a day. If the kidneys are affected, milk diet should be ordered. Against repeated vomiting of uræmic origin, Winker has obtained good results from tincture of iodine in drop doses in water before each meal.

Constipation must be combated with great care, for the straining which it causes is a potent element in the production of the metrorrhagia. The best means of regulating the bowels is to give the patient a diet with plenty of vegetables and fruit, green peas, prunes, etc. A large enema every day, with the addition of two tablespoonfuls of glycerin, usually suffices so that we avoid the constant and injurious employment of purgatives, but, if necessary, the following may be given:

℞ Pulv. rhei, ... gr. viiss
Pulv. belladonnæ, ... gr. ⅛.
M. ft. caps. No. i.

If these measures are not successful, we must have recourse to drastic purgatives, of which the best is podophyllin:

℞ Podophyllin, ... gr. ss.
Ext. belladonnæ, ... gr. ⅛.
M. ft. pil. No. i.

The pains are seldom benefited by surgical interference, but frequent injections and dressings diminish them sensibly. Morphine by hypodermic injection could hardly be refused without cruelty to patients whose condition is hopeless. It is only necessary to enforce the limits within which it may be employed, and so avoid such abuse of the drug as would alter the digestive function and depress the bodily powers.

[In many cases the most satisfactory results in relieving pain are obtained by the employment of—

℞ Phenacetine, ... ʒ i.–iss.
Codeinæ, ... gr. vi.–xij.
M. ft. chart. (vel caps.) No. vi. Sig. One powder to be taken three times a day for pain.]

The following have been recommended as specifics: Hemlock, which merely aggravates the stomach disturbance; condurango in decoction (15 gm. to 200 gm. water), which acts only as a stomachic; and Chian turpentine (0.5 to 1.0 gm. in pill), which seems to have no injurious action, although its therapeutic value has not been demonstrated. [Methylene blue

(pyoktanin), in two cases in which I have employed it locally, seemed to lessen the amount of hemorrhage, pain, and fœtor, but had no perceptible effect in checking the progress of the disease.]

VII.—Cancer of the Cervix Complicating Pregnancy.

It is impossible to recognize a pregnancy, in a woman with cancer of the cervix, before the fourth month, for the volume of the uterus may be legitimately attributed to the presence of the neoplasm. If, however, the diagnosis should be made at that early period, ought the fact to modify the treatment? I think not. What we know of the accelerating influence of pregnancy on uterine cancer on the one hand and the great probability of abortion on the other make vaginal hysterectomy perfectly legitimate whenever it is applicable to the gravid uterus. For this operation the disease must be limited, and the volume of the uterus must permit extraction by the vagina. It is then remarkably easy on account of the laxity of the tissues, and is infinitely preferable to intra- or supra-vaginal amputation of the cervix, which is a frequent cause of abortion and has often been followed by rapid recurrence. [The primary mortality seems to be even lessened by the presence of early pregnancy; fourteen cases, all successful, where the cancerous uterus with a pregnancy advanced from two to four months, has been removed by vaginal hysterectomy having been recorded in 1891. If the neoplasm has extended to the adjacent tissues we must distinguish between the very hard cervix, when abortion should be induced and followed by palliative treatment of the cancer (curette and cauterization), and the fungous cervix, all of whose circumference is not invaded, when it is best to wait and not induce abortion until feebleness of the fœtal heart renders it probable that its death is imminent.

When the labor is difficult, we should employ, according to circumstances, version or the forceps, and as a final resource the Cæsarean operation, for it seems to me that we should not sacrifice by craniotomy the living child of a mother who is beyond hope.

Finally we must consider the rare cases in which the cancer is still limited, but the uterus is too far developed for extraction by the vagina without evacuation of its contents. It is impossible to give rules which shall apply to all cases; the study of each patient must be the surgeon's guide. The following operations may be adopted, according to the special conditions of each case:

A. Induced labor, with hysterectomy after a few days.

B. Cæsarean operation, with colpo-hysterectomy later.

C. Supra-vaginal hysterectomy (Porro) followed at once by vaginal removal of the remainder of the uterus.

D. Total extirpation of the gravid uterus, with dissection of the vagina, by laparatomy, according to the procedure adopted for the first time with full success by Spencer Wells on October 21st, 1881.

VIII. Cancer of the Cervix Complicating Fibroma.

If the fibrous tumor is large enough to form an absolute obstacle to the accomplishment of vaginal hysterectomy, there is only the choice between the abdominal operation of Freund, extirpation through the pelvis (sacral), and curetting followed by cauterization. One or the other of these last two is the method which I should adopt, for the dangers of abdominal hysterectomy are very serious in such cases. If, however, the fibroid is within the limits which I have indicated above (p. 233), vaginal hysterectomy by morcellation should be done.

IX. Cancer of the Cervix, with Complicating Cyst of the Ovary.

Should hysterectomy be performed, if it is legitimate, before the ovariotomy or after it, or both in one session? I consider that the affection whose course is the more menacing should be first treated, namely, the cancer. If the radical operation is justifiable, we should first perform total extirpation by the vagina and try, after puncture, to remove the cyst wall through the vaginal wound. If this manœuvre should prove too difficult it would be better to give up the attempt, and perform ovariotomy after the patient had recovered; if, on the contrary, palliative treatment of the cancer alone is possible on account of its extension, we should not attempt ovariotomy, as the patient will survive but a very short time. Asch records a case in which he performed total extirpation of the cancerous uterus and ovariotomy at the same time. The uterus was first removed by the vagina, then the cyst by laparatomy. In beginning the second operation, bubbles of air were noticed in the peritoneum, evidently introduced by the vaginal opening. On the eighth day, after removal of the sutures, there was gaping of the wound, and escape of the intestines, which displaced the bandage and rested on the thighs for two hours. These loops of intestine were cleansed with carbolic compresses and returned to the abdomen and a second suture made. The patient recovered. It is difficult to think that this serious accident could have occurred if the operation had been performed in two sessions.

CHAPTER XVI.

CANCER OF THE BODY OF THE UTERUS.

Adenoma of the Uterus.—There is, except among French authors, a certain amount of confusion regarding adenoma of the uterus. Some authors apply the name of typical or benign adenoma to what I have described as glandular endometritis in a preceding chapter, while atypical or malignant adenoma is the same as the first stages of degeneration of the mucous membrane in epithelioma. This difference they derive from the anatomical conditions entirely, depending upon the distinctions and refinements of histology, while I, with all other French authorities, have adopted the nosology to the clinical aspect. The conception of adenoma plays no part at the bedside of the patient. I refer to the chapter on Metritis for whatever concerns benign adenoma, having described its pathology with glandular metritis and its symptoms with catarrhal and hemorrhagic metritis and mucous polypi.

Malignant adenoma is then only the initial stage of cancer of the mucous membrane. If there is any need of further distinction it may be described histologically as glandular epithelioma, adeno-carcinoma, or glandular carcinoma.

It suffices to glance at the two following figures to see the enormous difference which separates these conditions, and to grasp at the same time the transitions which permit the transformation of the one into the other; for a lesion begun as a slight glandular endometritis may become, if inveterate, a glandular endometritis of the most pronounced type (typical benign adenoma), may then degenerate into an atypical malignant adenoma, and this is the first stage of cancer.

In the case of the so-called benign adenoma (Fig. 230) the proliferation is absolutely typical, there are no solid epithelial tubes, and the cylindrical epithelium is in one layer only. Between the glandular tubes there is still a certain quantity of normal interglandular tissue. The glandular and the muscular layers are clearly defined, and the glands have no tendency to penetrate into the muscular parenchyma and destroy it.

In malignant adenoma (Fig. 231), on the contrary, the proliferation of the glands is atypical; furnished with a single layer of cylindrical epithelial cells, they are folded upon themselves and rolled up into glomeruli; the fibrous substratum has almost disappeared and the glands touch each other at many points; and there is no boundary between the glands and the uterine tissue.

The figure, borrowed from Ruge and Veit, reproduces the initial lesions

of cancer derived from malignant adenoma, forming thus the last stage which I have described in the pathological progression. The lumen of the glands is enlarged at the expense of the interglandular substance, the beau-

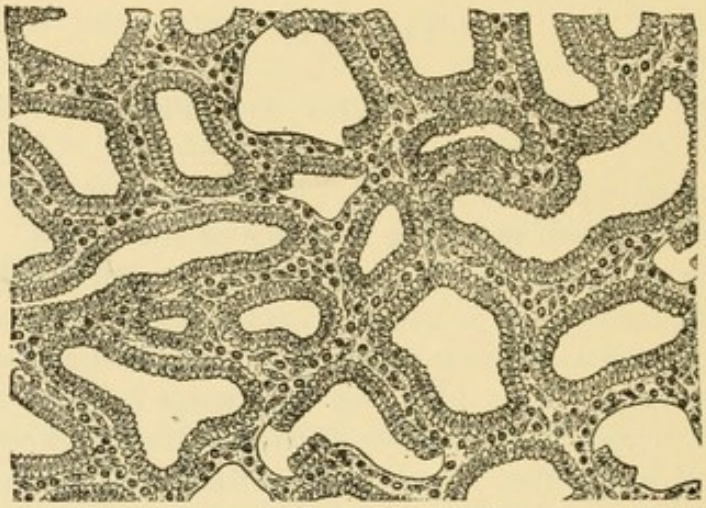


FIG. 230.—BENIGN ADENOMA OF THE UTERINE MUCOUS MEMBRANE (Compare with Fig. 100, Glandular Endometritis), Wyder.

tiful epithelium with vibratile cilia has changed its form and become stratified, flattened, and enlarged with an epidermoid aspect, following the greater

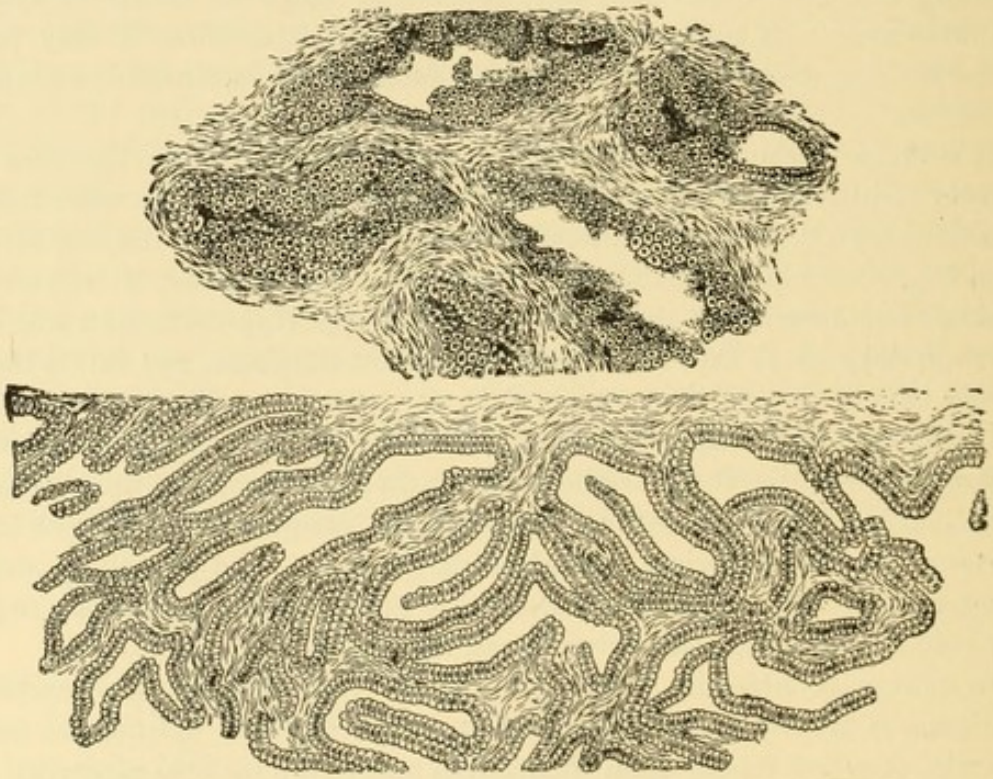


FIG. 231.—MALIGNANT ADENOMA OF THE UTERINE MUCOUS MEMBRANE. Beginning glandular epithelioma (Ruge and Veit).

or less rapidity of the proliferation, and the gland cells also stain with more difficulty. The space which the gland occupies by its increase may be fifty

times that of its original volume. The epithelial proliferation may begin upon one of the walls and fill the cavity little by little, so that at last there remains but an insignificant portion still covered with a single layer of epithelium; or it may start from the whole circumference of the gland at once and leave the cavity persisting. In other cases the glandular canal disappears so that there is only a solid mass of cells. Finally the proliferation of the cells may begin from many points at once and form by their junction a series of bridges which divide the cavity into several compartments. These glands, in part degenerated, form the last term between those which are still normal and those which are transformed into solid cylinders, stuffed full of cancerous cells.

As regards symptoms, prognosis, and treatment, malignant adenoma is identical with cancer of the uterine body.

Cancer of the Body of the Uterus.

Cancer of the body of the uterus presents various anatomical forms which correspond to distinct clinical types, as follows:

1. Cancer of the mucous membrane:
   - *A.* Epithelioma (French authors).
     Carcinoma (German authors).
   - *B.* Sarcoma.
2. Cancer of the parenchyma (fibro-sarcoma, sarcomatous fibroma).
3. Deciduoma malignum.

Primary cancer of the body of the uterus has until recently been regarded as very rare. Gallard found but two cases in his long career, and Pichot in 1876 could collect only forty-four cases among French and English authors.

This apparent rarity depends upon the fact that the older gynæcologists seldom employed exploratory dilatation, and almost never exploratory curettage. Thanks to the modern means of investigation we now know that primary cancer of the uterine mucous membrane is far more frequent than had been thought to be the case; thus Gusserow has published 122 cases. The relative frequency of cancer of the body and of the cervix is, according to Szukits, in the proportion of 1 to 420. More recently, Schröder in 812 cases found 28 of primary cancer of the body, and Schatz among 80 cases found 2.

I. *Epithelioma or Carcinoma of the Mucous Membrane.*

The German school ordinarily applies the term carcinoma to the form which the French school now designates as epithelioma. I shall consider these two terms, which suggest but one and the same lesion, as synonymous. One might almost describe this lesion as cancer of the menopause, in view of its great frequency at that epoch of the genital life. It originates in a

transformation from the conditions of glandular metritis, such as I have described, which may be followed step by step in the same patient by repeated curettings.

Pathology.—Macroscopically we may distinguish two varieties. In the one there is a diffuse growth of villi throughout the whole uterine cavity, which gives to its section the aspect of a ripe fig (Figs. 233 and 234); in the other there is an isolated fungoid growth with a large or small base, which at times has the form of a polyp (Fig. 232).

It is worthy of note

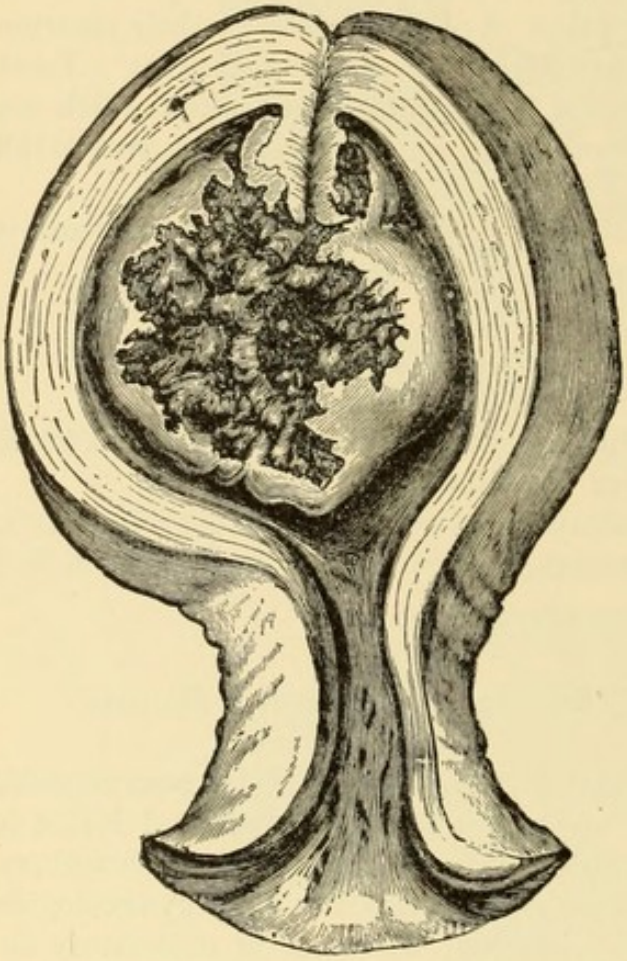


Fig. 232.—Epithelioma of the Uterine Mucous Membrane, Circumscribed Form.

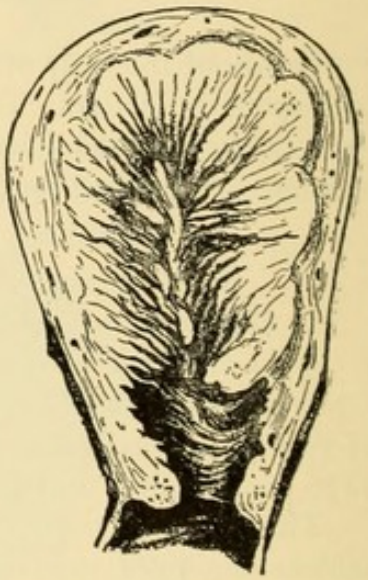


Fig. 233.—Epithelioma of the Uterine Mucous Membrane, Diffuse Form.

that the neoplasm has little tendency to invade the mucous membrane of the cervix. This peculiarity is both an added difficulty in diagnosis and an advantage in the matter of treatment. The uterine wall, on the contrary, is little by little eroded and destroyed. Metastatic nodules form in various points of the parenchyma, and even under the peritoneum, causing protective adhesions of that membrane between the uterus, the bladder, and the intestines. Occasionally fatal peritonitis has been caused by perforation. Frequently these metastatic nodules are found superficially in the vagina and deeply in the ovaries, tubes, etc.

Histologically these tumors are tubular or lobulated epitheliomata provided with tubes which for the most part are very large and form anastomoses with each other, with the peculiarity that the first layer of cells implanted

upon the wall is regularly cylindrical. These cells are of long shape, and have nuclei which stain strongly. The successive layers are formed by polyhedral cells which are at times of the pavement variety. The most internal become mucous, cover the granulations, and often present complete atrophy of their nuclei.

When a section is examined under a low power to obtain a comprehensive view of the neoplasm, a number of alveoli may be discerned, whose thin walls are carpeted by cylindrical epithelial cells in one or two layers only.

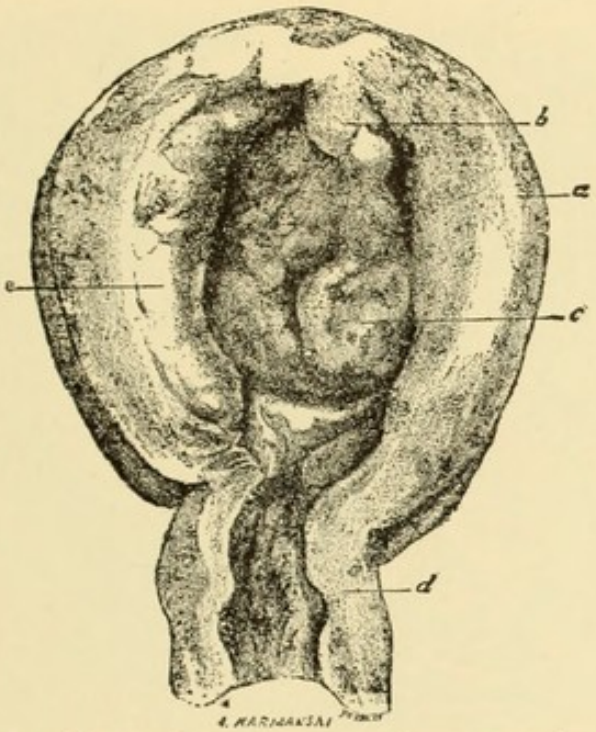


FIG. 234.—EPITHELIOMA OF THE UTERUS; DIFFUSE FORM, WITH CIRCUMSCRIBED THICKENING. *a*, Muscular wall of the uterus; *b*, *c*, section of neoplasm; *c*, surface of neoplasm; *d*, cervix, not involved.

In the fresh state, large cavities are also found which contain a mucous liquid holding cells in suspension (Fig. 235). It is easy to understand the method of formation of these cavities. The fibrous wall which circumscribes them contains capillary vessels penetrating into the epithelial layer, and covered by it. These vessels present vegetations under the form of papillæ, which are seen sometimes cut longitudinally, sometimes transversely, in which latter case they appear to be surrounded by cylindrical cells. There are also mucous cavities in the midst of the epithelial investment, so that certain tubes, originally narrow, are transformed into large cavities.

With the higher powers the conditions are more easily understood (Figs. 236 and 237). Besides the lesions, which are wholly epitheliomatous, the alterations of chronic metritis are almost constantly found. To avoid errors many sections should be examined, and not merely a few small fragments.

The great quantity of cylindrical cells in these tubular or lobulated formations distinguishes these epitheliomata of the uterus from ordinary tubu-

lar pavement epitheliomata, such as are found in the integument. They are in reality a special form, peculiar to the mucous membrane where they are developed.

At an advanced stage of evolution, cancer of the body of the uterus may ulcerate, or, as Cornil has found, the mucous membrane may be preserved and merely elevated by the epithelial lobules.

The mucous membrane of the body of the uterus is usually easily recognized, for its epithelial cells are preserved although covered by certain wandering cells, but its glands are atrophied and their cylindrical cells are very

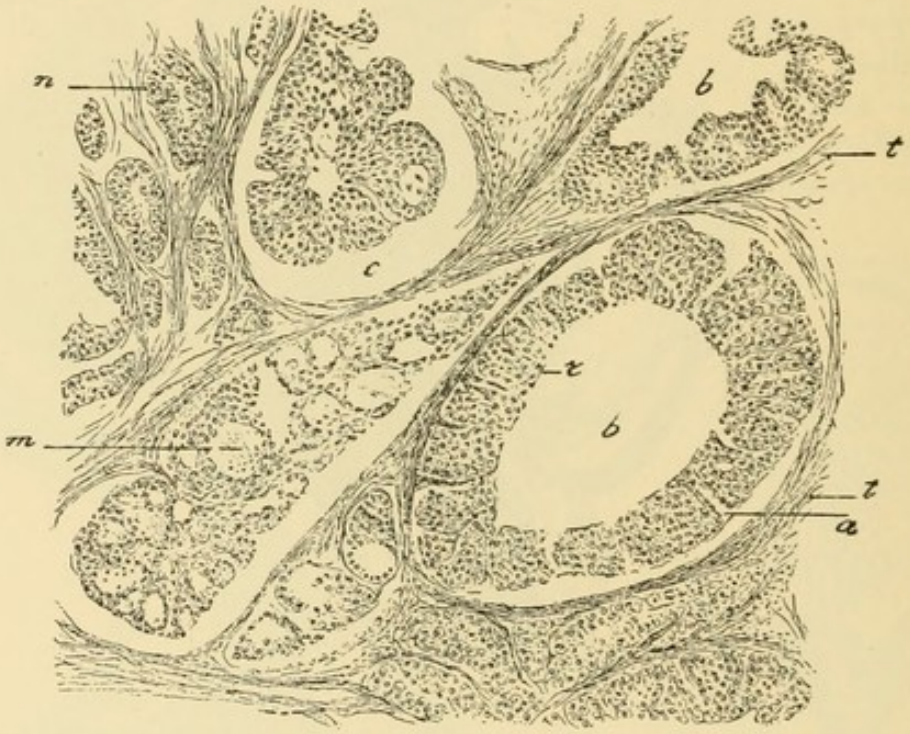


FIG. 235.—EPITHELIOMA OF THE UTERUS. × 120. *b*, *b*, Lobules of the epithelioma; *m*, lobules showing empty spaces, which are either transverse sections of vessels or cavities filled with cells in mucous degeneration; *n*, smaller alveoli of the epithelioma. Nearly all of these epithelial cells have a tendency toward isolation by the walls of the spaces that inclose them.

small, the connective tissue being thin and compressed. In other places the mucous membrane is reduced to a very thin layer of connective tissue lined by one simple layer of cylindrical cells (Fig. 238).

At a later period the muscular layers are infiltrated by the neoplasm, and there may also be extension to the tubes and ovaries.

I have described as a unique anatomical curiosity a case of primary pavement epithelioma of the body of the uterus, observed by O. Piering and others.

Symptoms.—Hemorrhage is the primary symptom, and, as in cancer of the cervix, it is usually accompanied by a serous discharge of a reddish color and a stale, disagreeable odor; with this there is often a discharge of small shreds of tissue from the broken fungosities.

The pains and the other functional and reflex symptoms are, for a long

time, those which I have described under the head of the uterine syndroma (*vide* metritis); but according as the disease becomes more advanced the pain takes on a paroxysmal character which is remarkable and almost pathognomonic. These crises of excruciating pain described by Simpson are wrongly attributed, I think, by Schröder to contractions of the uterus caused by the effort to expel its abnormal contents. They have none of the characters of colic, and their appearance at regular hours once or twice a day, even after the tumor has been destroyed by the curette, as I have observed,

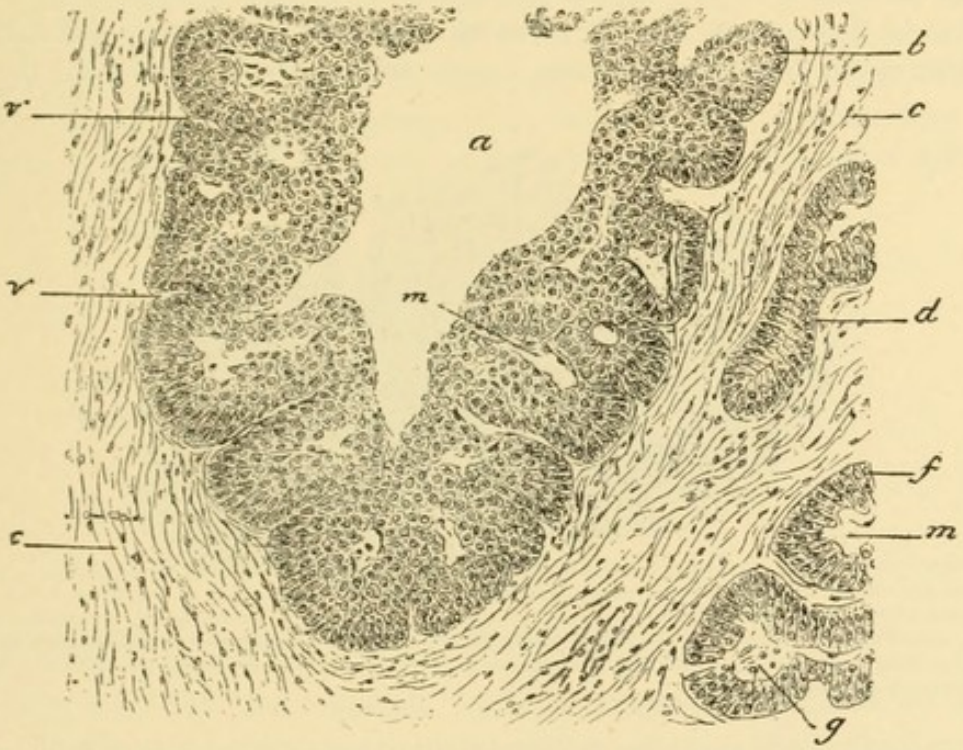


FIG. 236.—EPITHELIOMA OF THE BODY OF THE UTERUS. High power. *c*, Connective tissue; *d*, glandular cul-de-sac, but little altered; *f*, *g*, *m*, dilated and modified glands. Their investment is formed of cylindrical cells, *f*, but their cavity is full of cells, *m*, *g*, and the glandular membrane is wanting. *a*, Large cavity in the middle of an island of epithelioma. The epithelial mass is pierced by vessels which belong to the adjacent connective tissue, as seen at *v*, *v*, *m*, oblique sections of the same vessels (Cornil).

proves clearly that they are due to a veritable neuritis propagated along the nerves of the disorganized uterus.

Bimanual palpation determines that the organ is much increased in volume, being as large at times as the pregnant uterus at the fourth month. It remains movable for a long time, but finally becomes imprisoned by adhesions in the pelvis. By touch, the cervix is found to be free from the disease, but often much softened and partly open, as in the case of the gravid uterus.

The sound, which should be used with much precaution, reveals an increase in the capacity of the uterus, and the presence of irregular masses. At times the cervix may be sufficiently dilated for the finger to feel these fungosities within the uterus; if not, an artificial rapid dilatation will confirm the diagnosis.

The condition of the general health fails as the neoplasm develops and terminates in cachexia.

Diagnosis.—The hemorrhage, the serous discharge, the increase in the volume of the uterus, and the results of intra-uterine exploration constitute the clinical elements of the case, while the examination of portions removed by the curette clearly differentiate between cancer and metritis without malignant neoplasm, or between carcinoma and sarcoma. This examination is particularly necessary in order to differentiate cancer of the uterus from certain cases of fetid endometritis which occur in aged women.

It is in these cases, however, that we encounter the greatest difficulties in the differential diagnosis between cancer and metritis. With all the com-

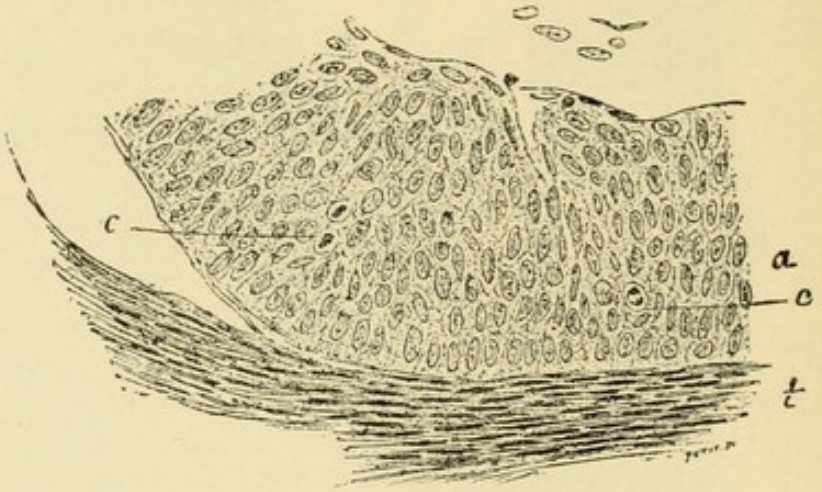


FIG. 237.—PRIMARY EPITHELIOMA OF THE UTERINE BODY. × 300. *a*, Numerous layers of stratified epithelium-the deepest being cylindrical; *e*, *e*, cells with karyokinesis; *t*, muscular tissue of the uterus, on which the cylindrical cells are directly implanted (Cornil).

mon rational signs, and especially persistent hemorrhage which has resisted the curette, we have only the resistance of the disease to therapeutic measures and the examination of small particles removed by the curette to enable us to decide the nature of the lesion. As Cornil has justly remarked, although histological diagnosis is easy when we have the whole uterus to examine, it is otherwise when we can secure only small fragments of the mucous membrane. The simple glandular hypertrophy of metritis may then be very difficult to distinguish from carcinoma, especially when the mucous membrane of the glands cannot be examined in the deeper parts. In the simple glandular hypertrophies there often exists between the culs-de-sac and the connective tissue a very regular layer of flat cells, which serve as the membrane of implantation for the epithelium. The vibratile cilia are almost always preserved and are found to the bottom of the gland. The mucous transformation of the cells is never complete, but occupies only their free extremities. The inter-glandular tissue is less charged with lymph cells, but in the epithelioma and the layers of young connective tissue they are arranged in regular lines which follow parallel to the excretory ducts. In the epi-

theliomata, on the contrary, there is at the same time a hypertrophic elongation of the glands and a multiplication of cells which rapidly lose the type of ciliated epithelium. As a result of this proliferation the lower part of the gland is filled full with an epithelial mass. The cells may either undergo a mucous transformation or take on the polyhedral or cuboid form. As soon as the walls of these glands are ruptured, the tumor presents the general disposition of epithelioma or carcinoma.

It may happen then, that as a last resort against the persistent hemorrhage which threatens the life of the patient, we are obliged to perform vaginal hysterectomy with only a diagnosis of probable cancer, but beforehand we must carefully assure ourselves by examination of the adnexa that they are not the cause of a reflex hemorrhage. Occasionally we can determine upon the organ so removed the presence of the characteristic lesions of epitheli-

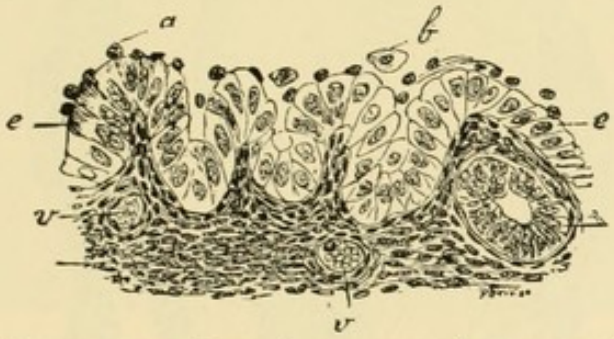


FIG. 238.—MUCOUS MEMBRANE OF THE CERVIX COMPRESSED AND ATROPHIED BY A CANCER DEVELOPED IN THE DEEPER LAYERS. × 300. *e*, *e*, Mucous cells of the clear epithelial investment, no longer having cilia; *a*, wandering cell on the surface of the epithelium; *b*, a desquamated epithelial cell; *t*, connective tissue of the mucous membrane compressed by the tumor; *v*, vessels; *g*, glandular tube (Cornil).

oma which were not demonstrable from the fragments obtained by the curette. Martin and Löhlein have published cases of this nature which are very instructive to the clinician.

A fibroma which is undergoing cancerous degeneration may be recognized by the aid of the microscope. The presence of metastatic nodules of a cancerous nature in the vagina will render the diagnosis clear.

The prognosis is grave; nevertheless an early operation has been followed by a long survival.

Etiology.—This form of primary cancer of the uterus is found chiefly in women who have reached the menopause, the average age according to Hofmeier being fifty-four years. Among thirty-one cases of malignant tumor, comprising many varieties which Pichot removed, only nine were below the age of fifty; in but one case was the influence of heredity manifestly present; nulliparæ were far more frequently attacked than in the case of cervical cancer. Only twenty-one per cent of Hofmeier's cases had never had children.

II. *Diffuse Sarcoma of the Mucous Membrane.*

Following Virchow, the name of diffuse sarcoma is given to thickening of the mucous membrane by proliferation of round or fusiform cells which infiltrate it and produce the type of young connective tissue, producing soft villous or lobulated tumors of an encephaloid aspect. This form of cancer is found most frequently in young women.

Pathology.—There is no need of dwelling upon the microscopic charac-

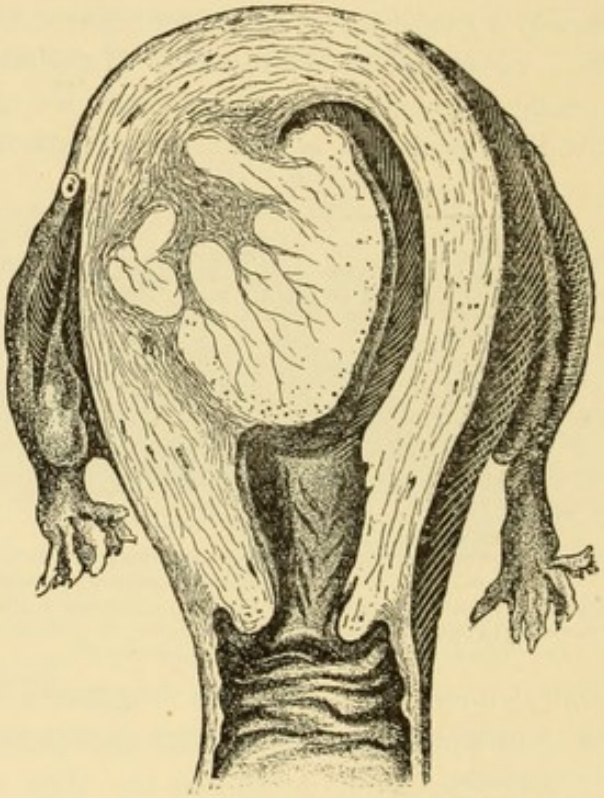


FIG. 239.—SARCOMA OF THE UTERINE MUCOUS MEMBRANE.

ters of sarcoma, which here present nothing of special interest (Fig. 240), except to notice that the histological elements of sarcoma and cancer have occasionally been united in the same tumor, thus constituting a mixed form or carcino-sarcoma.

When the sarcoma forms a pedicled tumor it may present in the cervix like a polyp. Its ulceration and disintegration are more rapid than in the case of epithelioma, and when the process has begun it may destroy the uterine parenchyma.

Abel, as I have already mentioned, affirms that diffuse sarcoma of the body of the uterus often coexists with cirumscribed epithelioma of the cervix, but he seems to have taken a purely inflammatory lesion for a sarcomatous growth.

Symptoms and Diagnosis.—The symptoms resemble in many particulars those of the preceding form. There is hemorrhage, a serous discharge, and

increase in the size of the uterus. The introduction of the finger discovers the neoplasm. The cervix is not involved. But sarcoma is distinguished from epithelioma by the following clinical characters. The discharge is less fetid during the early stages, the ulceration appears later, and the cervix is not so much dilated; possibly also a polypoid tumor may be found opening the cervix and descending into the vagina, at times causing inversion of the uterus. For the diagnosis from other diseases I refer to the preceding form.

Prognosis.—This is very grave, fatal recurrence being observed even when an early operation has been performed.

Etiology.—One of the most remarkable characters which separate this

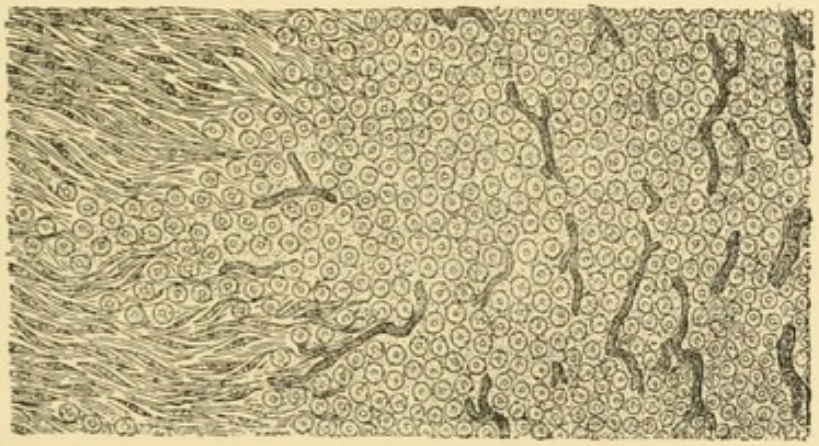


FIG. 240.—DIFFUSE SARCOMA OF THE UTERINE MUCOUS MEMBRANE. The neoplasm is separated from the peritoneum on the left by a well-marked layer of healthy muscular tissue several millimetres thick; the superficial portions toward the cavity of the uterus, on the right, are beginning to disintegrate. In the deeper parts are seen the connective-tissue fibrils, rich in fusiform cells with long and short processes. Between them is an amorphous basement substance with a large accumulation of round cells whose nuclei appear to resemble those of the others. In the superficial portions the bands of connective and muscular tissue have entirely disappeared, being replaced by round cells. The tumor is very rich in vessels, about which are foci of hemorrhage. In no part of the tumor can we find any trace of either mucous membrane or gland (Wyder).

neoplasm from epithelioma is the age at which it occurs, there being many cases of it among women of less than twenty years. Zweifel has reported one case of hysterectomy performed for uterine sarcoma in a child of thirteen. It especially attacks nulliparæ. The first histogenetic stage seems to be an interstitial endometritis. As this has so often been observed in the body of the uterus when the cervix is the seat of epithelioma, it is conceivable that the metritis may transform itself into sarcoma, according to the still disputed opinion of Abel, whence the frequent coexistence of these two different neoplasms in the same uterus.

III. *Fibro-sarcoma.*

Synonyms: Sarcoma fibrosum seu nodosum, circumscribed fibro-sarcoma, sarcoma of the uterine parenchyma.

Pathology.—From a clinical point of view this form might be called malignant fibroma; like its benign homologues, it occurs as a submucous, in-

terstitial, or subserous tumor. Like them also it takes its origin in the parenchyma of the uterus; but instead of being limited by a loose capsule, it is, as a distinctive characteristic, deeply rooted. On section its surface is pale and its consistence homogeneous and soft. When it has a pedicle it is apt to be fibrous, showing that it has come from a degenerated fibro-muscular polyp. The vestiges of a structure which was at first benign may at times be recognized in the sessile tumors, but in others the characteristic tissue of sarcoma—namely, the accumulation of round cells, in places fusiform—is traversed by a few bands of connective tissue. It is very probable that a fibro-sarcoma always originates in a fibro-myoma; this degeneration may often be detected, as the remarkable observations of Chrobak, Müller, Simpson, Frankenhäuser, and Kurz demonstrate.

Metastatic nodules have been observed in the vagina, the peritoneum, the lung, the liver, and the vertebræ.

Transformation of fibro-sarcoma into myxo-sarcoma, cysto-sarcoma, and other mixed forms is exceedingly rare, of which a remarkable case of Gusserow's of a myxo-sarcoma with metastasis to the peritoneum, and another of Rabl-Rückhardt's, where there was a combination of carcinoma and fibro-sarcoma, are noteworthy examples; the partisans of the proposition defended by R. Maier might even see here a proof of the direct transformation of sarcoma into carcinoma.

Symptoms.—At first nothing distinguishes fibro-sarcoma from a benign fibroma, the signs being hemorrhage under the form of menorrhagia or metrorrhagia, with a serous discharge, a non-odorous hydrorrhœa, moderate pain, and increase in the size of the uterus. The physical phenomena are those of a non-ulcerated tumor which may be reached by the finger if the cervix is dilated and the tumor submucous.

Later on, ulceration of the neoplasm alters the scene; the bleeding becomes an almost continuous oozing; the leucorrhœa has a fetid odor and contains débris which under the microscope is found to be made up of sarcomatous tissue; the pain increases and takes on a regular paroxysmal character, as already described under carcinoma of the mucous membrane. Local examination by the finger in the intact but dilated cervix permits us to feel the tumor which projects between the lips of the organ. The uterus may be greatly increased in size and is often retroverted and rendered immovable during the later periods of the disease. Inversion of the uterus has also been observed as a consequence of sarcoma. The cachexia becomes progressively more pronounced.

Frequently this second phase is preceded by a temporary improvement due to the removal of the tumor under the idea that it is a simple fibroma, but even during the operation there is a suspicion that it may be of a more serious character because of the intimate fusion with the adjacent tissues which renders enucleation impossible. A rapid recurrence leaves no room for doubt; this character is so pronounced that English authors have termed

it "recurrent fibroid." Freund has observed one very curious case of fibro-sarcoma in an atresic uterus which had caused hydrometra.

Diagnosis.—The suspicions to which the rational and general symptoms give rise are confirmed by the finger introduced deeply into the uterus, after dilatation if necessary. The only condition with which it might be confounded at the outset would be hemorrhagic metritis or fibroma. Later in the course of its development it might resemble a sloughing fibroma, an epithelioma, or a sarcoma of the mucous membrane. The examination by the microscope of fragments by the curette would be of valuable assistance in deciding the question.

The duration of the disease varies from four months to ten years; the average is three years.

The prognosis varies, but is always serious; the disease recurs most quickly in young patients and with tumors of a very rapid development.

Etiology.—From all the cases published up to 1885, Gusserow derived the following table, which shows the influence of age:

Before twenty	4 cases.
From twenty to thirty	5 "
" thirty to thirty-nine	15 "
" forty to forty-nine	28 "
" fifty to sixty	18 "
Above sixty (of which one case was at seventy-two)	3 "

This table demonstrates the predisposition created by the menopause as in the case of other malignant growths. In seventy-four cases analyzed by the same author in regard to fecundity and sterility, there were twenty-three women sterile, of whom four were virgins. This proportion seems very high and forms a contrast with that which I have said as to the predisposition of multiparæ to cancer of the cervix.

III. *Deciduoma Malignum.*

The malignant tumors which follow pregnancy, and which are termed deciduoma malignum, have but recently been known. R. Maier, who originated the name, had suspected their connection with the decidua, but to Sänger belongs the merit of having distinctly defined their clinical characteristics and of having called attention to the special nature of these neoplasms. They have since then been the subject of many articles and discussions.

Pathology.—Macroscopically, the deciduoma malignum presents no features which distinguish it from ordinary cancer of the body of the uterus, with which it has undoubtedly often been confused by the older writers. It occurs habitually in the form of nodules, often multiple; rapidly invading the entire thickness of the uterine wall and projecting both into the uterine cavity and toward the peritoneum (Fig. 241). These nodules are generally

soft and friable, easily penetrated by the finger. Their tissue is of low vitality, and their surface ulcerates very rapidly, causing severe hemorrhages which are one of their most marked clinical characteristics. They become

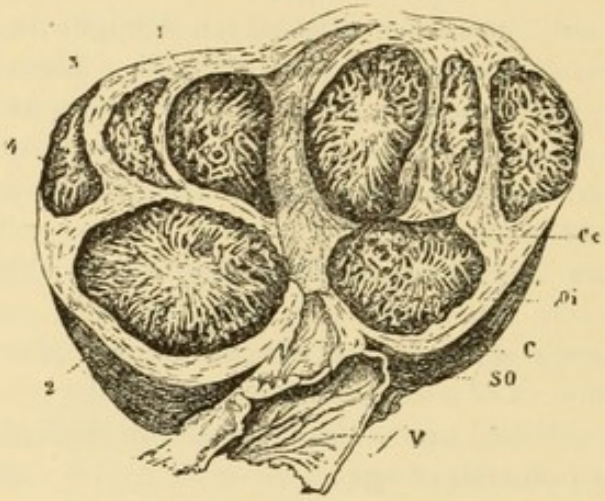


FIG. 241.—DECIDUOMA MALIGNUM OF THE UTERUS (SAENGER). Uterus divided through its anterior wall and opened. 1, 2, 3, 4, Tumors; *Cc*, uterine cavity; *Oi*, os internum; *C*, cavity of cervix; *SO*, peritoneum of uterus; *V*, vagina.

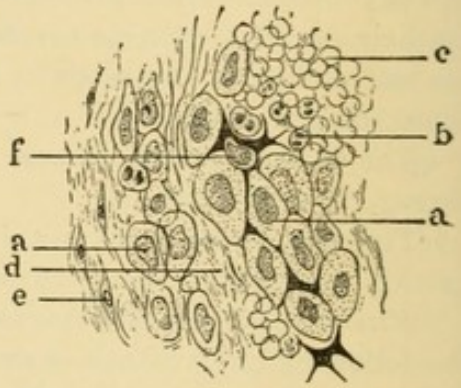


FIG. 242.—SECTION OF PORTION OF DECIDUOMA (FIG. 241). *a*, Decidual cells; *b*, leucocytes; *c*, blood corpuscles; *d*, intermuscular cellular tissue; *e*, fusiform cells; *f*, reticulum.

generalized with great rapidity and give rise to metastatic nodules which have been observed principally in the lungs, vagina, ovary, broad ligaments, and diaphragm.

Histologically the deciduoma malignum is characterized by the presence

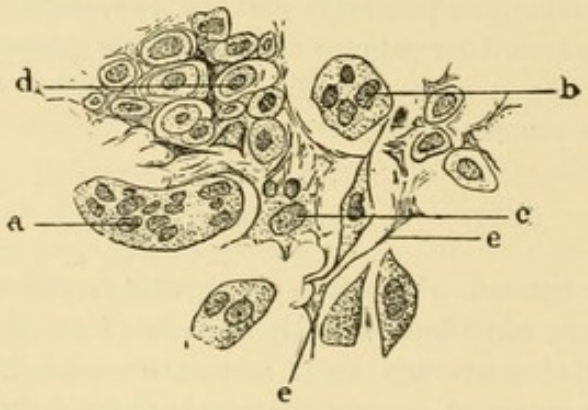


FIG. 243.—VERY SMALL SECTION OF FRAGMENT OF DECIDUOMA (FIG. 241). *a*, Decidual cells with thirteen nuclei; *b*, same with four nuclei; *c*, giant cell in process of formation, with three nuclei; *d*, uninuclear decidual cell enclosed in a reticulated stroma; *e*, reticulated stroma.

of large cells (Figs. 242 and 243) concerning whose origin authors are far from agreeing. According to Lacroix these cells are essentially polymorphous. A large number of them are round or polygonal with rounded angles; in this case their epithelioid appearance is very marked. When these cells are crowded together they become polygonal with sharp angles, fusiform and more or less elongated. Their protoplasm is most often granular; sometimes, however, it appears more homogeneous and stains more deeply with the

ordinary reagents. These large cells of the deciduoma contain one or more nuclei. The cells occur in different parts of the tumor, either singly, or in small groups (Figs. 244 and 245), or in masses of considerable size. In the

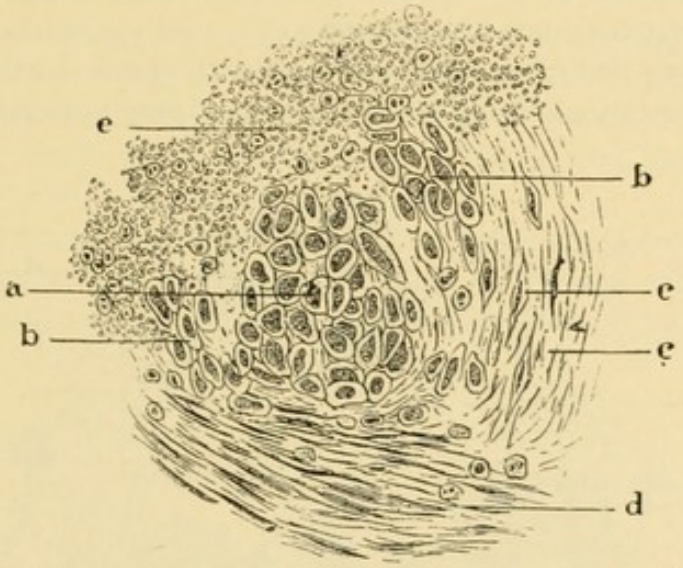


FIG. 244.—SECTION OF ANOTHER FRAGMENT OF DECIDUOMA (FIG. 241). *a*, Group of decidual cells resembling cancer nest; *b*, *b*, groups apparently in process of formation; *c*, intermuscular cellular tissue; *d*, muscular fibres; *e*, extravasation of blood.

first case they grow into the interstices of the connective tissue, push aside fixed cells and fibres, and penetrate even into the interior of muscular bun-

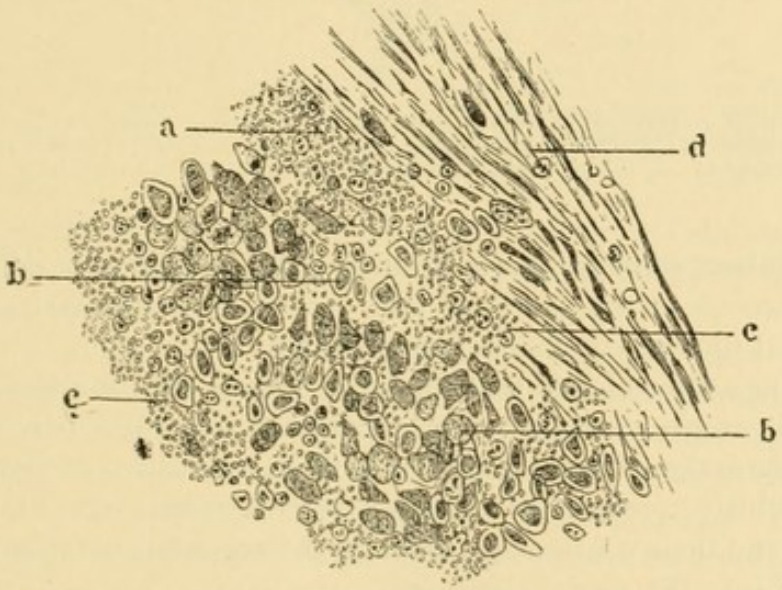


FIG. 245.—SECTION OF ANOTHER FRAGMENT OF DECIDUOMA (FIG. 241). *a*, Venous capillaries; *b*, *b*, nests of disintegrating decidual cells; *c*, extravasations of blood; *d*, muscle.

dles. When, from their rapid multiplication, these cells become united into groups, the connective and muscular tissues between them atrophy.

Without following the discussions upon the nature and origin of these cells, we content ourselves with stating that some believe them to originate

from special cells of the decidua by simple proliferation; others consider them as epithelial in nature, an opinion which has tended to become common since Marchand's important article, but differ as to their point of origin, which some believe to be the decidua serotina, others the chorionic villi. Ruge thinks that they are sarcomatous cells existing before pregnancy, and assuming during that period an appearance of decidual cells. This divergence of interpretations has given rise to a confusing nomenclature: sarcoma

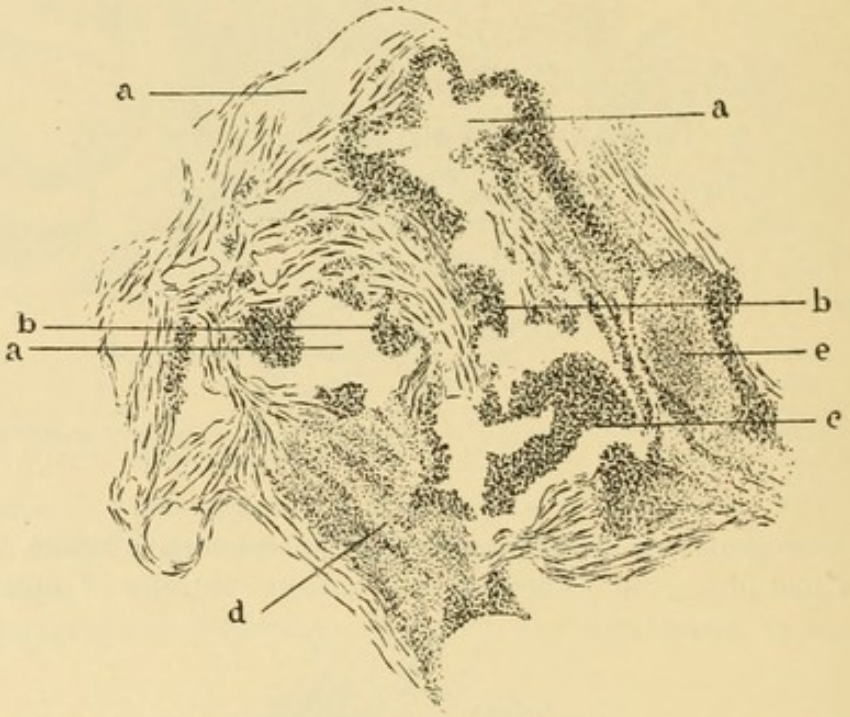


FIG. 246.—SECTION AT POINT OF TRANSITION OF TUMOR INTO UTERINE TISSUE (FIG. 241). *a*, *a*, Section of veins of muscular tissue; *b*, *b*, sarcomatous proliferations along internal wall of veins; *c*, muscle tissue which has become entirely sarcomatous; *d*, necrotic portion of muscular tissue infiltrated with leucocytes; *e*, *e*, extravasations of blood.

deciduo-cellulare, sarcoma chorio-deciduo-cellulare, blastoma deciduo-chorio-cellulare, sarcoma of the chorionic villi, deciduo-sarcoma uteri giganto-cellulare, decidual tumors, carcinoma syncytiale uteri.

Two things show clearly that the large cells of the deciduoma, whatever may be their origin, constitute a characteristic element which justifies the separate place assigned to this affection in the classification of tumors. These are: the exclusive presence of cellular elements of this type in these uterine neoplasms, and their constant presence in the secondary nodules observed in the lungs (Fig. 248), vagina, or ovary.

Symptoms.—The onset is generally insidious, and it is difficult to say how long after the delivery or abortion the tumor appeared. It usually announces its presence by metrorrhagia, but this may be absent throughout the entire course of the affection. The hemorrhages are characteristically profuse and persistent, and reappear quite abundantly and at a short interval after curettage of the uterus; exceptionally, they cease entirely after curet

tage. These hemorrhages are the essential symptom; the others are secondary. The fetid discharges come on only later, generally after an examination or an intra-uterine treatment; they are accompanied by fever and indicate a secondary infection.

The uterus increases progressively in size, as is easily appreciated by bimanual examination. Irregularities of its wall may be noted. The finger introduced into the uterine cavity after preliminary dilatation ascertains the existence of the tumor, notes its special consistence, and can if necessary remove a fragment for microscopic examination.

As Nové-Josserand and Lacroix have stated, the very circumscribed spot of softening produced by the deciduoma malignum, through which the finger may be passed often close to the peritoneum, is limited by well-marked bor-

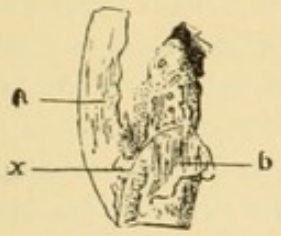


FIG. 247.—POINT AT WHICH SECTION SHOWN IN FIG. 246 WAS MADE. *a*, Uterine wall; *b*, nodule of tumor.

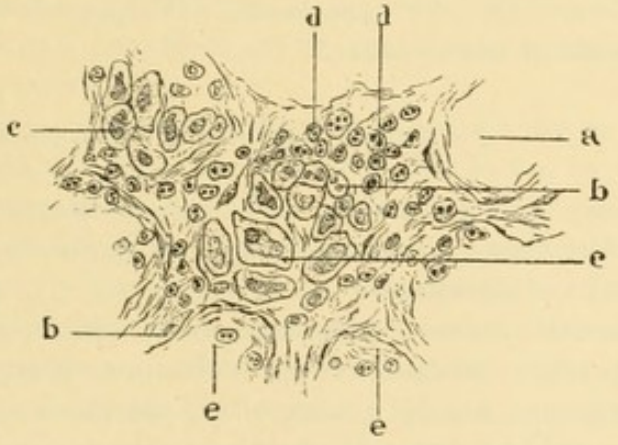


FIG. 248.—SECTION OF METASTATIC NODULE IN LUNG. *a*, Small pulmonary vein; *b*, *b*, pulmonary endothelium; *c*, *c*, decidual cells in interior of alveoli; *d*, *d*, intra-alveolar cellular tissue infiltrated with leucocytes; *e*, *e*, alveoli with fibrinous exudate.

ders having the normal consistence of uterine muscle. This softening has only a very distant resemblance to the rather uniform friability of the entire uterus after an abortion.

The affection rapidly proceeds to a fatal termination. Gradually a progressive anæmia is established, which in a short time ends in cachexia. The metastases, which are rather constant, are visible when occurring in the vagina, or give rise to special symptoms when they are situated in the lungs (dyspnœa, cough, blood-stained expectoration, physical signs of consolidation of the lungs, or a pleuritic effusion). They have in several instances confirmed the diagnosis, which was doubtful before their appearance. They shortly precede the fatal termination. The entire duration of the affection is not more than six or seven months.

Prognosis.—This is exactly the same as that of common cancer of the uterus. In the observations collected by Cazin it is seen that death rapidly occurred in all patients who were not surgically treated, or who did not submit to a palliative treatment of one or more curettages. Recurrence has

been observed in three cases in which vaginal hysterectomy had been performed; in three, who had undergone this operation a longer or shorter time before, recurrence had not yet taken place. One of them, operated upon by Segond in September, 1893, is now in perfect health, locally and generally; she had, however, an extension already to one of the ovaries, as Cazin discovered by the histological examination of the uterus and appendages.

Etiology.—From an etiological point of view, the only certainly known fact is that deciduoma malignum follows a pregnancy. In quite a number of cases the appearance of these tumors has been preceded by the expulsion of a hydatidiform mole. At what moment do these tumors develop? Is it during pregnancy or after labor or abortion? Are they simply, as Veit and Ruge hold, sarcomata in existence before pregnancy and undergoing certain cellular modifications as a result of this condition? These questions can be answered only by hypotheses. We possess no information as to the original cause of the affection.

Treatment of Cancer of the Body of the Uterus.

There is no great difference in the treatment of the various forms of cancer of the uterus; that which follows applies as well to epithelioma as to sarcoma and deciduoma.

The indications are the same as for cancer of the cervix. Perform a radical operation whenever there is reason to hope that the disease may be removed entire, and the gravity of the operation is justified by the great benefits which are to be derived from it; in other cases limit the interference to palliative treatment.

The method of choice is vaginal hysterectomy performed as early as possible, before there is much enlargement of the uterus. Schröder advises us to remove by the vagina a tumor which does not exceed the volume of the fist. This limit is purely theoretical, and by the aid of morcellation can be markedly exceeded. I know that morcellation in cases of cancer of the uterus submits the woman to the risk of infection, but this consideration should be relegated to second place on account of the facilities for operation which this method gives. It is to be noted that the immediate success of the vaginal operation is much facilitated by the fact that the cervix is normal, so that there is but little risk of infecting the wound.

When the lesions are very extensive, some surgeons (especially in Germany) have had recourse to hysterectomy by the sacral route, which I have described in the preceding chapter, instead of relying, as I advise, upon a series of curettages and energetic cauterizations. Up to the present time, when the uterus has been too large for vaginal extraction the custom has been to remove it through an abdominal incision. Two methods may be needed:

1. If the cervix has remained healthy, we may excise the fundus and use

the cervix for a pedicle; in other words, perform a supra-vaginal hysterectomy (which should not be confounded with total hysterectomy). But unfortunately the cervix will furnish a stump which is far too short to be fixed externally, and it must therefore be abandoned within the peritoneal cavity, sutured by Schröder's method as described under the head of myoma. We must determine beforehand that it is healthy, and curette its interior and cauterize it with the thermo-cautery.

Abdominal hysterectomy for cancer of the uterus in Schröder's hands has given four deaths in thirteen cases, or thirty-one per cent.

Rapid return of the disease is *a priori* to be feared from the fact that the section of the cervix necessarily goes so near to the altered tissues. However, in eleven cases of cure by Schröder three only succumbed to a recurrence during the first year, four were still in good health after two years, and two after five years. In the tenth edition of his book, Schröder speaks of one cure dating from five and one from seven years before, which evidently belonged to the same series.

2. If the uterus is very large and the cervix is involved, we can no longer do the supra-vaginal operation, but must perform total extirpation by the abdominal method. This operation was formerly employed for all cancers of the cervix and body, but by reason of its alarming mortality there was a return to the vaginal method as far less dangerous. The operation of Freund as actually performed is only a return to a method proposed by Delpech in 1830 (combining the hypogastric with the vaginal method). The typical operation of Freund as described in his first writings is no longer practised without the modification which was suggested by Rydigier, and which consists in freeing the cervix completely by the vagina before opening the abdomen. The perfected operation is performed as follows:

The patient is placed in Trendelenburg's position after the preparation which I have described for vaginal hysterectomy.

After the first and the second steps are executed, a tampon of iodoform gauze is placed in the vagina.

Third Step. Opening the Abdomen.—The incision begins at the umbilicus and extends to a finger's breadth above the pubes. It is well to suture the abdominal wall in mass at each side of the lower angle of the wound to avoid laceration or stripping of the peritoneum. If the abdominal wall is very rigid, one or both of the recti muscles may be severed near their insertion. Credé has proposed a very bold plan for the purpose of gaining more room, namely, the resection of a part of the pelvic wall. The intestines, which have a tendency to fall toward the diaphragm from the position of the patient, are held in that place by gauze compresses; but if there is no other way of obtaining room enough, a portion of the intestine may be drawn out of the wound and kept warm and moist by frequently renewed gauze compresses.

Fourth Step. Ligation and Section of the Broad Ligaments.—The uterus

is seized with a Museux forceps and drawn strongly out of the abdomen. Freund then ties the broad ligaments in three portions. In passing the lowest thread which is to include the uterine artery, he uses a needle trocar whose point can be pushed out of a canula and then retracted within it. When the operation has been begun by the vagina, this step is much simplified, for the uterine artery has already been tied from below. This preliminary has also the enormous advantage of enabling us to avoid the ureters more certainly, though it is also possible to see them after the abdomen has been opened. The vessels having been ligated, the broad ligaments are divided and the uterus removed. The separation from the bladder should be conducted with the greatest care after incision of the peritoneal pouch. If the patient is young, the ovaries and tubes should be removed with the uterus.

Fifth Step. Dressing.—The toilet of the peritoneum is to be carried out, the abdominal wound closed, and iodoform gauze placed in Douglas' pouch and in the vagina.

Freund prefers to close the vaginal wound by carefully suturing its edges to the peritoneum above, passing the sutures by the vagina and exercising strong traction on the ligatures of the superior portion of the ligaments, causing their inversion, so that there shall be a large cicatricial mass in the place of the uterus between the bladder and the rectum.

Bardenheuer employs a very complicated method of drainage.

Martin advises that the order which I have given be reversed, first removing the fundus by laparatomy and then the cervix by the vagina. He has performed this operation three times with two deaths, while the third patient died of a return of the tumor within the first year.

The statistics which Hegar and Kaltenbach have given in 1881 comprise 93 cases, with 63 deaths, or 68 per cent. In the third edition of their work (1886) they have presented the following figures: in 119 cases there were 80 deaths, or 67.2 per cent; also 4 operations which were not completed and 1 whose result is unknown, that is, 5 which may be counted as among the fatal cases. The tumors recur very rapidly and in almost every case. The preceding authors do not know of more than a single case of permanent cure, namely, a patient operated upon by Freund in 1878. Whenever they could follow the case long enough they always saw a return of the disease after a short respite. Total extirpation by the abdomen is then an operation of gravity and of doubtful benefit; and for my part I prefer the sacral method when vaginal hysterectomy seems to be impossible.

When the limits of the uterus have been passed by the growth of the tumor, we are confined in our efforts to merely palliative treatment, the curette and cauterization (see chapter on treatment of cancer of the cervix).

Strict antisepsis of the vagina and uterine cavities is here of great importance, for the products of the disintegration of the neoplasm have but one means of exit—by the cervical canal—and by their presence in these cavities

they may produce the symptoms of putrid intoxication. I have seen patients who appeared absolutely septicæmic return to life, so to speak, after the use of the curette, antiseptic tampons of iodoform, and persevering intra-uterine irrigation. Many of these cases are described in the thesis of my brother, Adrien Pozzi. The sublimate solution 1 : 5,000 is here more or less dangerous on account of the large absorbing surface. It must therefore always be followed by the use of filtered and boiled water, which is simply aseptic. For a more energetic disinfectant I am accustomed to employ injections of a cherry-red solution of permanganate of potash (one to two per cent) and as a deodorant one to two tablespoonfuls to the litre of Labarraque's solution.

In the case of acute septicæmic intoxication great benefit may be obtained from free intra-uterine irrigation followed by the introduction of small strips of iodoform gauze into the uterine cavity, leaving them in place twenty-four hours as a rapid and energetic means of disinfection. Antiseptic tamponing of the uterus has been recommended by Fritsch after curetting for cancer, both as an antiseptic and as a hæmostatic.

CHAPTER XVII.

DISPLACEMENTS OF THE UTERUS.

The uterus is connected posteriorly to the sacrum by the utero-sacral ligaments, whose inextensible and resistant fibres are attached to the organ at the level of the cervix. Its connections with the bladder in front and the round and broad ligaments at the sides preserve its normal position of slight anteflexion, which it retains as a vestige of its fœtal condition. The tonicity of the pelvic floor, of which the only weak point is occluded by the normal contraction of the vagina, prevents the abdominal contents from acting in the direction of their weight; the pressure is distributed over the whole surface and the uterus floats as if it were suspended in the midst of the organs of the lower pelvis which act as cushions for it. When the uterus is artificially drawn downward, this state of the pelvic contents becomes very apparent, for up to the moment when the utero-sacral ligaments are stretched and oppose any farther descent, the organ yields with but gentle resistance, as of a floating body which is slowly drawn under.

When the bladder is full, it pushes the uterus backward, so that its slight curve of anteflexion is obliterated, to be restored and exaggerated when the organ is again emptied. The rectum, when full, pushes the uterus forward and upward in a corresponding manner, though in the physiological condition this motion is seldom so pronounced that its action is noticeable. In the case of the bladder, however, it is important, especially as social customs, which very quickly become organic habits, exaggerate it considerably.

There is then but one point of attachment where the uterus is at all firmly fixed, namely, that of the posterior ligaments, and, as they are inserted where the organ is thinnest, evidently its position may be compared to that of a pyramid balanced upon its point. This paradoxical condition does not exist in the lower animals but is an anomaly in the animal kingdom, explained by the upright position of the human species.

When we consider the extensive changes of volume, form, and consistence which the uterus undergoes at each pregnancy; the alterations and lesions which may be produced by parturition on the adjacent organs, ligaments, muscles, and serous membrane; and finally the influence which efforts of all sorts may exert on an equilibrium so unstable—we are surprised that uterine displacements are not more frequent.

In the description of displacements I shall treat first of those which are produced in the vertical planes, comprising flexions and versions, for which

I reserve the name deviations, and next of those which follow horizontal planes, *i.e.*, elevation, prolapse, and inversion.

Classification.—The displacements in the vertical planes are commonly divided into versions or flexions according as the uterus as a whole is involved or only the body flexed on the cervix. There may be therefore ante- and retro-flexion, and ante- and retro-version, and latero-version and flexion. The latter are rare in the simple form, but they exist in combination with the others. When the uterus is displaced *en masse* backward or forward, it is called ante-or retro-position, two words which have only a descriptive value.

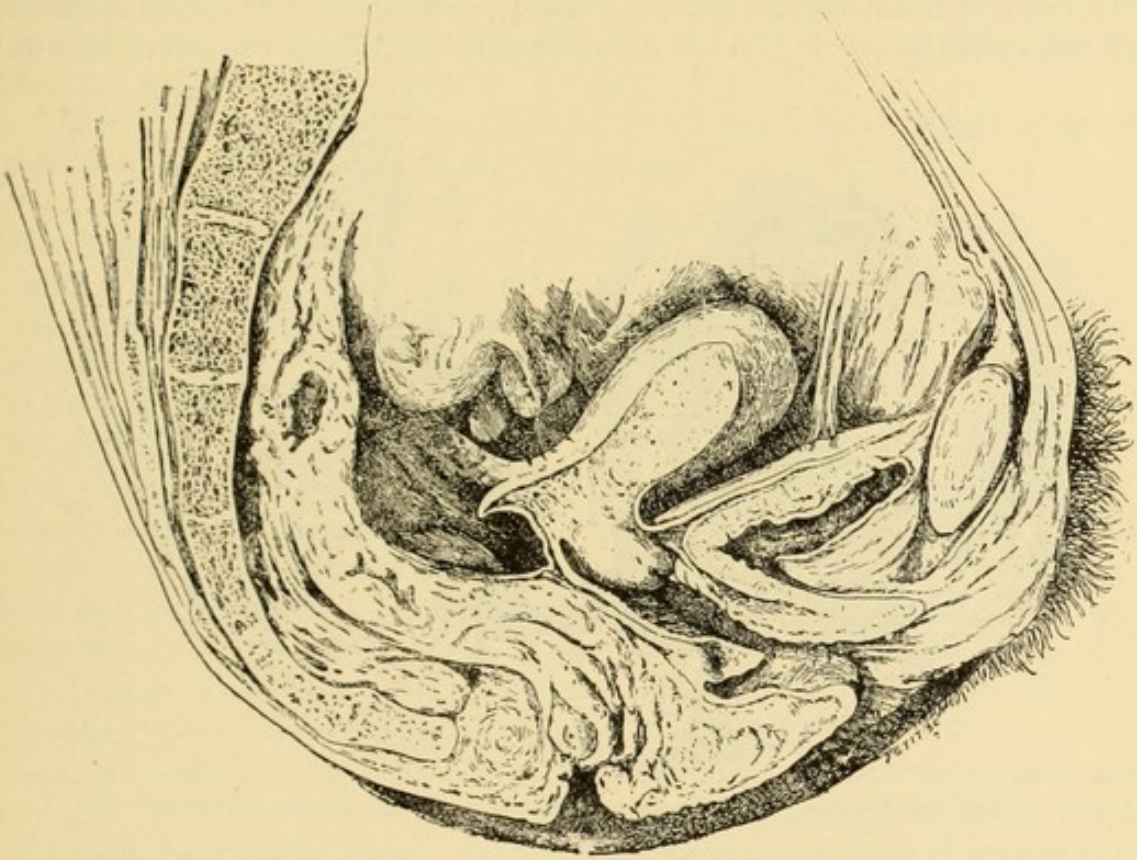


FIG. 249.—POSITION OF THE UTERUS, WITH THE BLADDER EMPTY.

Historical Review.—The history of uterine deviations has passed through several phases. They were unknown at the time, before Récamier, when all uterine maladies without neoplasm were attributed to prolapse; by Récamier and Lisfranc they were relegated to the second place by the prominence which these authors gave to ulceration; with Velpeau, on the contrary, their rôle in uterine pathology was much exaggerated. This latter belief, by which displacements were made the chief factor in gynæcology, endured till Gosselin produced a reaction in favor of metritis. The science becoming more analytic and more eclectic at the same time, the tendency was then to refer each disease to its proper place. There were also new elements introduced, up to that time almost ignored, which resulted from pathological conditions of the adnexa.

As is well known, displacement by itself does not constitute a disease, but is only a factor, or the coefficient in a morbid complex into which the deviation enters only as a variable. There is no gynæcologist who has not seen marked displacement in women who presented no symptom of disease, and certain authors, basing their statements on this fact, have not hesitated to deny the pathological importance of deviations completely. They go from the one excess to the other. If the displacement does not constitute a disease by itself, it creates for the displaced organ a peculiar vulnerability which results from alterations in the circulation produced by the increase of the venous tension and the nutritive changes which may be the consequences of this condition; it favors and preserves inflammation of the uterus both in

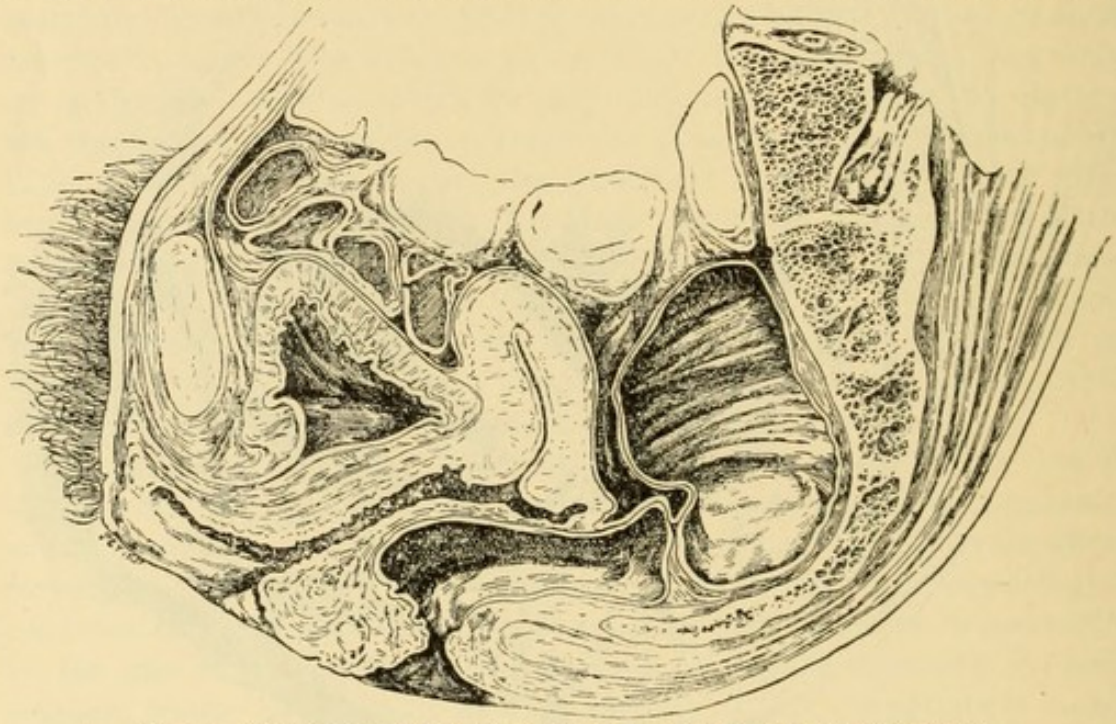


FIG. 250.—POSITION OF THE UTERUS, WITH THE BLADDER HALF FILLED (WALDEYER).

its cavity and on its surface. Prolapse of the adnexa, moreover, which frequently accompanied the inflammation of the uterus, may be the source of reflex nervous troubles whose importance, especially in the posterior displacements, should not be neglected. And the adhesions of peri-salpingitis, when that is added, may fix the uterus in the vicious position, and thus render all resulting phenomena the more distressing.

From the preceding it is evident that the conception of uterine displacement, which was formerly so simple and referred to one point of pathology alone, comprehends for us, under the same clinical term, complex elements whose treatment should be considered of the first importance, even before that of the actual change in the axis of the organ; of these the chief are: metritis; prolapse of the adnexa, either healthy or inflamed; peri-salpingitis; and, especially at the beginning of the treatment, excessive mobility of the uterus due to laxity of the ligaments.

Displacements Forward—Anteversion.

Pathology and Etiology.—The normal curvature of the uterus coincides fairly well with the curvilinear axis of the pelvis. In anteversion this curve becomes straight, as the uterus falls forward and the organ lies just behind the pubes upon the bladder, the cervix presenting directly backward (Fig. 251). The uterus is usually somewhat increased in size by a certain degree of metritis, and there often exists a perimetritic exudation toward one of the poles of the organ, sometimes in front at the level of the fundus, sometimes behind at the level of the cervix, which tends to fasten the uterus in its abnormal position.

The great cause of anteversion is to be found in the structural changes which occur after labor and abortion, or in the course of an abnormal involution, caused by a slight degree of infection. The organ takes the position while it is still soft and yielding, and maintains it because its normal tonicity fails to return. Then there are adhesions formed and the uterus becomes fixed. The presence of a tumor which by its weight causes the deviation is only of secondary importance.

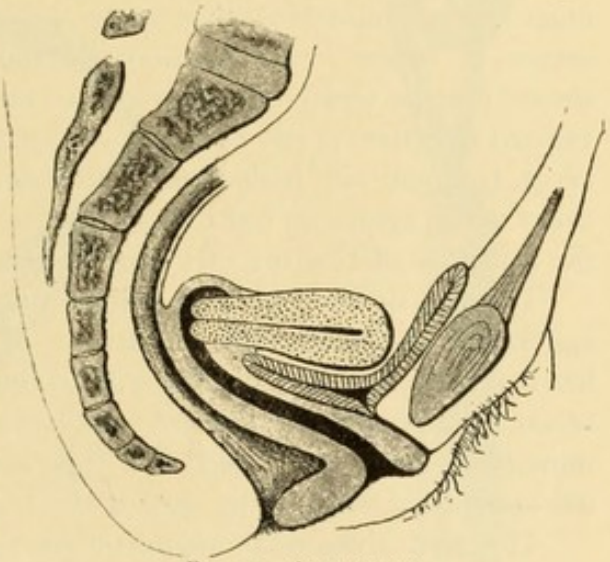


Fig. 251.—Anteversion.

[Anteversion being but an exaggeration of the normal position, but rarely causes symptoms or needs treatment except when complicated by parametritic adhesions or contraction of the utero-sacral bands, which markedly limit its mobility. In a limited number of cases of anteversion, with marked relaxation of the uterine supports and "descent" when in the erect position, the ring pessary may be needed as advised below.]

Symptoms.—The uterine syndrome which I have described in discussing metritis reappears here in all its characters. The rectal and vesical tenesmus are especially noteworthy, are exaggerated by the pressure of the uterine body and neck, but yet may be absent or may exist with simple metritis. The nervous reflexes which result are due to the uterine mobility and the enteroptosis which it causes more than to the mere displacement, which is demonstrated by the effectiveness of immobilization by means of the pessary.

Diagnosis.—The diagnosis is easily made clear by bimanual palpation. The finger in the vagina seeks for the cervix far in the rear, then, carried forward, feels the body of the organ through the anterior cul-de-sac and may follow its anterior surface, while the hand placed above the pubes examines

the posterior, placed horizontally. The passage of the uterine sound is usually difficult and is seldom necessary. It should be employed only when there is any doubt as to the nature of the tumor felt in the anterior vaginal pouch, or if the fundus cannot be differentiated from a tumor above it, such as a fibroma or an inflammatory or hemorrhagic exudation. Anteflexion may be recognized by the curve which exists at the junction of the cervix with the body. To facilitate the passage of the sound into the cervix, the anterior lip may be seized with a tenaculum and drawn gently downward. Rectal touch in such cases is often of great service in determining whether the fundus is in its normal position.

Treatment.—As it is the metritis which causes the anteversion and keeps it up, we must address our efforts in the first place to that disease; but before beginning a vigorous treatment of the uterine mucous membrane, we must assure ourselves that there is no acute inflammation about either uterus or tubes. Should there be acute perimetritis or salpingitis, they should first be treated by appropriate means, among which I include very hot vaginal douches [110° F. and for twenty to thirty minutes], tampons of glycerin, frequent sitz baths, and vesication over the hypogastrium; then when every acute symptom has disappeared, we perform curettage and follow it by the injection of tincture of iodine or perchloride of iron as already described.

There is no need here to replace the organ, for its position is only an exaggeration of the normal condition. If the pain persist after the metritis has been cured, it can be due only to reflexes which take their origin from the relaxed ligaments and the enteroptosis; it is then that the organ should be immobilized and sustained, and this may be accomplished either through the abdominal walls or by way of the vagina.

The best abdominal supporter in the case of forward deviation is that which carries a movable cushion, which may be managed by a strap or a channel and screw after its application above the pubes (see Fig. 252).

The most serviceable form of pessary in anteversion is that which I term "the indifferent," because its sole function is to distend the vaginal pouches and thus immobilize the uterus and maintain the cervix. The pessary which is called Dumontpallier's in France and Mayer's elsewhere, in the form of an elastic ring, is the best example of this indifferent class of instrument, easy to apply, withdraw, and clean. Special forceps have been invented for its introduction into the vagina without pain (Fig. 254), but with a little experience the same result is obtained by holding it between the index and the thumb. It is convenient to place the patient in the lateral or genu-pectoral position; then it is necessary merely to place the upper part of the pessary in the posterior pouch, push the anterior portion a little upward, and it adapts itself automatically to the parts. Its size should be determined according to the dimensions of the vagina. A pessary which does not overstretch the canal or cause the patient inconvenience may be left in place two or three months; it does not interfere with either coitus or fecun-

dation. [While a well-fitting, polished, hard-rubber pessary may often be left in place this length of time, any soft-rubber instrument should be frequently removed and cleansed, as otherwise it soon becomes extremely offensive.] At the end of that time it should be taken out and cleansed in carbolic solu-

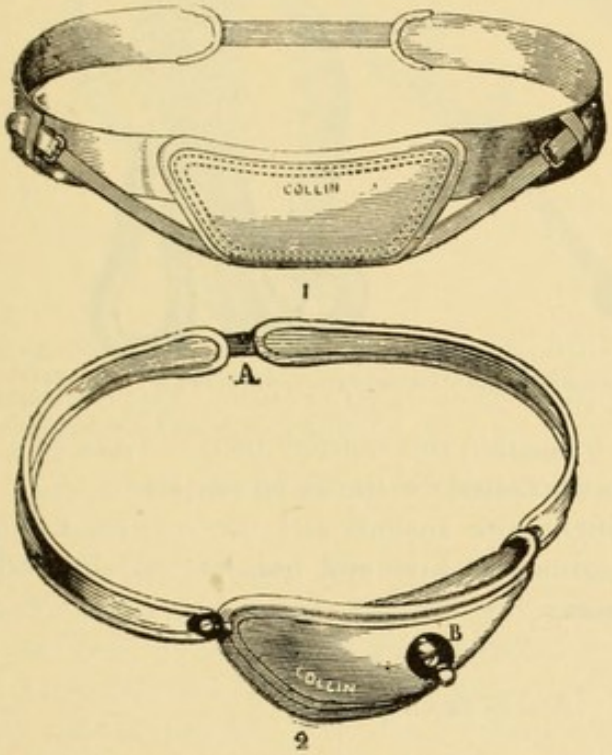


FIG. 252.—1, ELASTIC ABDOMINAL GIRDLE (PAYOT). 2, GIRDLE HAVING A MOVABLE PLATE WITH DOUBLE MOTION.

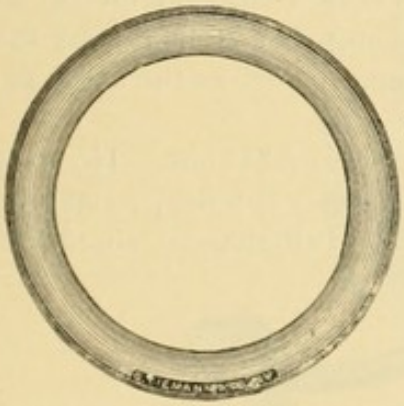
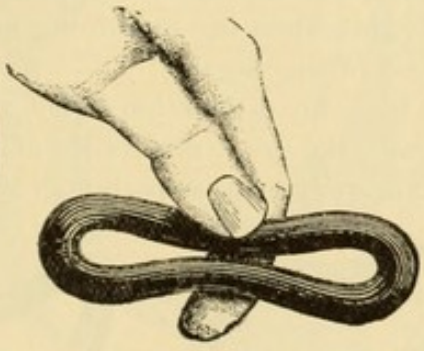


FIG. 253.—DUMONTPALLIER'S OR MAYER'S SOFT-RUBBER RING PESSARY.



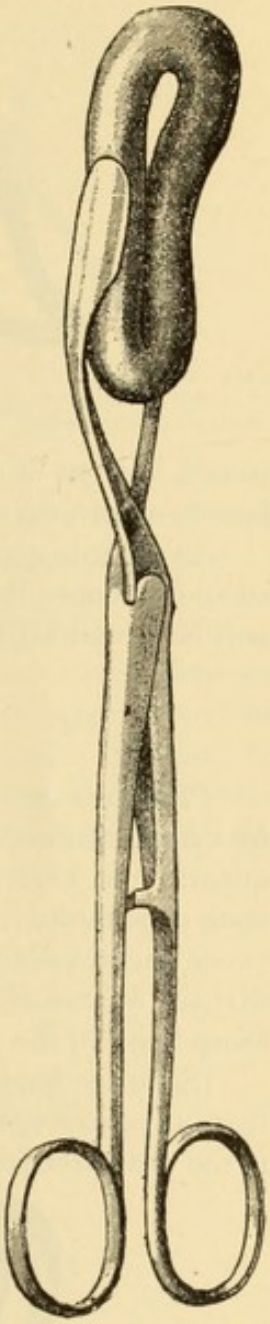


FIG. 254.—FORCEPS FOR INTRODUCTION OF RING PESSARY.

tion and the patient advised to go without it for a few days to see whether it is still necessary.

Many special forms of pessary have been invented and advocated for anteversion, but I have never found them of the least advantage. The above cut shows the method of application of Hewitt's pessary. The use of

Thomas' form will be more easily understood when we consider the figures relating to Hodge's pessary for retroversion, for it is like the Hodge, but with the difference that it has a movable piece shaped like a horseshoe which

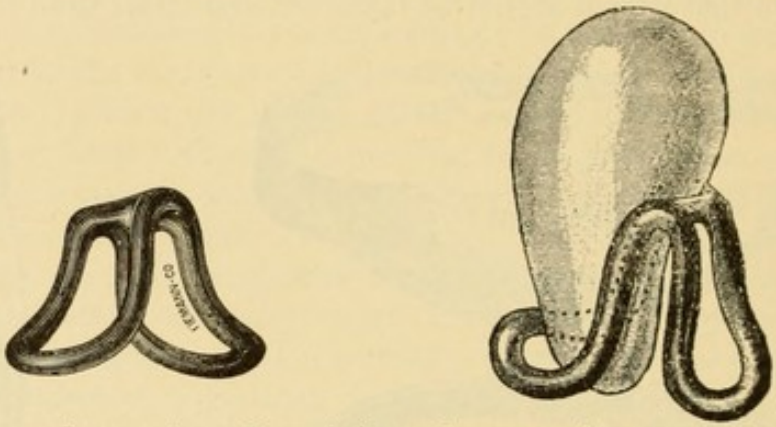


FIG. 255.—GRAILY HEWITT'S CRADLE PESSARY FOR ANTEVERSION.

passes in front of the cervix to sustain the uterine body. Galabin's model has its anterior portion much thickened for the same purpose.

As regards general treatment, the anæmia and the nervous excitability should be controlled. Preparations of iron and quinine, and hydrotherapy will be beneficial in many cases.

ANTEFLEXION.

Pathology and Etiology.—Anteflexion is an exaggeration of the normal forward curvature of the uterus. Before it was well understood it was frequently the case that a uterus in perfect position was taken for one in a state of pathological deviation. It is difficult to draw a clear distinction between the physiological and the abnormal positions; but it might be said that the abnormal begins when the examining finger perceives the angle as a sharp bend in the axis of the organ.

[Schultze holds that this distinction is not an invariable one. He states that, as contrasted with the great mutability of normal anteflexion, stability is the characteristic most typical of pathological. Pathological anteflexion

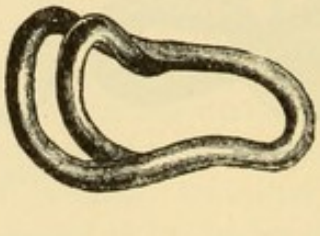


FIG. 256.—THOMAS' ANTEVERSION PESSARY.

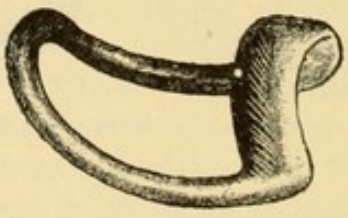


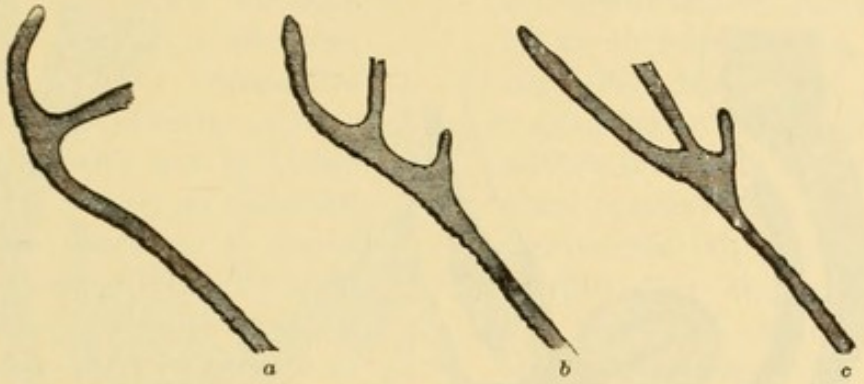
FIG. 257.—GALABIN'S ANTEVERSION PESSARY.

is then that position in which the uterus lies with its fundus permanently flexed over its anterior surface and more than normally stabile.]

T. Gaillard Thomas distinguishes three varieties:

1. Corporeal flexion, where the body is bent upon the cervix which is normally placed; this is the usual type.

2. Cervical flexion, where the cervix is bent upon the body.



[Fig. 258.—Various Forms of the Cervix, Natural Size (Schultze). *a*, Fully developed normal cervix, normally inserted into the vaginal vault; *b*, an approximation to the condition in childhood often found in virgins and usually accompanied by flexion; *c*, cervix and mode of insertion normal during childhood; when found in the adult it is nearly invariably associated with sharp flexion.]

3. Cervico-corporeal, where the segments of the organ are bent the one upon the other.

Etiologically there are two forms, the congenital and the acquired.

In the fœtus and in early infancy the cervix is relatively much developed while the body is still small, and there is an exaggerated curve between them; if at the time of puberty the growth of the uterus is irregular and the anterior wall is retarded in its development while the posterior increases in size, the congenital form of anteflexion manifests itself. As a second mark of arrested growth, the cervix may be very long and conical (Fig. 258), with

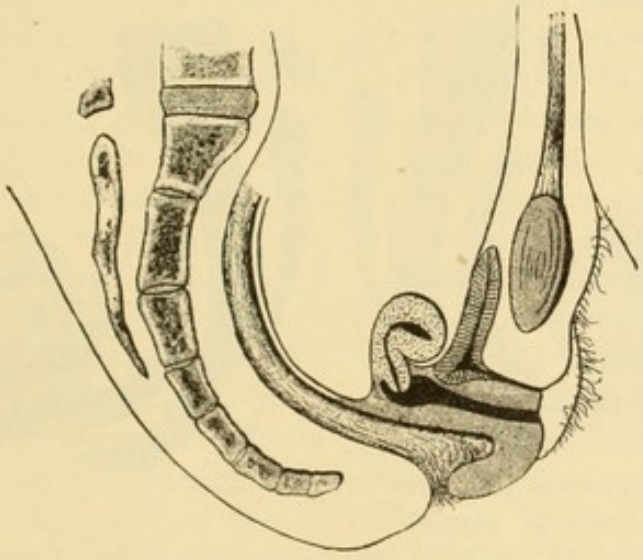


Fig. 259.—Anteflexion of Infantile Origin. The angle is acute and the fundus globular.

the vaginal portion tapering and the external os very narrow. At other times atrophy of the anterior lip may be pronounced and thus furnish an indication of the condition of the corresponding uterine wall. This congen-

Thomas' form will be more easily understood when we consider the figures relating to Hodge's pessary for retroversion, for it is like the Hodge, but with the difference that it has a movable piece shaped like a horseshoe which

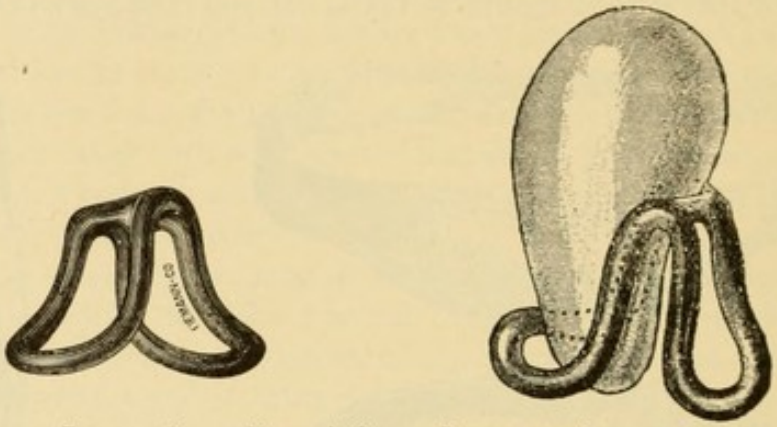


Fig. 255.—Graily Hewitt's Cradle Pessary for Anteversion.

passes in front of the cervix to sustain the uterine body. Galabin's model has its anterior portion much thickened for the same purpose.

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Fig. 256.—Thomas' Anteversion Pessary.

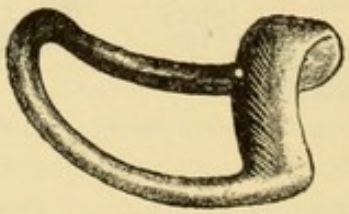

Fig. 257.—Galabin's Anteversion Pessary.

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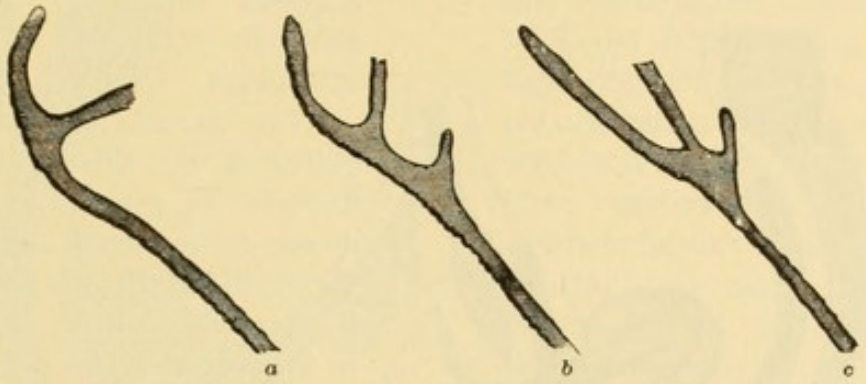

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In the fœtus and in early infancy the cervix is relatively much developed while the body is still small, and there is an exaggerated curve between them; if at the time of puberty the growth of the uterus is irregular and the anterior wall is retarded in its development while the posterior increases in size, the congenital form of anteflexion manifests itself. As a second mark of arrested growth, the cervix may be very long and conical (Fig. 258), with

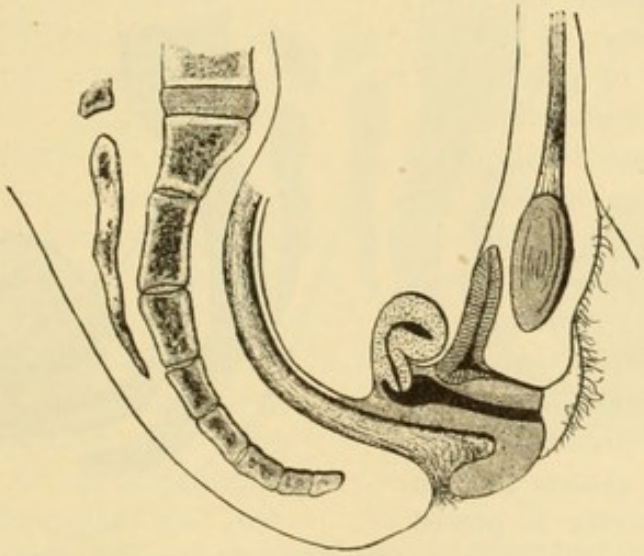

Fig. 259.—Anteflexion of Infantile Origin. The angle is acute and the fundus globular.

the vaginal portion tapering and the external os very narrow. At other times atrophy of the anterior lip may be pronounced and thus furnish an indication of the condition of the corresponding uterine wall. This congen-

ital anteflexion has been observed with hypoplasia of all the genital organs and a narrow pelvis.

The congenital forms do not present so acute an angle of flexion as the acquired forms, but correspond generally to the first two varieties of Thomas.

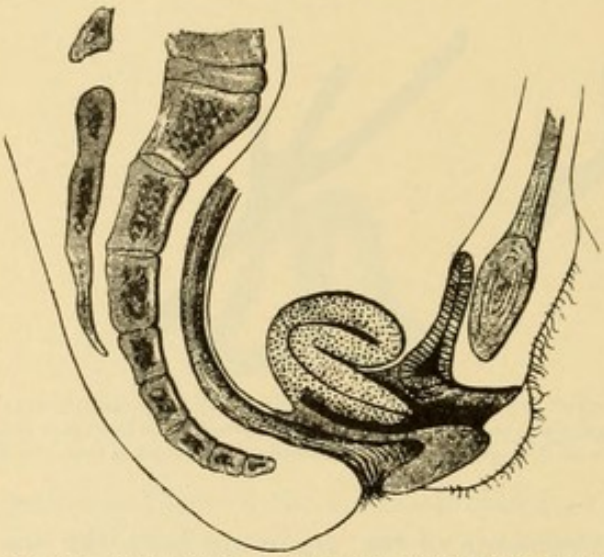

Fig. 260.—Very Acute Anteflexion with Hypertrophy of the Vaginal Portion of the Cervix.

The anteflexion may be acquired at the time of the establishment of puberty if, when the uterus is engorged and softened during the first menstrual periods, the hygiene of the young woman is improper. Any overstrain or great fatigue, masturbation, and all the causes of virginal metritis may here play their part in developing both an inflammation and a deviation. It is readily seen that the general softness of the organ permits it to bend at the isthmus as upon a hinge, and to become flexed to the side or to increase its infantile forward curve. Cases have been observed in which a fall was the starting-point of this condition.

Metritis of puerperal origin may be counted among the causes of acquired anteflexion, though it more commonly produces a retroflexion. It has been attributed with much reason to absence of sufficient involution of the posterior wall after labor and abortion, and this may be due to the persistence of portions of the membranes or placenta causing a very intense local infection at the place of their adhesion. Schultze, after E. Martin, has attributed great importance to parametritis situated posteriorly, involving the utero-sacral ligaments and causing their contraction (Fig. 261). He also asserts that in such cases the cervix is placed much higher than normal in the pelvis, and the vagina thus undergoes elongation. The origin of the posterior parametritis he finds in puerperal or gonorrhœal infection.

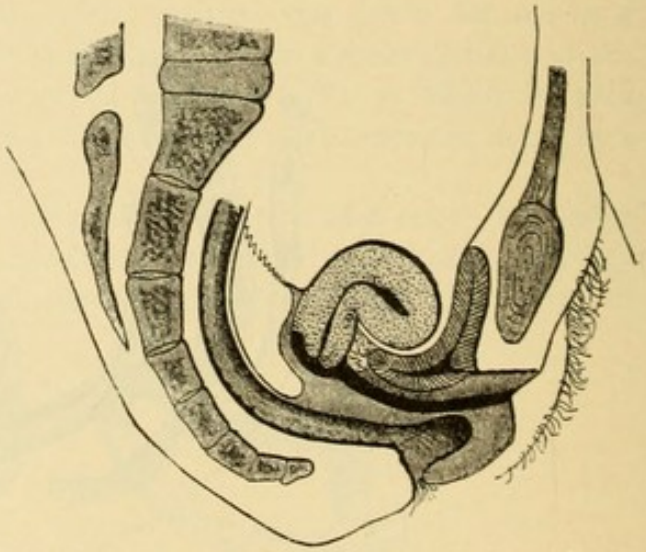

Fig. 261.—Anteflexion from Contraction of the Utero-Sacral Ligaments.

I am of the opinion that this is most frequently due to peri-salpingitis

about the diseased adnexa. The adhesions which result and which fix the cervix strongly from behind cause the uterus to fall forward and flex it at the isthmus, which is weakened by the accompanying metritis, while the cervix, hypertrophied and sclerosed by an old inflammation, remains rigid (Fig. 262). The subvaginal elongation of the cervix results in inveterate catarrh, which often coexists with anteflexion, as has been well described by A. Martin; this author considers the congenital lesions of but little importance.

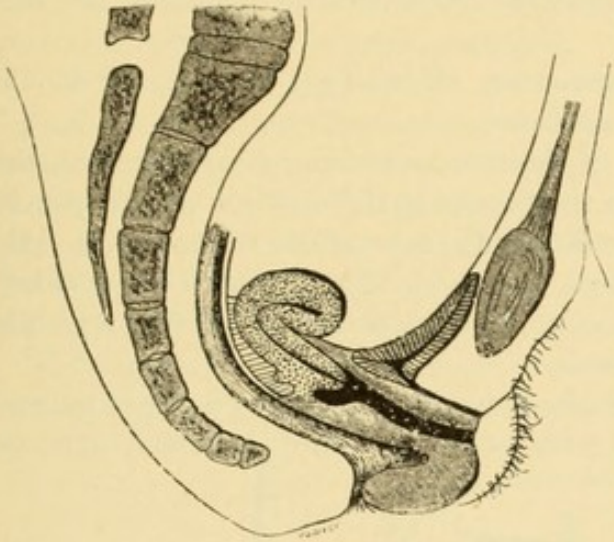

Fig. 262.—Anteflexion Combined with Retro-Position and Posterior Adhesions.

Symptoms. — Congenital anteflexion is accompanied by amenorrhœa, or delay in the appearance of the menses, when it coincides with an infantile condition of all the genital organs. If the periods begin at the normal time, they are apt to be at long intervals and irregular. At other times, with a normal flow of blood, there appear the symptoms of dysmenorrhœa. Violent pains in the loins occur while the blood distends the uterus above the point of flexion, then suddenly the obstacle is overcome and the blood is expelled in a clotted flow, which may have a very strong odor, due to its long stagnation. The mechanical theory of the pain of dysmenorrhœa depending upon anteflexion has been generally received since it was made known by Simpson and Sims. It is not, however, accepted by Fritsch, who explains the pain as due to irritation of the nerves from congestion by the abnormal vascular tension produced by curvature of the vessels at the point of the flexion. It is difficult not to attribute great importance to the obstacle, in view of the paroxysmal character of both pains and discharge. We may also ask whether the posterior perimetritis noted by Schultze is not as often the result of the anteflexion as its cause, when every month there are a few drops of blood forced through the tubes into Douglas' pouch, producing thus a kind of miniature and periodic hæmatocele. Thus

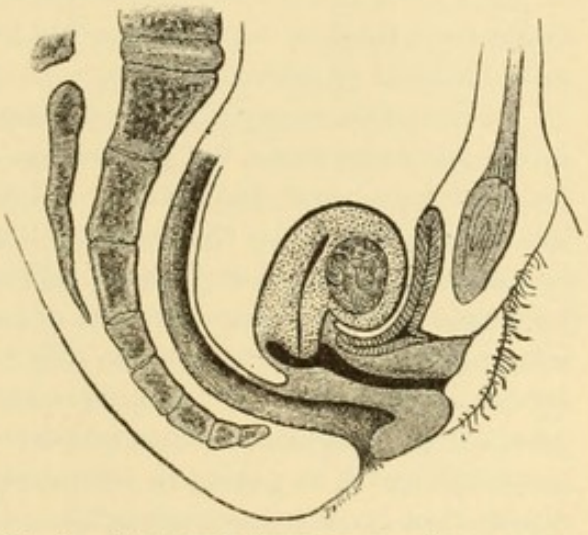

Fig. 263.—Anteflexion Simulated by a Fibroma in the Anterior Uterine Wall.

we might explain the acute and febrile phenomena with which these crises of dysmenorrhœa sometimes terminate.

These patients present all the symptoms of the uterine syndroma. The dysuria is ordinarily very marked, and the reflex nervous symptoms are bitterly complained of.

Pain often occurs in sexual intercourse. Sterility is the rule, and should conception take place, abortion is probable.

Diagnosis.—If the case is one of the frequent acquired anteflexions, the so-called corporeal, the finger feels the fundus in the anterior vaginal pouch, curved like a pistol handle and almost on the same plane as the cervix. By pressing the organ down in bimanual palpation, the body of it is rendered accessible and the finger can appreciate its curve and angle of flexion, while the cervix is found in the normal axis.

In the cervical variety of the affection the cervix is, on the contrary, oblique from above downward and from before backward; by touch alone we

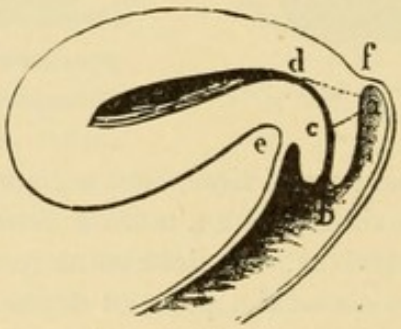

FIG. 264.—SAGITTAL DISCISSION OF THE CERVIX IN CERVICAL ANTEFLEXION (SIMS). *a*, *b*, *c*, Portion of the cervix divided by the scissors; *c*, *a*, *d*, triangular portion which escapes the scissors and which is divided by the probe-pointed bistoury; *e*, *f*, supravaginal portion of the cervix where the flexion occurs.

might then think of retroversion, but bimanual palpation discovers the fundus in the normal situation.

In the cervico-corporeal variety the direction of the cervix is the same as in the preceding form, but the fundus is also curved and hidden behind the pubes; by exploring the anterior cul-de-sac in front of the cervix it may be felt. At times, when the uterus is thus rolled on itself, there is nothing to be felt but the angle of flexion; and above it a rounded mass which might very easily be taken for a fibroma or an inflammatory exudation. The opposite mistake has also been made (Fig. 263). The uterine sound is of great service in these cases. Its introduction may be rendered easy by seizing the cervix with tenaculum forceps and drawing it down and back, when the sound, properly curved, is passed in with great care and gentleness in the supposed direction of the uterine cavity, while one finger presses on the fundus through the anterior vaginal pouch to straighten it a little. When the sound is in the uterus the organ may be restored to its normal shape by merely carrying the handle of the instrument forward. Then the two surfaces of the organ may be examined by rectal touch and bimanual palpation to discover the presence of any tumor which may coexist and to estimate the uterine mo-

bility. To avoid all danger of interrupting a beginning pregnancy, this examination should be made only shortly after a menstrual period.

A calculus in the bladder, pressing upon the anterior cul-de-sac, could only be mistaken for anteflexion when the examination of the uterus and vesical catheterism were not combined.

Treatment.—The indications are to relieve symptoms, to cure the pathological conditions of the mucosa, to induce a return to the normal in the muscular tissue, and to restore the normal uterine position. Acquired anteflexion causes but little disturbance except when there is coincident inflammation or when it presses upon the bladder or with a very movable uterus. Relief may be obtained by either a girdle or a pessary without the need of previous reduction (*vide supra*, Anteversion).

The treatment should be directed chiefly against the coexisting metritis. In simple cases curetting followed by iodine injections will be found suffi-

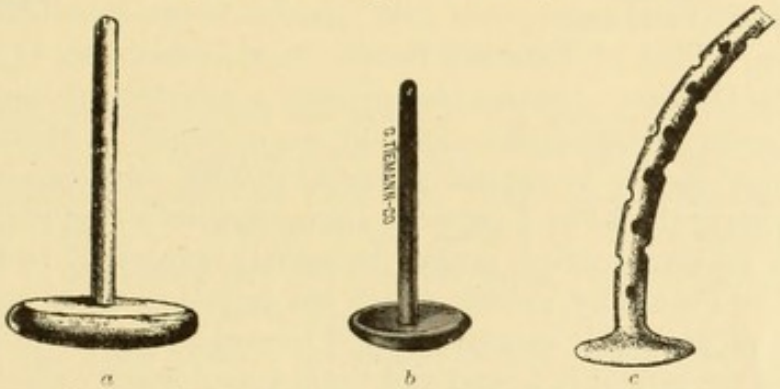

FIG. 265.—STEM PESSARIES. *a* and *b*, Common forms; *c*, Fehling's.

cient. With marked cervical hypertrophy Schröder's biconical amputation or excision of the mucous membrane will be required. This causes a rapid and progressive involution of the hypertrophied cervix, which much exceeds the immediate results obtained by the bistoury, and which with the amelioration of the metritis causes the disappearance of the morbid symptoms which are attributable to the deviation. The displacement corrects itself little by little. It seems probable to me that the good effects of Sims' "sagittal discission" (Fig. 264), which has enjoyed such favor and been so much abused, should be referred to the indirect action of the operation upon the involution of the uterus and its influence on the metritis, rather than to the mere re-establishment of the normal calibre of the cervix.

Congenital anteflexion claims our interference only because of the very painful dysmenorrhœa or the sterility which it causes. If we decide to straighten and dilate the organ as has been recommended, it is well to precede every attempt at straightening by the use of laminaria tents, after determining the extent and direction of the uterine cavity by the sound. The laminaria tents, treated with iodoform and sufficiently thin, are supple enough to permit a good deal of curvature. It is useless to attempt too great a dilatation; the principal office of the tents is to soften the tissues and make them

more supple in view of the final restoration of the form of the organ. This is begun with the dilatation itself. After dilating, enlarging, and somewhat correcting the axis by the use of a few tents, we may continue by passing Hegar's bougies once or twice a week, aiding the manœuvre by fixing the cervix with tenaculum forceps and by pressure on the fundus by the finger in the anterior vaginal pouch; the process should be completed with sizes No. 10 or 12. Rapidly straightening the uterus with a sound, returning it to its position by a "*tour de mâitre*," which temporarily carries the organ backward, is here always out of place.

Since the case is almost always one of incomplete development, the progressive dilatation and the frequent passage of sounds will produce a fluxion to the part and an increase in its nutritive activity, which are probably the chief advantages of the method.

In addition to the pessaries which I have described, which are applicable to both anteflexion and anteversion alike, special forms have been invented for anteflexion. That of Fancourt Barnes is a combination of the Hodge model with the Hewitt. Thomas has invented a complicated form composed of a Smith pessary supporting a cup with an intra-uterine stem. I much prefer abdominal girdles to vaginal pessaries in both anteversion and anteflexion, but among the latter I consider Dumontpallier's ring sufficient.

The stem, or intra-uterine, pessary so warmly advocated in England by Simpson and in France by Valleix, which has caused so many accidents before the days of antiseptic surgery, should be employed only in exceptional cases. When the patient is a weak and timid young woman who is very nervous, and for whom the repeated manœuvres of progressive dilatation would be torture or at least present a real difficulty every time, we are authorized to leave an agent within the uterus which shall gradually straighten and dilate it. The older forms of pessary had a stem which was perfectly straight, which is erroneous, as the normal uterus has an anterior curvature. They were often composed of two metals, copper and zinc, whose galvanic action was thought to aid the salutary action of the dilatation. Fehling constructed a far more rational instrument consisting of a tube of thick glass, fenestrated, provided with a bell mouth, and slightly curved; this curve could be altered by heat. This tube was to be filled with powdered iodoform and introduced into the uterine cavity, with care that the tube be about one-half centimetre shorter than the canal, previously measured. The patient is kept in bed and under observation for eight days; then she is allowed to rise, but the stem is not removed, according to this author, before eight or ten months. It is kept in place by the projection of the mucous membrane into the fenestræ of the tube, and, being light, has but little tendency to fall out (Fig. 265, *c*). I think that this delay of eight months is too long, and that the good effects should be produced within one or two. It is claimed that massage has given good results. [*Vide* Dysmenorrhœa.]

The chief cause of the dysmenorrhœa in congenital anteflexion is in

the conical cervix with its stenotic external os. To relieve this stenosis, crucial incision with the bistoury has been practised for a long time. Simpson's metrotome, Collin's hysterotome, or Küchenmeister's scissors may be employed.

The results so obtained are not permanent, for the cicatrization re-establishes the original conditions; a stomatoplastic operation by biconical amputation of the cervix is far preferable. (*Vide* Cervical stenosis.)

The operation of discission in cervical anteflexion is sometimes performed for the relief of sterility. Marion Sims (Fig. 264) incised the posterior lip of the cervix with his short and curved bistoury. Emmet practised the same incision with elbowed scissors, which are preferable; he straightened the canal by making an incision on its anterior face with a short tenotome a



Fig. 266.—Collin's Hysterotome.

certain depth into the tissues and kept the cut open by means of a glass tube. He thus removed a triangular piece or the whole of the posterior lip. More complicated plastic operations have been proposed, like Küstner's or Reed's, but I reject them all. If there is any deformity of the cervix, amputation of the part is preferable (according to the rules given under Metritis), taking care to leave a sufficiently large os.

Thiriar has more recently attempted to cure anteflexion by an operation which he calls cuneihysterectomy. He performs a cœliotomy, and after the intestines have been pushed up from the pelvic cavity, draws upon the uterus as forcibly as possible by means of tenaculum forceps. Upon the posterior projecting angle of the flexion he denudes a surface of about two centimetres in height and extending entirely across the uterus. The portion removed includes the entire thickness of the uterine wall except the mucosa. The edges of the denuded area are united by separated catgut sutures, and the abdomen is closed without drainage. This ingenious operation is claimed by its originator to be easy in execution, but in spite of one complete success obtained by Thiriar, it should be accepted with great reserve.

CHAPTER XVIII.

DISPLACEMENTS OF THE UTERUS—Continued.

Posterior Deviations.

Displacement of the uterus backward is far more frequent than any other variety. Sänger, among 700 gynæcological patients, found 108 cases of retro-deviation, or 15.43 per cent. Winckel obtained 19.10 per cent, and Löhlein 17 or 18 per cent.

I. *Retroversion.*

Pathology; Etiology.—Every time that the bladder becomes filled the uterus is placed physiologically in a temporary position of retroversion. The

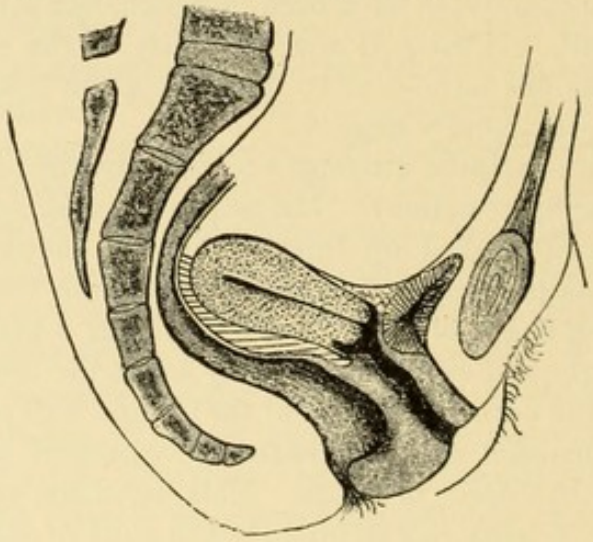

Fig. 267.—Retroversion with Posterior Adhesions of Large Extent.

tonicity of the broad, round, and utero-sacral ligaments, which, it must not be forgotten, contain much muscular tissue, ordinarily sustain the uterus in its normal position; but when it has become increased in weight by inflammation and especially by retarded involution after parturition, the ligaments themselves undergo a relaxation, while the uterus is rendered turgid by metritis, and the abnormal position may become permanent under the influence of prolonged dorsal decubitus.

Then the uterus often becomes fixed in the new and abnormal situation, by adhesions, the result of a local pelvic peritonitis originating from an inflamed tube which may be the antecedent and chief cause of the whole dis-

turbance. A sudden effort or a fall is often the determining cause of the deviation; retroversion is not so common as retroflexion.

Symptoms.—When the displacement has occurred suddenly, it is often accompanied by acute pain and various nervous phenomena; when it is acquired slowly, its symptoms are often not to be distinguished from those of a metritis or of a circumscribed perimetritis which may have preceded it, and with these we find the uterine syndrome. Sterility is the rule. Vesical and rectal tenesmus may either be very marked or absent altogether Palpation and touch recognize the position of the cervix forward and that of the fundus posteriorly toward the concavity of the sacrum, where it is more or less immobilized. The two segments of the uterus are found in the same straight line.

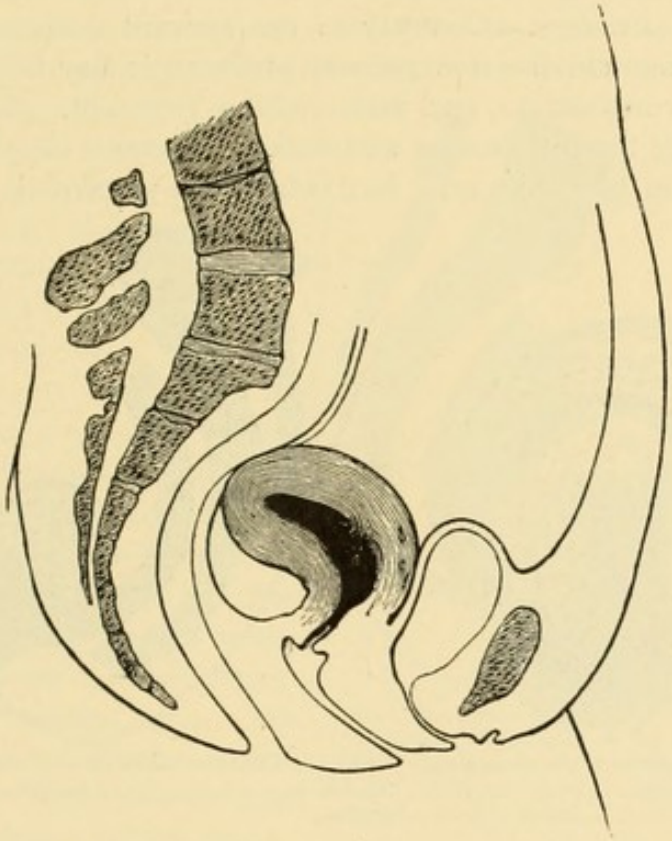

Fig. 268.—Retroflexion of the Uterus from Subinvolution of the Anterior Wall, on which may be Seen the Site of Placental Insertion (E. Martin, Sr.).

Diagnosis.—Bimanual palpation with rectal touch, and the use of the uterine sound if necessary, are the means by which this form of displacement may be recognized. The distinction from retroflexion is found in the fact that there is no angle in the organ between cervix and fundus. It should not be confounded with fibroma of the posterior wall, with a retro-uterine hæmatocele, tumor of the ovary or tube prolapsed into the cul-de-sac of Douglas, with a focus of parametritis or with a scybalous accumulation. Almost all cases in which any doubt could exist are easily made clear by the uterine

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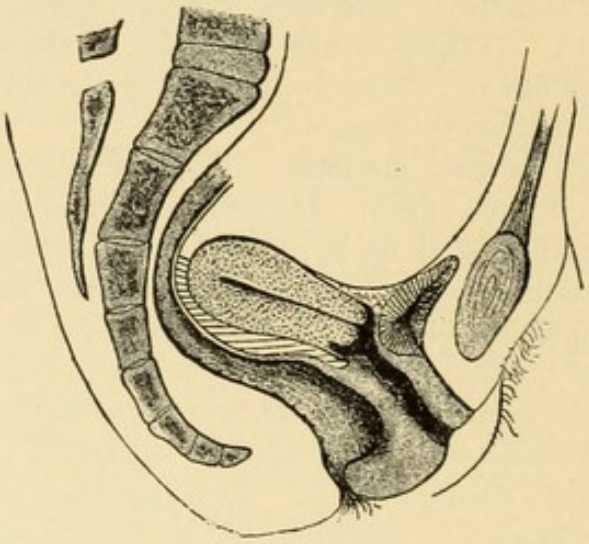

Fig. 267.—Retroversion with Posterior Adhesions of Large Extent.

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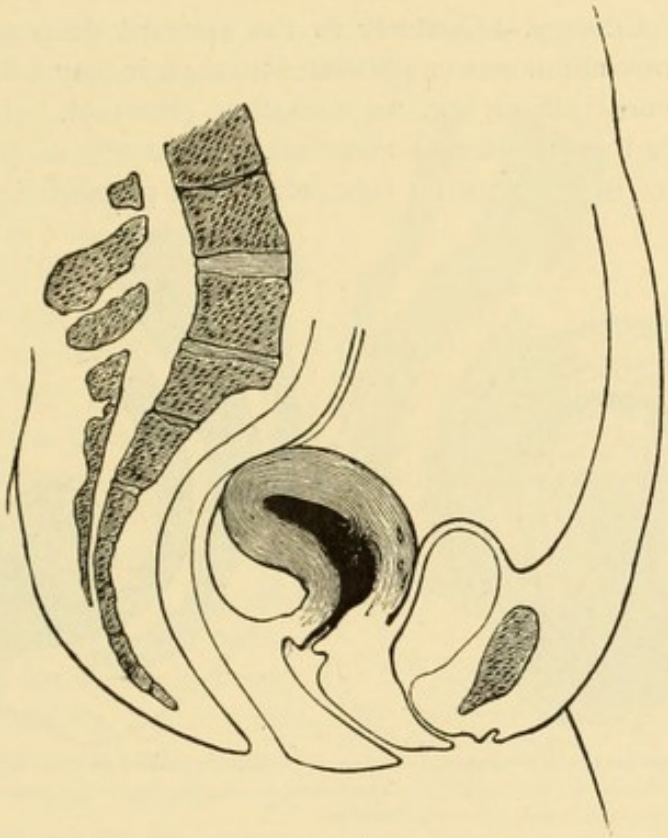

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sound combined with other means of exploration; this instrument being especially useful where we must differentiate the condition from anterior cervico-corporeal displacement, which, in view of the direction of its antero-posterior axis, is almost necessarily a source of error if we confine our examination to touching the cervix alone.

Treatment.—This is similar to that for retroflexion.

II. *Retroflexion.*

Pathology; Etiology.—Contrary to the forward deviations, retroflexion seldom exists from childhood or puberty, although it may follow virginal metritis, habitual constipation, and masturbation (Fritsch). In the immense majority of cases the retroflexion succeeds to a metritis of puerperal origin; the subinvolution of the anterior face where the placenta is inserted plays

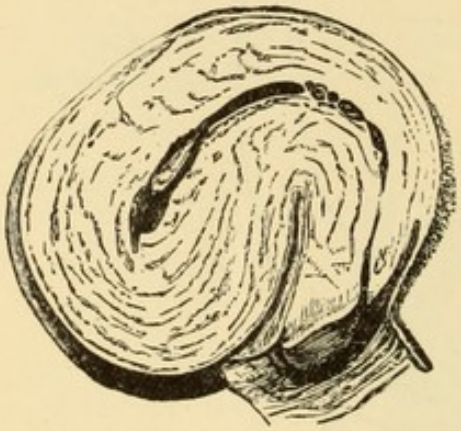

FIG. 269.—EXTREME RETROFLEXION OF THE UTERUS.

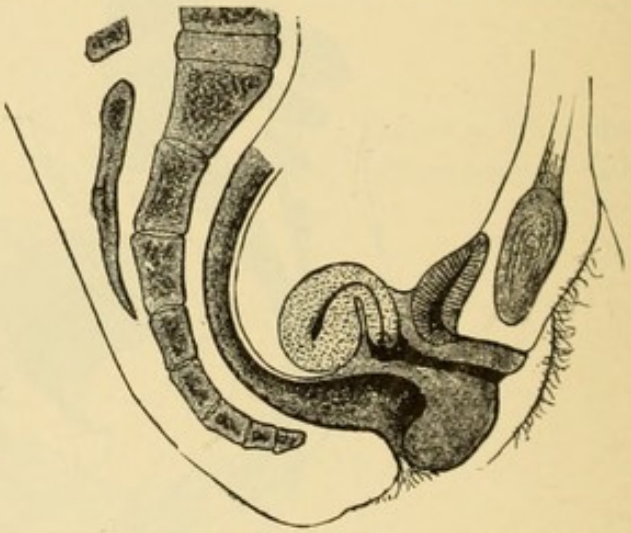

FIG. 270.—RETROFLEXION OF THE UTERUS IN A NULLIPARA. The cervix is movable, the os has preserved nearly its normal position.

here, according to E. Martin, a rôle similar to that which I have indicated for anteflexion.

Considerable importance must also be attributed to the weight of the congested organ, and to relaxation of the broad and round ligaments, which cease to hold the uterus in place anteriorly, while the cervix remains fixed by the more resistant utero-sacral ligaments. The flaccidity of its own supports thus allows the uterus to bend backward at the level of the isthmus, impelled by the weight and pressure of the intestines. Retroflexion has been observed to follow simple retroversion and even anteversion; in the latter case this is possible when the seat of the flexion remains soft and movable like a hinge. The cervix is directed downward and forward, ordinarily approaching the vulva, for it is usually a little lowered. The external os is somewhat patent and its lips are swollen, owing to the disturbance of the venous circulation which results from the curvature of the vessels. It must

not be forgotten that the displacement almost always happens in a woman who has had at some time metritis of puerperal origin. The body of the organ occupies the pouch of Douglas. On one or the other of its walls there has been found a marked thinning, anteriorly by Ruge, posteriorly by Fritsch.

Adhesions are often present, either perimetritic from exudation into Douglas' pouch, or parametritic from similar conditions about the utero-sacral ligaments. According to the opinion of Schultze, relaxation of the folds or ligaments of Douglas under the influence of posterior parametritis plays a great part in the production of all the uterine displacements. In order to comprehend the production of retroflexion, we must suppose that during a first stage of acute inflammation the ligaments preserve all their resilience in such a way that the cervix becomes fixed; soon after, in the stage where the exudation retreats, the denutrition of the ligaments causes their flaccidity; then, according as the cervix has resisted or become flexed in the first stage, we have a retroversion or flexion. In other words, version presupposes alteration in the ligaments; flexion, an altered condition of both ligaments and uterine parenchyma together.

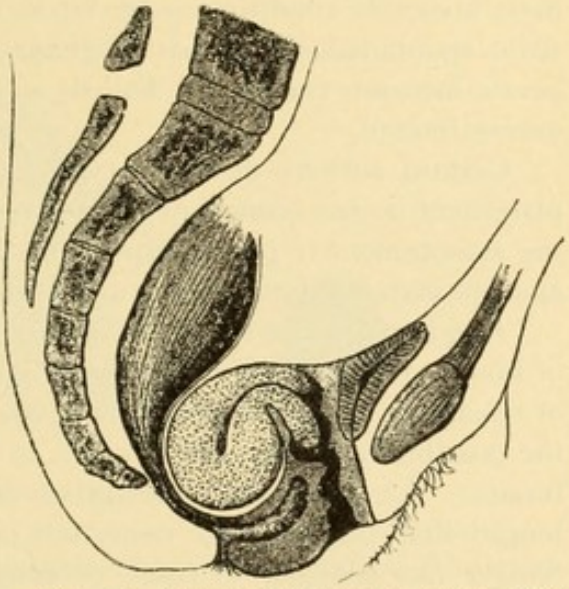

FIG. 271.—RETROFLEXION OF THE UTERUS, VERY PRONOUNCED. Compression of the rectum, whose lumen is effaced; hypertrophy of the cervix; atrophy of the angle of flexion; thickening of the posterior lip; thinning of the anterior lip, which is hidden in the bottom of the cul-de-sac.

The peritoneal adhesions fix the uterus to the bottom of the recto-uterine pouch, by bands often loose, filamentous, and easily torn. At other times they are funicular, lamellated, and firm. The ovaries and tubes are often drawn by the deviation into the cul-de-sac. It is probable that a part of the nervous reflexes, often grave even to the production of paraplegia, which have been noted in cases of retroflexion, are due to the dragging upon the nerves, and not to the problematical compression of the sacral plexus.

Salpingitis often coexists, and is the rule in the irreducible cases, the fact that the organ cannot be reduced very frequently depending upon the presence of adhesions between the adnexa and the wall of the pelvis. Exacerbations of the salpingitis are the cause of these adhesions, and also of the hard, often painful nodules that so rapidly appear and disappear about the lateral and posterior surfaces of the retroflexed organ.

Symptoms.—The uterine syndrome is present, the reflex nervous phenomena are very well marked, and there is sterility. Constipation, with or without tenesmus, is peculiarly obstinate, and Barnes attributes to this the copræmia which so often debilitates the patient.

The nervous reflexes appear most often as difficulty in walking markedly out of proportion with that caused by simple muscular fatigue and simulating paraplegia, as multiple neuralgias, hysteriform excitability, fitful cough, dyspepsia, etc. Schröder has observed chorea; Chrobak, very intense asthma; Kehrer, aphonia; Sielki, hystero-epilepsy; Kidderlen, incessant vomiting. Simple straightening of the uterus has caused all these symptoms to disappear rapidly.

Sterility is usually the sequence of retroflexion, though at any time fecundation may take place and the uterus return to its proper position. If it remains flexed and incarcerates the fœtus in the lower pelvis, it produces serious compression symptoms or abortion. If involution proceeds under the most favorable conditions after labor, the uterus may correct its own malposition spontaneously. That pregnancy in such cases may be a valuable therapeutic measure cannot be denied, and yet its importance has been much overestimated.

Certain authors describe a post-puerperal retroflexion in which the displacement occurs immediately after confinement. This is often only one of the symptoms of a post-puerperal metritis with retarded involution, and disappears with the latter under appropriate treatment.

Diagnosis.—The tumor occupying the posterior cul-de-sac may, by means of bimanual palpation, be easily recognized as the fundus from the absence of resistance in the anterior pouch where the organ is normally placed, and the possibility of feeling the angle of junction between the cervix and the fundus. Le Dentu attributes great diagnostic value to the presence of a longitudinal median ridge easily felt on the posterior surface of the uterus. Sänger has noticed, in cases of congenital retroversion, the presence of a median protrusion of the anterior vaginal cul-de-sac, a frænum 1 to 1½ cm. high, dividing the cul-de-sac into two portions. It seemed to be the remains of delayed fusion of Müller's ducts. Rectal touch is here often indispensable. Exploration with the sound removes the last doubts; it should be curved to suit the axis of the uterus, and the cervix seized with tenaculum forceps and drawn downward. Further details of diagnosis will be found under the head of retroversion, to which I refer (see page 375).

It is necessary to determine clearly the degree of mobility of the uterus before entering upon any treatment, and from this point of view Trélat divides retroflexions into three classes: (1) reducible; (2) resistant; (3) adherent. These different grades may be appreciated after efforts of reduction, either by the bimanual procedure or by the sound, by estimating the resistance encountered and by the permanence of the reposition.

Treatment.—Whether the complicating metritis should first be treated or the displacement reduced is a disputed question. I think it is well to treat the inflammation first, and for this purpose to employ the curette followed by injections, and, in case of metritis which is chronic and painful [with

cervical laceration and hyperplasia], to amputate the cervix, [or perform Emmet's operation] (page 184 *et seq.*). It is not unusual to see the pains of retroflexion cease when the metritis has been cured, and also a certain degree of reduction may result from the subesquent involution. It is well in special cases to dilate the cervix, before curetting, with laminaria tents, which effectually begin the work of straightening the canal.

If with the metritis there is also an acute perimetritis, with peri-salpingitis, this should be treated by appropriate means (hot injections, baths, application of iodine, glycerin tampons of the cervix, etc.), and only when all inflammatory symptoms have ceased should we make an effort to reduce the



FIG. 272.—REDUCTION OF RETROFLEXION IN THE GENU-PECTORAL POSITION.

uterus and maintain it in place; the contrary practice advised by Poullet appears to me unwise.

Reduction of Retroflexion.—This may be accomplished in many ways:

1. *By the Genu-Pectoral Position.*—When the woman has been put in the genu-pectoral position with the legs a little separated, and the fourchette retracted so as to allow the entrance of air into the vagina, the viscera fall toward the concavity of the diaphragm (Fig. 272) and the retroverted or retroflexed uterus, if freely movable, is restored to its normal position. This reduction may be aided by keeping the vaginal walls separated and applying traction to the posterior cul-de-sac with a speculum blade which depresses the fourchette. This "spontaneous reposition by air," as Courty terms it, is a valuable exercise which the patient may every day repeat, morning and evening, for a few moments, placing herself in the attitude of a praying Mahometan. Tarnier advises the patient, when she takes this position, to introduce a small speculum of wire or simply an injection nozzle into the vagina to facilitate the entrance of air and the upward movement of the uterus. E. Mosher recommends his patients to pass the finger into the vagina and press upon the anterior face of the cervix, which has the effect of making the uterus revolve forward. If this procedure is not sufficient for many

cases, it is still a valuable auxiliary where the trouble is not inveterate. Patients should also be advised to sleep on the face or side.

[In using the genu-pectoral position it is necessary to see that there are no constricting bands or corsets about the waist to interfere with the free forward and upward falling of the abdominal viscera. If after the perineum is retracted and the vagina allowed to "balloon" (an effect caused by the traction of the inverted abdominal contents) the fundus remains fixed behind the sacral promontory, it may often be dislodged by drawing the cervix down

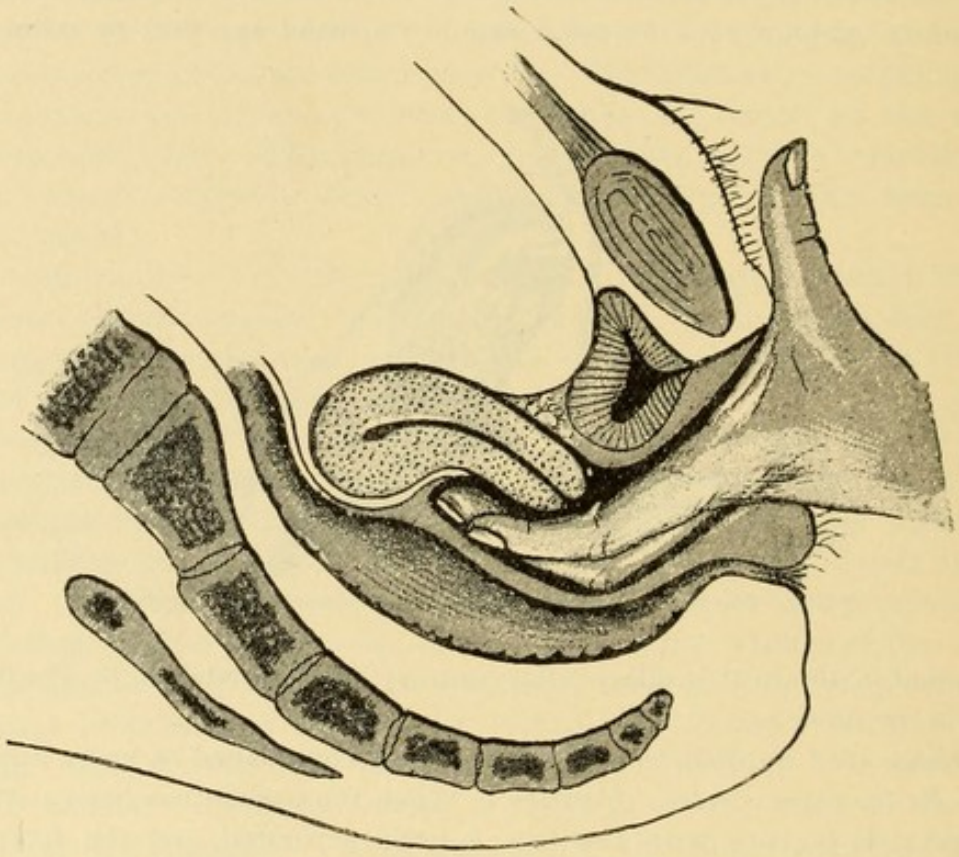

FIG. 273.—BIMANUAL REDUCTION OF A RETROVERSION OR FLEXION. First step. Elevation of the uterus.

toward the vulvar opening and backward by a tenaculum forceps, and, if this is not sufficient, by pressure at the same time against the fundus by the fingers, or a wad of gauze held in a dressing forceps. Occasionally, especially where we have to do with an incarcerated retroflexed gravid uterus, it may be necessary to employ manual pressure, or a colpeurynter, through the rectum.]

2. *Bimanual Reduction.*—The patient may be put in Sims' position, or even in the genu-pectoral if necessary; two or three fingers of the left hand are then placed in the rectum or the vagina, and the cervix is pressed backward, while the right hand on the abdominal surface endeavors to seize the fundus and bring it into the position of anteversion; the new position of the organ must be exaggerated to successfully combat the tendency to return to

the displacement. This manœuvre may be much simplified by seizing the cervix with tenaculum forceps and drawing it gently downward.

Schultze has advised in difficult cases to introduce the finger into the previously dilated cavity of the uterus; and by energetic traction thus exerted directly upon the uterine tissues, break up any adhesions which have formed between the organ and other structures which oppose the reduction. He describes minutely the method of freeing the uterus from pseudo-liga-

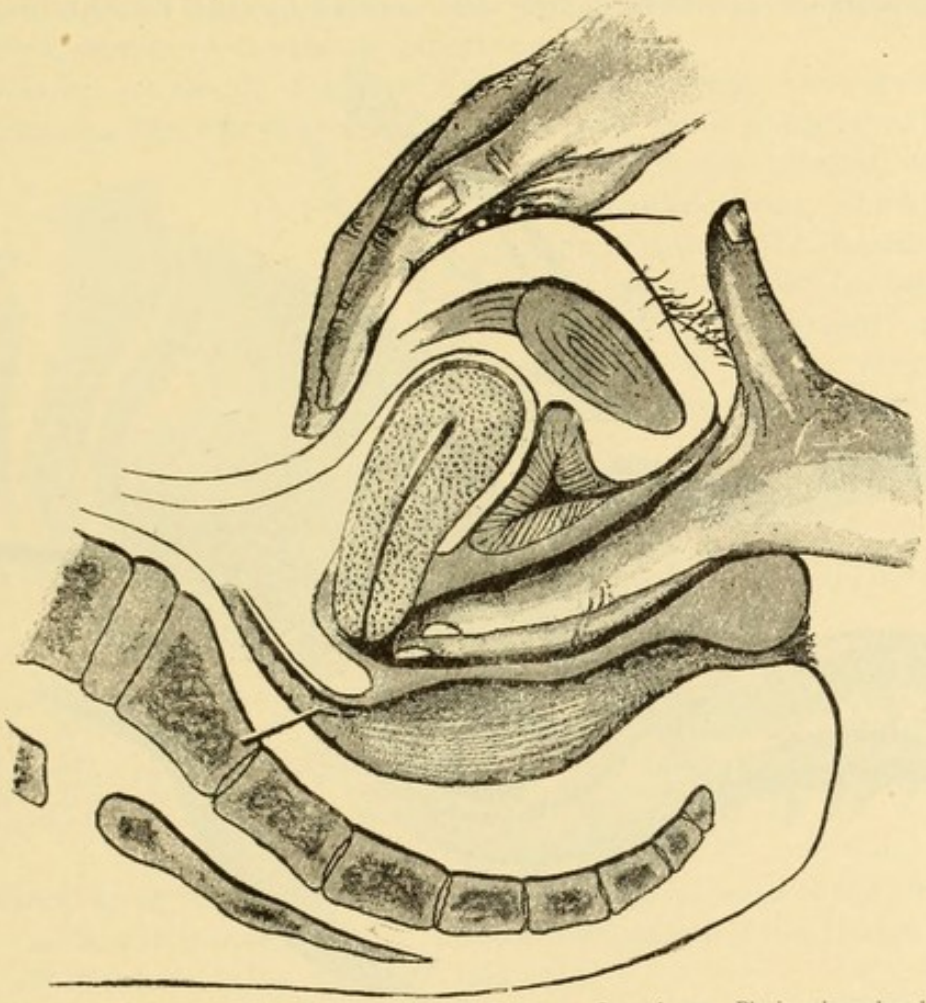

FIG. 274.—BIMANUAL REDUCTION OF A RETROVERSION OR FLEXION. Second step. Placing the reduced uterus in a position of anteversion.

ments and adhesions which fix it behind or laterally or on its surface to the rectum. Under anæsthesia he claims that he can feel the ovaries and destroy their adhesions. This bold practice has found imitators, but it has also been condemned (Schröder). It is true that Schultze has obtained very remarkable success in this way, but if the tubes should be inflamed, the method, it seems to me, would be very dangerous.

3. *Reduction by the Sound.*—This is the method which is generally employed, and which even Schultze advises whenever it is necessary to overcome resistance of unusual degree. Either the genu-pectoral or Sims' position may be adopted. A large smooth metallic sound is selected and intro-

duced many times consecutively to reduce the deformity to a retroversion; then the sound is made to describe an arc of a circle, and the beak of the instrument within the uterine cavity performs a rotation which carries its concavity forward. The uterus is thus straightened but is still in the retroposition; to bring it forward, the handle of the sound is depressed toward the fourchette (Fig. 275).

In all these manœuvres no sudden, rough movements should be performed, but the pressure should be gentle and continuous. It is well to precede

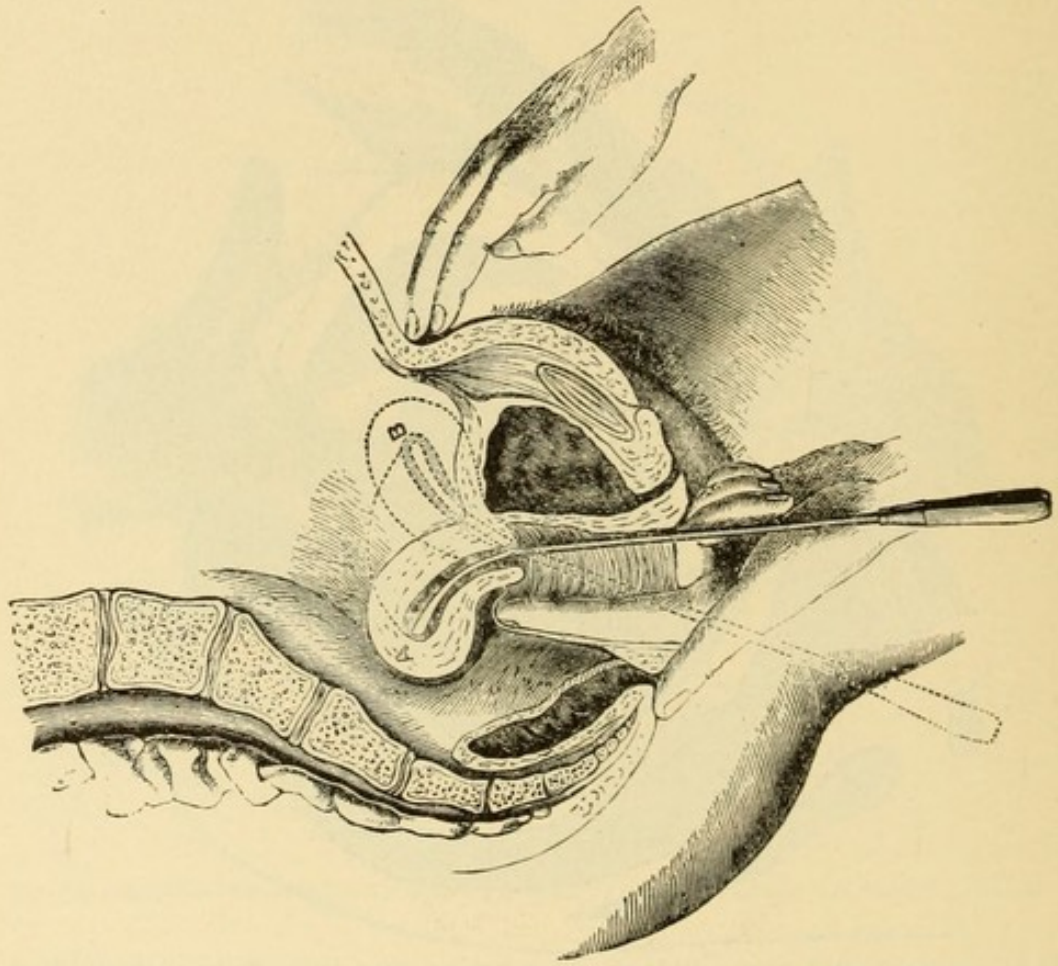

Fig. 275.—Replacement of a Retroflexed Uterus by the Sound.

the reposition of the organ by dilatation with laminaria tents, which gives suppleness to the tissues, and the mucous membrane which is so often diseased at the isthmus should be curetted; the reduction may then be completed in one session. At other times it is of advantage to divide the treatment over several sittings, repeating them every two or three days: after each one the amount of improvement obtained may be preserved by carefully filling the posterior vaginal pouch with iodoform gauze; finally the pessary may be introduced. The most simple instrument for reducing the uterus is the sound; I prefer it to all the various repositors which have been invented.

[It is to be remembered that this method of instrumental reposition is

only to be employed after a most careful examination has shown the probable absence of any recent parametritric trouble or of marked disease of the uterine appendages, and that in its employment the most scrupulous asepsis is to be maintained. With these precautions, and remembering that to avoid mechanical injury to the uterine tissue the sound should be inserted only to within a quarter of an inch of the fundus and the finger tip in the vagina and not the cervix used as a fulcrum, the method is comparatively safe.]

Fixation of the Reduced Uterus.—For this purpose we may employ either prothetic measures (pessaries) or various operations.

Pessaries.—A simple tampon of cotton in the posterior pouch is a means of maintaining the uterus and is easily renewed, but it is better to employ an indifferent pessary, like Dumontpallier's ring, which has at times caused the reposition of the organ without the surgeon's efforts by the steady pressure which it exerts (Fig. 276). [Ring pessaries of either hard or

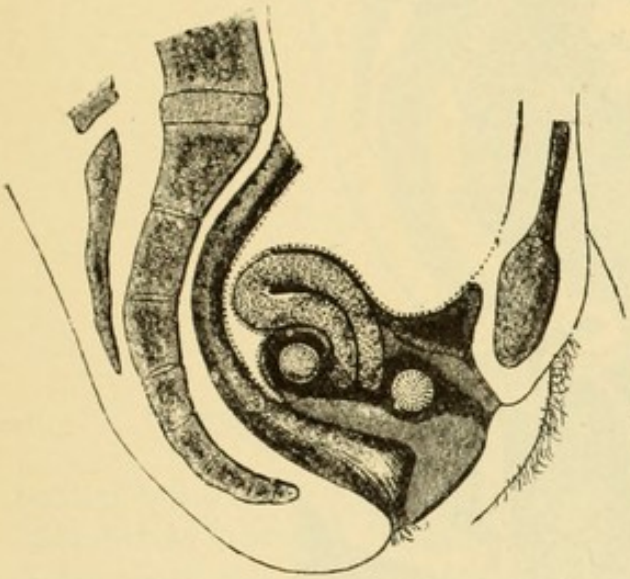

Fig. 276.—Annular Pessary of Dumontpallier in Place, in a Case of Retroflexion which it is Changing to Retroversion; Reduction may Follow Spontaneously.

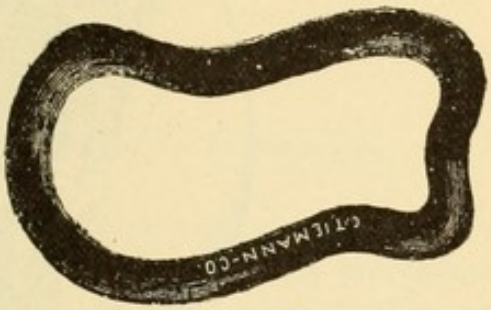

Fig. 277.—Hodge Pessary with Anterior Depression to Avoid Compressing the Urethra.

soft rubber, while often effective, are objectionable because of the stretching of the vagina which they cause.] A better instrument is the Hodge pessary with a double curve (Figs. 277, 278, and 279).

The pessary should be chosen to fit each case. If too small it is of no value, if too large it becomes intolerable. If the perineum is resistant, the pessary may be a little narrowed below (Albert Smith's); this would be an inconvenience in the contrary condition. It is well to have a small depression in the anterior portion to avoid injury to the urethra (Fig. 277). The most convenient kind of pessary is that formed of one thickness of strong copper wire and covered with rubber; they may be instantaneously modified, and yet they are resistant enough. As a matter of fact, the surgeon should know how to adapt his instrument to each case by giving more or less sweep to its curves. Hard-rubber pessaries are also very good, unalterable, and can be softened in hot water so that their form can be changed. In difficult cases I model a pessary of flexible tin, and when I am certain that it is of the

shape exactly adapted to the case I copy it in aluminum, which is both light and resistant, though the vaginal secretions alter it and it has to be frequently renewed. The lower extremity of a pessary should always rest a little above the meatus.

Gaillard Thomas has devised a pessary which resembles the Smith, except that it has its posterior bar thickened [and Mundé has still further modified this by making it shorter and broader (Fig. 281)].

The Hodge or Smith pessary should be introduced with the patient lying

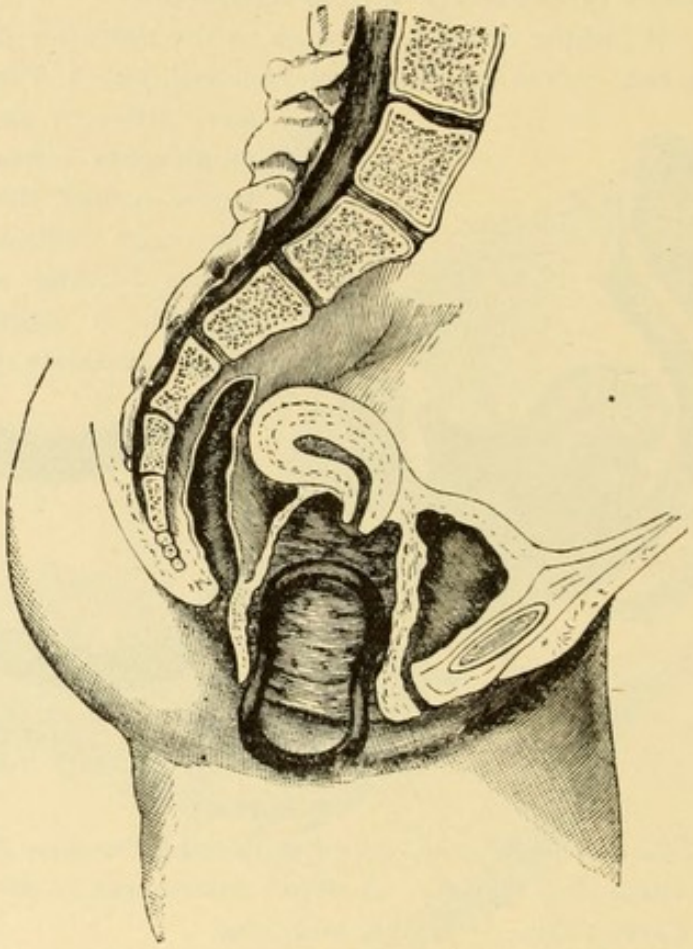

Fig. 278.—Introduction of a Hodge Pessary in a Case of Retroflexion (which Should First be Reduced).

on the side; it is covered with vaselin and presented at the vulva in such a manner that it shall glide flatwise along one of the lateral vaginal walls. While the labia are separated, the perineum is strongly depressed (Fig. 278); then when the pessary has passed the introitus, it is easily turned about in the larger superior portion of the canal. It then glides upward and backward, describing a spiral along the posterior wall. A slight pressure on its posterior bar carries it beyond the cervix into the posterior vaginal pouch, and it thus occupies an oblique position from above downward and from behind forward. The abdominal pressure acting upon the pelvic floor, constantly but with increased force in all efforts, tends to make the pessary take

a horizontal position, and it thus oscillates about an imaginary axis which passes through the middle of its transverse diameter, so that while the inferior arc is depressed the superior is lifted, owing to the obliquity of the wall. The posterior cul-de-sac is therefore stretched, the cervix drawn backward according to the degree of the abdominal pressure, and the uterus as a whole

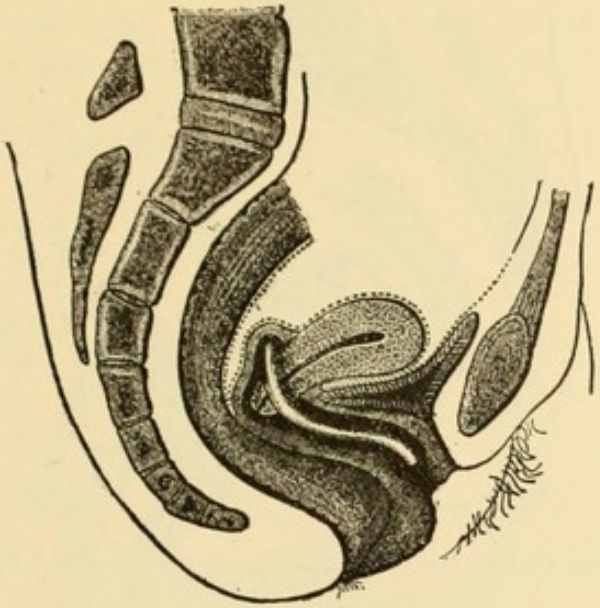

Fig. 279.—Hodge or Smith Pessary in Place after Reduction of Retrodeviation.

carried forward if the retroflexion has been reduced previously. It is not unimportant to remark that, even when this reduction has been incomplete, some benefit may often be obtained by either the ring or the Hodge pessary; the instrument then acting simply by diminishing the mobility of the uterus.

The cradle pessary with a simple curve has the advantage of not descending so far as the Hodge, and also of sustaining the anterior vaginal wall;



Fig. 280.—Albert Smith Pessary for Retroversion.



Fig. 281.—Mundé Pessary with Thickened Posterior Bar for Use in Retroflexion.

but it is not so powerful as the doubly curved lever form (Figs. 280 and 282); it is specially adapted to cases in which there is some relaxation of the anterior wall.

If the patient takes a douche twice a day, the pessary may be left in place for two or three months; at the end of this time it should be with-

drawn and careful account taken of the position of the uterus; if it remains in the position of anteversion, the pessary is given up, otherwise its use must be continued. The accidents which have been described as the effect

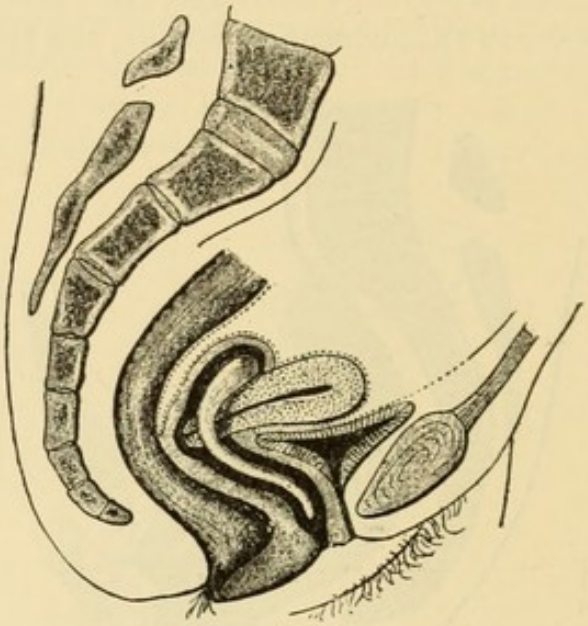

FIG. 282.—MUNDÉ-THOMAS' PESSARY IN PLACE AFTER REDUCTION OF A RETRODEVIATION.

of forgotten pessaries are due to their complete neglect for years, with no attempt toward cleanliness.

[The Albert Smith type of pessary, both with and without the thickened

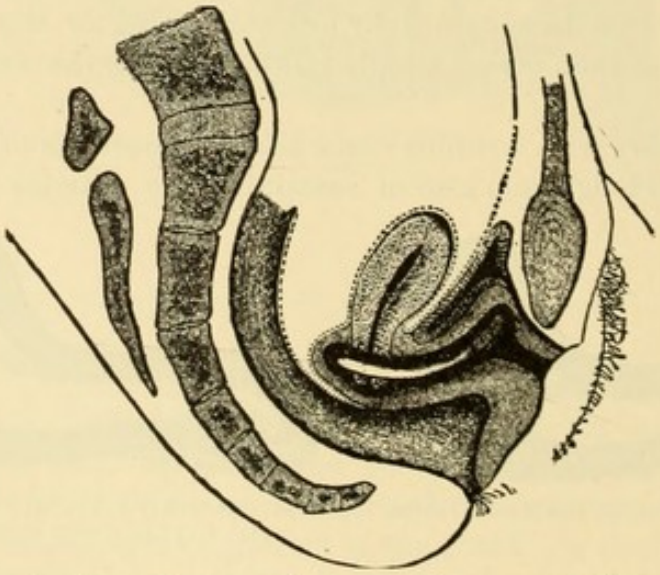

FIG. 283.—CRADLE PESSARY IN PLACE AFTER REDUCTION OF A RETRODEVIATION.

posterior bar, is the most generally useful, and it is seldom that any other form will be required in the treatment of retro-displacements. This is employed with a posterior bar having a gentle sweep in simple retroversion, and

with a more pronounced curve, up to 90°, when a flexion is to be overcome.

It is to be remembered that this pessary does not act by a general overdistention of the vagina, but by pushing up the posterior cul-de-sac and thus drawing the cervix backward and upward. When properly fitted, it should cause no pain, should not project from the vagina or be felt by the patient, should be movable and small enough so that the finger can be swept between it and the vagina at every accessible point without tension. It should never be introduced until the uterus has been replaced, never when there is any marked tenderness or inflammation present in any part of the pelvis. The

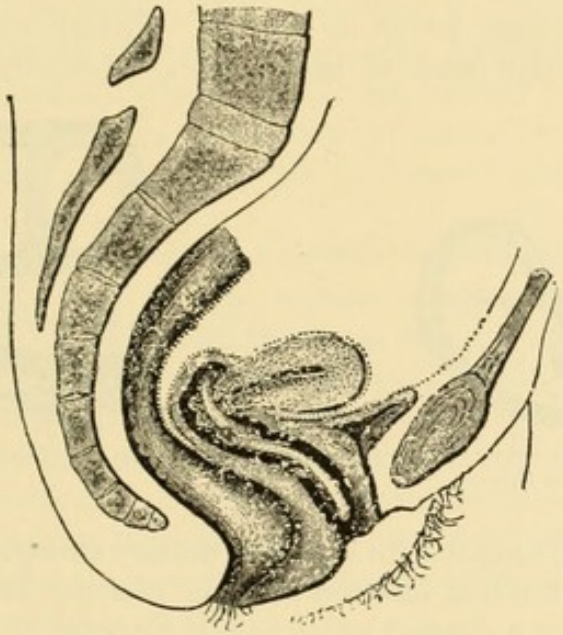

FIG. 284.—SCHULTZE'S FIGURE-OF-EIGHT PESSARY IN PLACE AFTER THE REDUCTION OF A RETRODEVIATION.

patient must always be told that she is wearing a pessary, and that she must remove it by hooking her finger over the anterior bar and pulling downward if it causes pain at any time. She must keep the parts clean by a daily cleansing warm injection, with a little sodium bicarbonate added. Injections of alum or any sulphate are to be avoided, as they soon cause the pessary to become roughened by incrustations. The pessary should be removed at least once in three months, to be cleaned and polished. So far, no better material has been found than polished hard rubber of good quality. While it is truly said that very few permanent cures result from the use of these instruments, they are most valuable as a palliative and adjunct to other treatment, and when properly and intelligently used do not cause harm.

A properly fitting bar pessary does not interfere with coitus or impregnation; and should the latter occur the pessary should be worn until the uterus has become so large that there is no longer danger of its possible retroversion and incarceration.]

The preceding pessaries act indirectly upon the cervix by the tension of adjacent parts; other forms of the instrument have a direct action upon the organ. Schultze uses pessaries of the form of the numeral 8, which encircle the cervix and lift it backward; they are made of copper covered with rubber. An instrument is chosen whose upper curves embrace the cervix without strangling it, and the lower ring is adapted to the size of the vagina and the angle of the pubic arch. These pessaries are best for nulliparæ, in whom the vagina is resistant and there is no need of seeking a point of support from the pubis; in the latter case they are intolerable.

When the perineum is very flaccid and the vagina large and relaxed, Schultze employs a pessary with a cervical rest (Fig. 285), which resembles the instrument proposed lately by Vulliet. Fritsch combines Schultze's pessary with the Hodge made of hard rubber, especially in the first days



Fig. 285.—Schultze's Pessary with Cervical Rest, or Sleigh Pessary.

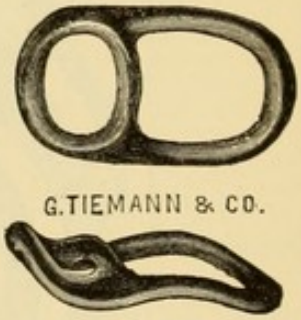

Fig. 286.—Fritsch's Pessary.

after reduction, following it with a Hodge pessary strongly curved (Fig. 286). All these pessaries are best inserted in Sims' position (lateral semiprone).

Pessaries have been devised which have their point of support externally, like the hysterophores used in prolapse; they are all inconvenient and untrustworthy. [The Thomas-Cutter is sometimes temporarily useful when the posterior vaginal cul-de-sac is too shallow to permit the use of an intravaginal pessary, its action tending to stretch and deepen this pouch.]

Pessaries with an intra-uterine stem may be of service in maintaining a reduction for a few days, especially as an auxiliary to other methods. Courty replaces the uterus with the sound once or twice a week, introducing a galvanic uterine stem for a few hours after each session. Alexander also maintains the organ in anteversion with a stem pessary after shortening the round ligaments. These are the only advisable applications of these instruments in retroflexion.

Whatever the form adopted, there are many cases in which it is absolutely impossible to maintain the reduction. Sänger, from careful statistics of 57 cases treated by pessaries in his practice, obtained but 7 cures, or 12.2 per cent; 27 were improved, or 47 per cent; in 15 cases there was no result (24.7 per cent) beyond moderation of the subjective symptoms.

The causes of failure with pessaries may be either extreme mobility of

the uterus or relaxation of the vagina and perineum; in the latter condition they may be combined with the use of a perineal cushion, which often affords much relief. If there is at the same time procidentia uteri or vaginæ, plastic operations are of great service in providing a point of support for the pessary.

Patients are always relieved, especially when the abdomen is very large, by an abdominal supporter which takes off the weight of the viscera.

Whatever the prothetic measures adopted, there are many patients who cannot be cured by them; in such cases we must have recourse to operation. There are two of these which merit special mention, viz., shortening the round ligaments and abdominal hysteropexy.

The Operation of Alquié-Alexander-Adams.—The idea of restoring or elevating the uterus by shortening the round ligaments, which are easily accessible to the surgeon at their termination, belongs to Alquié, of Montpellier. Two English surgeons reinvented the operation and performed it at about the same time, and it is only just to connect their names with that of our compatriot.

The operation is performed to maintain the reduction in retroflexion and for prolapse; I will return to it in considering the latter subject. It was very coldly received in England, Germany, and France. It was asserted, after insufficient and unfortunate investigation, that the round ligaments were not to be found outside the inguinal ring. A reaction then followed, and the operation to-day has many partisans, although its precise indications and its advantages are far from being correctly appreciated.

In my description of the technique I base my remarks on Alexander's paper and on my own experience. The operation should always be preceded by curettage as a preliminary step.

First and Second Steps. Discovery of the Ligaments.—Having found the pubic spine, an inch and a half incision is made over it in the line of the inguinal canal down to the muscles. With the finger the non-resistant point of the external inguinal ring is found and laid bare, avoiding the intercolumnar fibres which limit the ring above and externally. The cellular layer which stretches between the pillars of the ring is then cut and a cushion of fine yellow fat, upon which Imlach insists, pouts out of the wound. The genital branch of the genito-crural nerve is then drawn aside, and with a grooved director the round ligament is sought. It may be recognized by its reddish cord-like aspect, a little striped at its lower extremity (Fig. 287); it is then seized with forceps and isolated with a blunt instrument. The wound is then covered with an antiseptic pad and the same manœuvre repeated on the other side.

[The ligament is more easily found toward the upper limit of the external ring. If a nick is made in the intercolumnar fascia and the opening made to gape by drawing it back with a strabismus hook, while another is passed down on the outside of the grayish mass seen through the opening, and its

point turned inward, a mass of tissue is easily secured which when freed from the accompanying nerve is easily recognized as the round ligament. Fibres are found which do not draw on the borders of the ring, and by steady traction on these the glistening, smooth cord of the ligament emerges.]

Third Step. Reposition of the Uterus.—Alexander prefers to replace the uterus with a sound which an assistant passes into the organ, aiding the reduction by means of bimanual palpation, while the surgeon uncovers the wounds, seizes the ligaments, and isolates them with the spatula or by cutting the fibrous bands which hold them with the scissors. They are drawn out a distance of about ten centimetres. Four or five centimetres, which some operators have considered enough, does not accomplish a satisfactory reduction. To avoid wounding the serous membrane, Duplay has proposed to put a ligature round that portion of the ligament which is farthest up the canal; thus if the infundibuliform process of the peritoneum has been drawn down, it is tied off by the ligature. I do not practise this manœuvre.

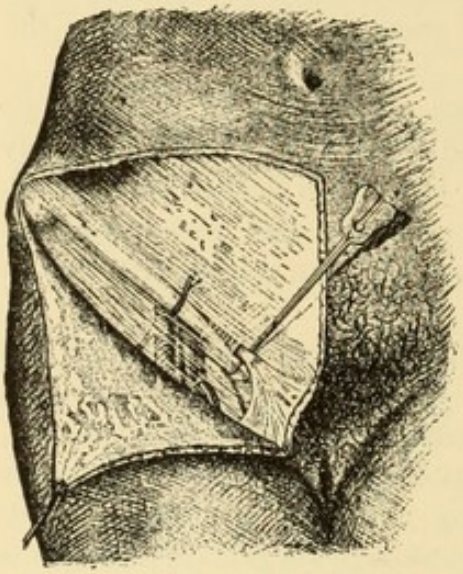

FIG. 287.—THE ROUND LIGAMENT AT THE EXTERNAL ABDOMINAL RING.

The two ligaments must be treated with the same traction and they should come with but little force, especially when the assistant aids the reduction by the sound; this easy extraction need not cause any fear that they have been torn within the abdomen. Resistance is felt when the uterus is replaced, and movements of the sound in the organ will be transmitted to the ligaments.

Fourth Step. Suture of the Shortened Ligaments; Closure of the Wound.—The surgeon confides to an assistant the charge of keeping the ligaments moderately tense while he prepares to suture them. A curved needle with silk is passed through the external pillar and the ligament toward its upper border and lastly through the internal pillar, so that the stump of the ligament is firmly united to the margin of the external orifice of the inguinal canal. A second suture is passed through the lower portion of the ligament; then all that part of the fibrous cord which is beyond these sutures is cut off. If it has been necessary to open the canal and divide the intercolumnar fascia, the incision should be closed with catgut; even when these parts have not been cut, I am accustomed to close the ring by a deep catgut suture, which thus forms the lowest of the different planes of superimposed sutures which I employ for the closure of the wound. It is useless to drain if the wound is clean and the search for the ligament has not been difficult. Antiseptic dressing, with slight compression.

Casati, of Rome, has proposed a modification of the technique, making a

curved incision from one ring to the other, crossing the extremities of the excised ligaments, and fixing them with a deep, continuous catgut suture. Doret employs the same cutaneous incision as Casati, opens the entire length of the inguinal canal, liberates the two round ligaments, and ties them together in a triple knot which is fixed in the fibrous tissue in front of the symphysis. The rest of the ligament is then sutured to the inguinal canal. Doléris, in cases in which the ligaments are thin, adopts a procedure similar to the above, with the difference that the crossing and suturing of the ligaments is made under the skin and not exposed. The free end of the right ligament cut at its pubic insertion is seized by forceps introduced from the opposite side, and carried under the skin above the pubes to meet the end of the other. The left ligament is sutured to its pillars, the free portion is resected, and its free extremity placed in contact with that of the opposite ligament; the two trunks are freshened and sutured with catgut; drainage. Segond fastens the round ligament in the superior angle of the ring by a suture of silk; then, in the middle of the two pillars on their free borders and parallel to them, he makes a short incision like that which Reverdin has advised in the radical operation for hernia; he thus obtains two small buttonholes which he uses in tying the ligament round the pillars. Seizing the end of the ligament, it is passed from behind forward through one of the openings, then through the other from before backward, and finally made to emerge in the superior angle of the ring, which thus forms an actual knot and is then fastened with one or two sutures which diminish the ring and give more solidity to the fixation of the ligament. I consider the procedure which I have given more simple and equally effectual.

Fifth Step.—Alexander considers it of great importance to maintain the uterus in a good position during convalescence, with a stem pessary to keep it straight and a Hodge to insure anteversion. The ligaments are thus relieved from the traction which the uterus does not fail to exert upon them by its tendency to reproduce the displacement. The pessary should be retained during the first month, which the patient spends in bed [and for several months after]. I have abandoned the stem, but it is well, I think, to maintain the uterus and thus relieve the ligaments either with the Hodge or by means of antiseptic tampons frequently renewed.

Gravity of the Operation; Results; Indications.—At the end of the work which I have cited, Alexander mentions twenty-six cases of retroversion and retroflexion upon which he had operated up to June, 1885, with permanent success. It is evidently, then, a benign operation. But Alexander states that death may occur in exceptional circumstances, as after every surgical procedure, however small, having known three cases, in his own experience, from pyæmia due to contagion. Many cases have been recently published in France and elsewhere by Trélat, Doléris, Schwartz, Terrillon, who have obtained great advantages from the operation in retroflexions which were easily reduced, with no accidents. Fatal cases have been described by for-

eign writers, Harrington having collected one hundred and forty cases, with one death, from twenty-one operators. The operation is now generalized and is practised everywhere, with variable success, which appears to depend upon the degree of clearness with which the indications are appreciated. Besides the important discussion at the Paris Surgical Society, I would mention those of the Congress of Gynæcology at Munich, and at the Congress at Halle.

Trélat has performed Alexander's operation forty times, of which five were for movable or adherent retroversion, which were previously reduced in repeated sessions, and obtained excellent results. He clearly formulates the rule that shortening of the round ligaments seems to be the operation directly indicated to maintain in anteversion a uterus which was previously fixed by adhesions in retroflexions, mobilized by treatment, but unable to preserve the position itself or by pessary. Moreover, since retrodeviations seemed to him to constitute an actual menace to the patient, in view of the almost constant complication of metritis and salpingitis provoking adhesions, he considered it good practice to intervene in retroversions which were absolutely indolent, and thus to guard against possible accidents. This principle seems to me to extend the field of operation far too widely. I am inclined rather to accept Mundé's advice, who, although a great partisan of the operation, reserves it for painful deviations which are easily reducible.

It seems, then, that the operation of Alquié-Alexander is susceptible of giving excellent and permanent results in retroflexions of the uterus. In simple cases a pessary may be preferable; but where it is difficult to apply and is not well borne, shortening of the round ligaments is a valuable resource; we should thus be able to cure even bedridden patients; but it is well to know that cases which are rebellious to the pessary sometimes bring disappointment, even after operation; Küstner and Keith have published instructive cases of this variety.

It has been fully demonstrated that shortening of the round ligaments does not hamper the course of pregnancy in any way, and does not complicate labor; it also appears that the malposition has no tendency to recur after confinement. Several cases of pregnancy and delivery at term have been reported. Alexander has seen seven of his patients out of eight successfully delivered. Polk has noted the occurrence of pregnancy in a woman operated upon for retroversion with adhesions; she miscarried at the fourth month. Doléris has observed pregnancy seven times; Imlach, four times.

[Nearly all those who have had practical experience with Alexander's operation have declared in its favor, and it will undoubtedly continue to be done successfully in properly selected cases and with accessory operations for lessening the weight of the uterus, narrowing the vaginal walls, and repairing the torn perineum.

The greatest value of the operation is in old cases of retroversion and flexion, especially when associated with descent or prolapse and with more

or less anterior or posterior colpocele; that is, when the pelvic floor is injured beyond non-operative restoration. To these indications may be added displacement accompanied by prolapse of the ovaries, so that the wearing of a pessary is not practicable. The presence of adhesions is an absolute contra-indication, except where they can be broken by gentle manipulation. When Alexander's operation is contra-indicated or inefficient, other methods are to be employed. These fall into two distinct categories, one utilizing the natural supports, the other creating new supports, and each having its own sphere of usefulness.]

Colpo-hysteropexy and Vaginal Hysteropexy.—The first attempts to fix the uterus by way of the vagina, after it had been reduced to a good position, date from the time of Amussat, who in case of version, either forward or backward, employed the hot iron and cauterized the side opposite to the displacement to produce a cicatricial bridle which would restore the organ. Courty claimed to have obtained very good results from this singular treatment in cases of anteversion, and, although he did not reject it in retroversion, declared that there was here some danger to the adjacent peritoneum.

With the same object a transverse fold of the vagina has been sutured in such a way as to shorten one or the other wall of the canal; Sims performed this three times for anteversion.

Richelot, Sr., has proposed to consolidate the cervix with the posterior wall of the vagina. Bossi has recently described a similar procedure under the name of vaginal fixation of the cervix. Byford has performed an analogous metro-elytrorrhaphy in patients who had passed the menopause, uniting the anterior vaginal wall on the anterior surface of the cervix with the posterior wall of the vagina. Doléris practised pre- or retro-cervical colporrhaphy in similar cases, after having reduced the displacement.

When the anterior vaginal wall appears too short, Skutsch proposes to lengthen it by a transverse incision, which is then sutured longitudinally.

Schücking fixes the fundus of the uterus to the vesico-uterine cul-de-sac by means of a double-threaded, strongly curved needle *cachée*, introduced into the replaced and dilated uterus, with which he pierces the vaginal fundus and vaginal pouch below the bladder, tying the suture so as to have the uterus in an exaggerated position of anteflexion. The suture is removed from the tenth to the fourteenth day, when the exaggerated anteflexion disappears. Zweifel opens the anterior cul-de-sac as a preliminary measure, in order to avoid with certainty injuring the bladder, intestine, or urethra, accidents which are to be feared. In spite of this modification, of which Schücking strongly approves, and notwithstanding reported successes, this adventurous procedure does not seem to me worthy of recommendation.

Von Rabenau has proposed to incise the cervix, then to open the anterior vaginal pouch and separate the bladder from the uterus by a dull instrument; the anterior wall of the uterus is then excised for a distance of four centimetres and the wound sutured. This operation has been imitated by

Schmid, of Cologne. Fraenkel has justly observed that the cervix is so strongly drawn forward by the cicatricial process that the body of the uterus tends to fall backward.

Sänger has theoretically adopted the idea of Schücking, but his operation of suturing the fundus to the anterior vaginal cul-de-sac is different. After transverse section of the anterior cul-de-sac of the vagina and of the peritoneum behind the bladder, he sutures the uterine body to the vagina with silver, uniting the vaginal wound on a vertical line to elongate the anterior wall of the canal and permit the cervix to retire backward.

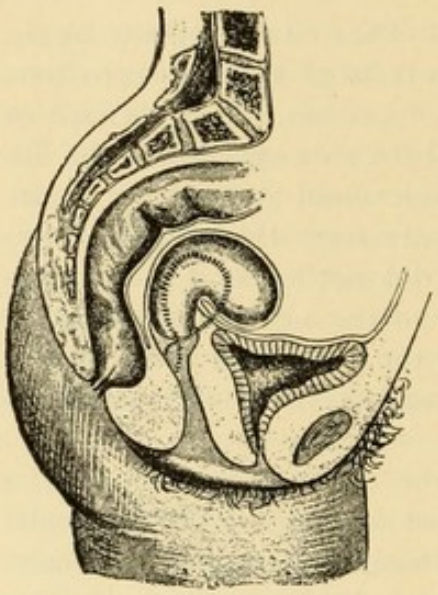

FIG. 288.—VAGINAL HYSTEROPEXY. SCHÜCKING'S OPERATION.

Another method which is suggested by the same author is dilatation of the uterus, introduction of the finger into its cavity, and, using the finger as a guide, the direct insertion of a metallic suture into the uterus through the anterior vaginal cul-de-sac which is left intact.

These methods of vagino-fixation are not satisfactory and have been but little used. The recent methods of Mackenrodt and of Dührssen, however, are now commonly employed, especially in Germany, and have been adopted by Le Dentu, with slight modifications. In these two procedures the operation includes three steps: (1) Incision of the anterior vaginal wall; (2) dissection of the bladder, which is drawn forward and upward; (3) suture of the body of the uterus to the denuded borders of the vaginal incision, with or without opening the peritoneal cul-de-sac. The body of the uterus is in this way fixed to the anterior vaginal wall for a greater or less distance, and unless relaxation of the wall of the vagina occurs, the uterus is maintained in the position of anteversion in which this procedure has placed it.

Both Mackenrodt and Dührssen begin by forcibly drawing the cervix downward and backward in order to expose the anterior vaginal wall. The bladder is emptied and its lower limit carefully ascertained. A sound is used to replace the uterus and carry it very far forward, and this instrument is then left in the care of an assistant; it is better to employ a special forceps constructed by Orthmann, one of its jaws, which is elongated in the form of a sound, being passed into the uterus, while the teeth of the other grasp the cervix. After this point Mackenrodt's and Dührssen's methods differ.

At first Mackenrodt made a curved transverse incision convex anteriorly, a little below the lower limit of the bladder, extending as far as the tissue of the cervix. He then incised the anterior vaginal wall in the median line, from a point one centimetre behind the sub-urethral tubercle to the

preceding transverse incision, and dissected the two triangular flaps thus formed. After having completely separated the bladder from the uterus as far as the vesico-uterine cul-de-sac, he drew the uterus forward (Fig. 289) and

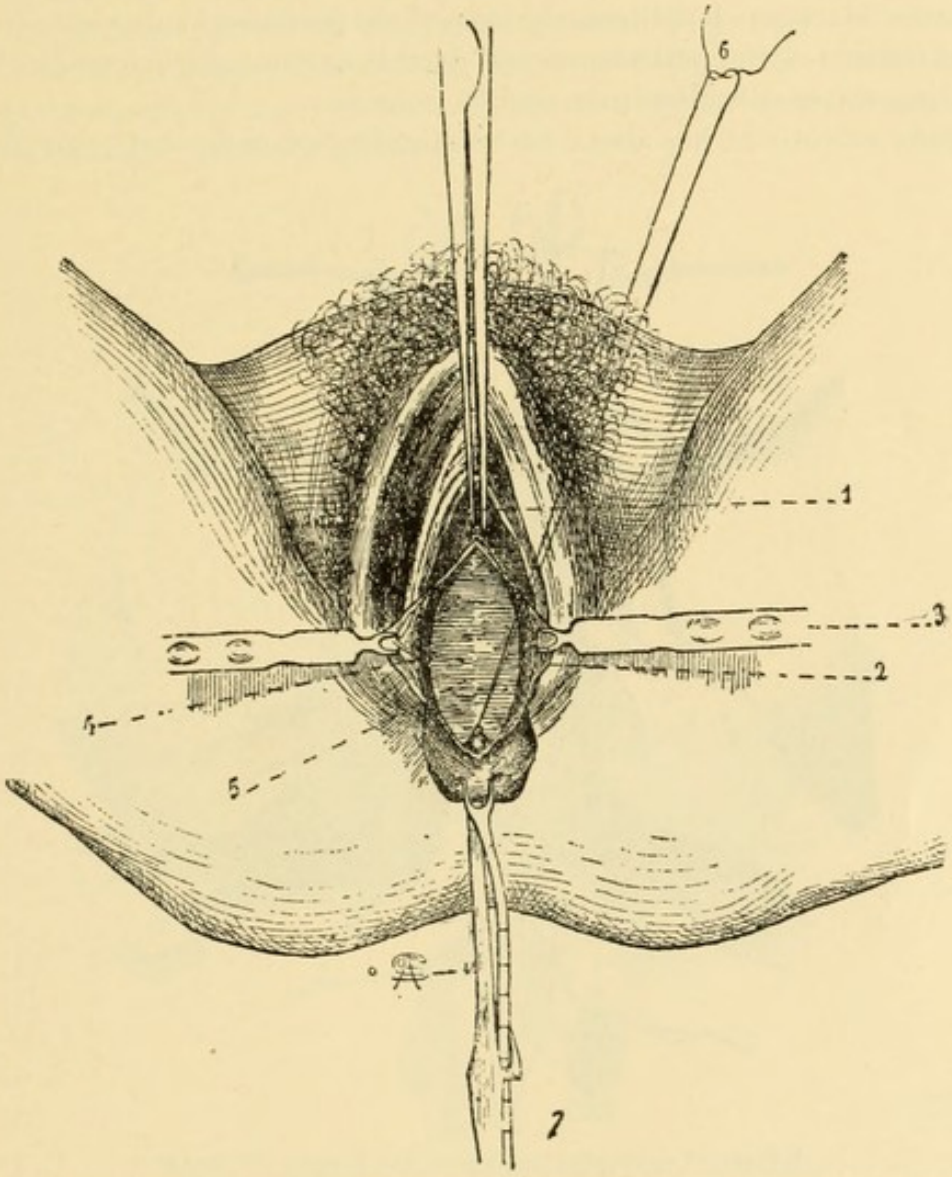

FIG. 289.—MACKENRODT'S VAGINO-FIXATION ACCORDING TO ARRIZABALAGA. Anterior median incision and separation of vaginal flaps. 1, Forceps placed below tubercle of anterior vaginal column; 2, deep surface of vaginal flap; 3, hooked retractor showing internal surface of flap; 4, dotted line showing limits of subsequent colporrhaphy; 5, bladder wall; 6, suture in cellular tissue between bladder, vagina, and cervix, raising lower portion of bladder; below is part of anterior surface of cervix; 7, combined sound and forceps drawing cervix toward vulva.

attached it to the two vaginal flaps by silkworm-gut sutures passed a little above the upper portion of the cervix; be then fastened the two triangular flaps in their original position.

This primitive procedure gave several failures in the hands of its originator and of others. Mackenrodt has modified it several times. Being convinced that the recurrences were due to the persistence of the vesico-uterine cul-de-sac, he obliterated this by an important special step in the operation;

for this purpose he passed several catgut sutures transversely across the cul-de-sac to unite its anterior and posterior walls. The entire anterior face of the uterus from cervix to fundus was then fixed to the vagina across the obliterated cul-de-sac.

Later, Mackenrodt deliberately opened the peritoneal cul-de-sac, drew the uterus outside of the peritoneum and fixed it so throughout its entire length, accepting the modification proposed by Schauta.

Quite recently he has abandoned vagino-fixation in favor of vesico-fixation,

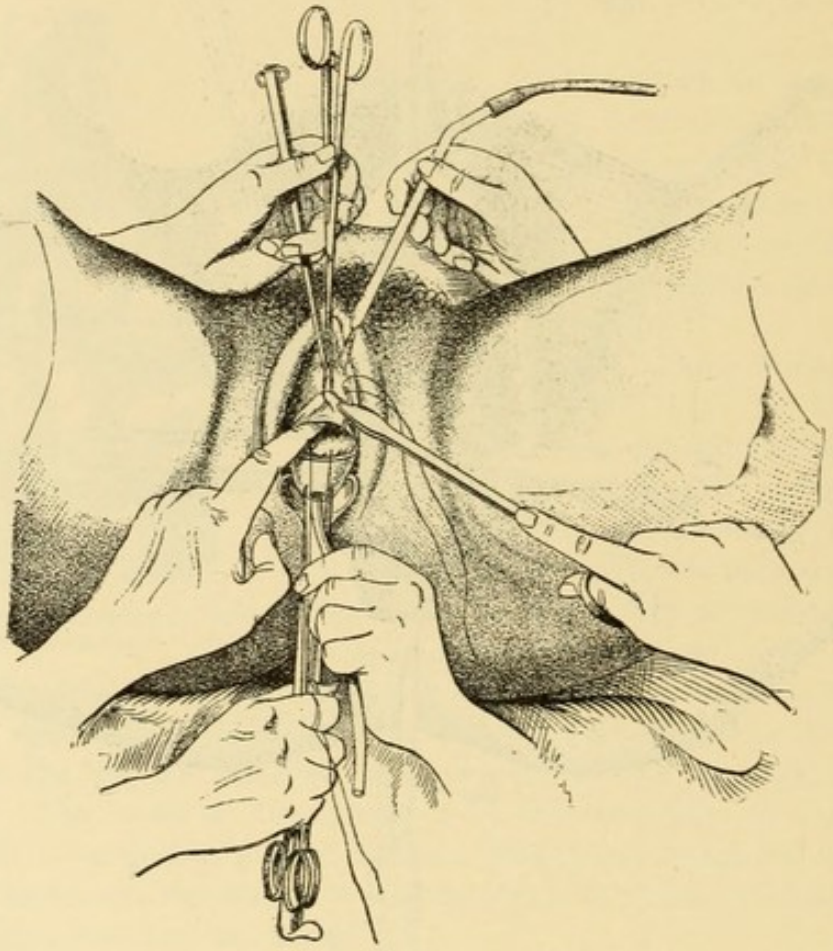

FIG. 290.—VAGINO-FIXATION—PLACING THE SUTURES (DÜHRSSEN).

on account of the unfavorable results of the former operation in subsequent confinements. After opening the peritoneal cul-de-sac he sutures the vesical flap of peritoneum to the fundus of the uterus, and then fixes the bladder to the anterior wall of the uterus as far as the os internum. The sutures are removed after three or four weeks.

Dührssen makes a transverse incision in the anterior vaginal wall near its insertion into the cervix and separates the bladder so as to denude as large a portion of the anterior face of the uterus as possible. The uterus is replaced by a sound in the hand of an assistant, and a silk suture, intended to draw down the body of the uterus, is passed transversely through its an-

terior wall (Fig. 290). If necessary a second and a third suture may be passed above the first. The three sutures which fix the uterus are passed in the following manner: The suture penetrates the raw surface of the upper vaginal flap, near its free border, passes through its entire length, then traverses the uterine wall at the level of the fundus (Fig. 291). Each suture runs vertically; they are tied and left in the wound. The sutures used to draw down the uterus are then removed and the vaginal wound is closed by a continuous catgut suture (Fig. 292).

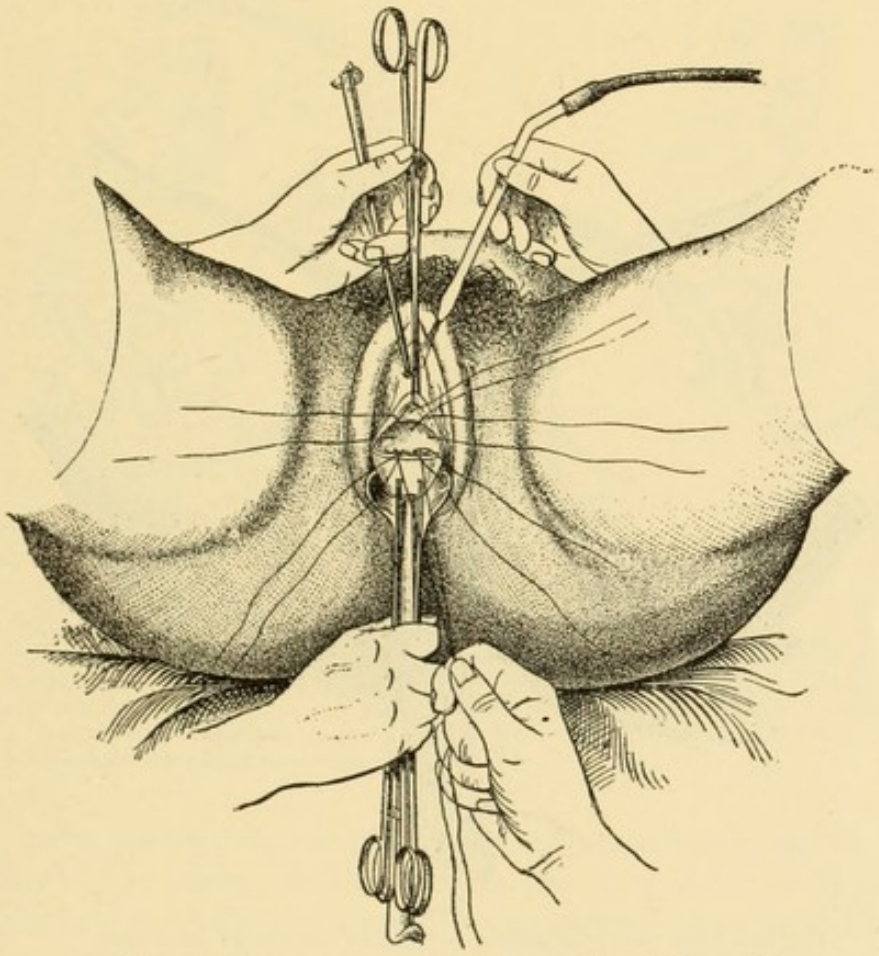

Fig. 291.—Vagino-fixation—the Sutures in Place (Dührssen).

Pregnancy after Vagino-fixation of the Body of the Uterus.—The important communications made by Strassman and Mackenrodt to the Berlin Obstetrical and Gynæcological Society show the influence which vagino-fixation may exert upon subsequent pregnancies.

When pregnancy occurs in a uterus fixed to the anterior vaginal wall, traction is exerted upon the adhesions, sometimes destroying them and leading to a recurrence after delivery. This occurred frequently after Mackenrodt's earlier operations when fixation was accomplished without opening the peritoneal cavity.

When the peritoneum is opened (that is to say, in Dührssen's method

and in the modified procedure of Mackenrodt) the adhesions are much stronger. They do not yield to the traction and furnish an insurmountable obstacle to the regular development of the uterus, resulting in frequent abortions. Dührssen has counted six abortions in twenty-four pregnancies under these conditions, and Weberstedt reports six abortions in twenty-four pregnancies observed at Gusserow's clinic in patients operated upon by Dührssen's method.

When pregnancy continues to term, serious complications may arise at the time of delivery. Strassman has shown clearly that when the adhesions

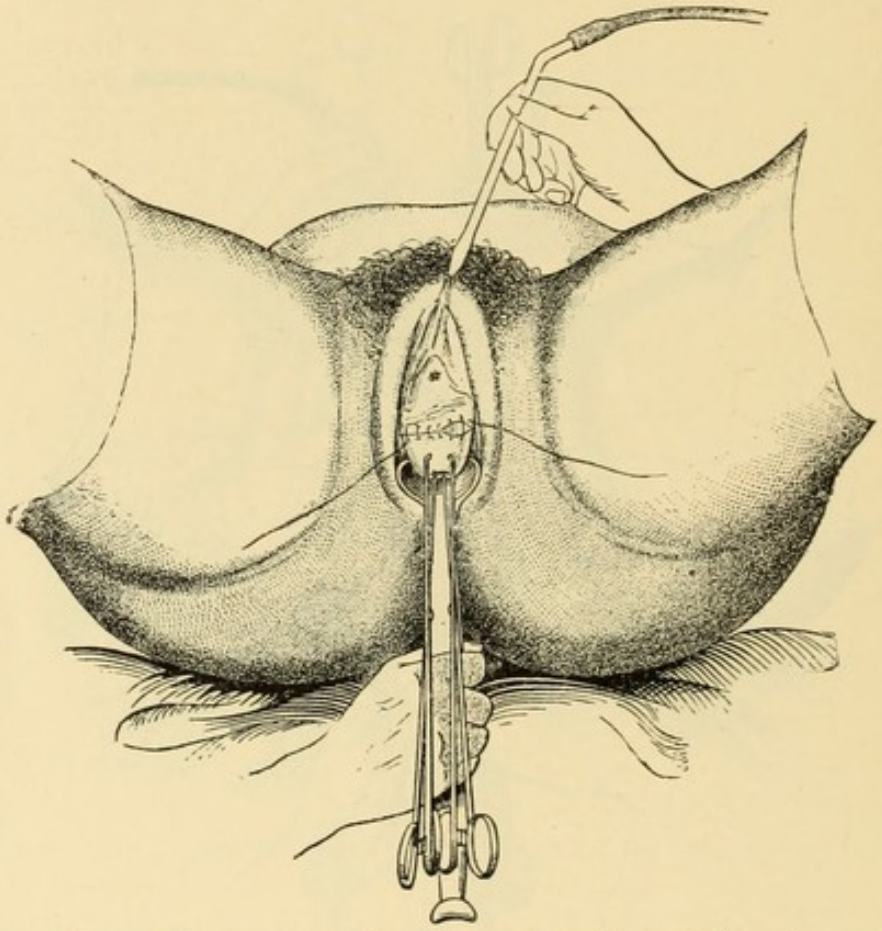

FIG. 292.—VAGINO-FIXATION—FINAL SUTURES OF THE VAGINA (DÜHRSSEN).

do not yield, the development of the gravid uterus takes place especially at the expense of the posterior wall; the anterior wall hypertrophies, but does not rise out of the true pelvis where it is imprisoned. The cervix is drawn high up and backwards by the posterior wall. Strassman reports two cases in which normal delivery was impossible. In the first, version was required and the patient died of post-partum hemorrhage. In the second, Porro's operation was performed and death followed. Mackenrodt adds a similar case.

Richelot has warmly recommended a procedure of Nicoletis for the purpose of elevating the uterus, which takes its point of support upon the posterior vaginal wall and peritoneum. The intra-vaginal portion of the cervix is first amputated, then on its posterior aspect three catgut ligatures are passed

through the uterine stump and vagina in such a way that they reappear at the internal uterine os. These three threads are median; to the right and left two others are passed, taking in the posterior wall of the vagina and emerging on the anterior border of the stump so that the posterior vaginal wall is thus suspended from this border of the uterine section; coaptation is completed by superficial sutures. The entire vaginal insertion is carried forward, and the wall drags upon the fundus of the uterus and rotates it forward even at the moment of operation (Fig. 288). This, I think, is to expect a mechan-

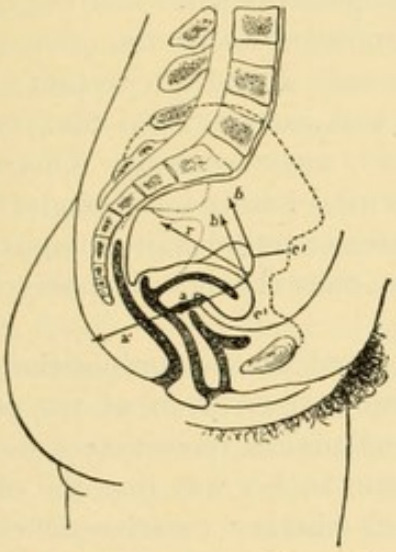

FIG. 293.—VAGINO-FIXATION. Theoretical correction of action of posterior adhesions of uterus fixed by Mackenrodt's method. *a*, Cicatrix of uterine fixation; a^1, direction of its action; *b*, direction of traction force exerted by adhesion at fundus of uterus; *c*, c^1, situations into which the fundus *c* is successively drawn by traction force *b*; *r*, resultant of traction forces a^1 and *b*.

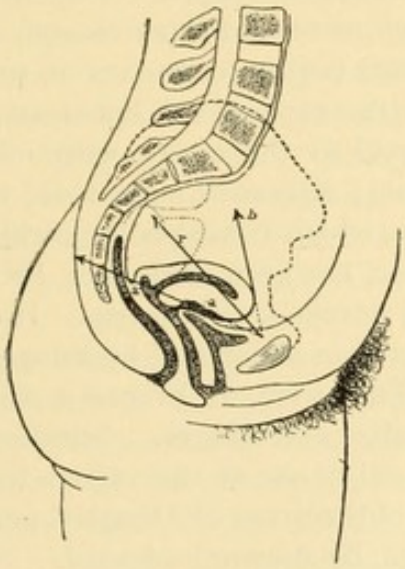

FIG. 294.—VAGINO-FIXATION. Theoretical correction of action of posterior adhesions of uterus fixed by Dührssen's method. *a*, Cicatrix of uterine fixation; a^1, direction of its action; *b*, direction of traction force exerted upon fundus of uterus by adhesion at that point; *r*, resultant of traction forces a^1 and *b*.

ical effect to be permanent, which is really only an illusion, for the constant extensibility of the vagina and the frequent flaccidity of the perineum reduce the procedure to an ingenious theoretic conception. The good results obtained have been due only to cervical amputation and its effect upon the metritis.

A new method of fixation of the uterus has recently been recommended by Pryor, who fixes the uterus to the bladder in cases of movable retroversion. He opens the anterior cul-de-sac, denudes a small surface on the anterior surface of the uterus, and a corresponding area on the posterior surface of the bladder, and unites the two organs in these regions by several interrupted sutures.

When the uterus is retroverted and bound down by adhesions Pryor opens the posterior cul-de-sac, breaks up adhesions, and makes the uterus completely movable. He then places in Douglas' cul-de-sac a tampon of iodoform gauze which pushes the body of the uterus forward. A second

tampon, in the vagina, presses the cervix backward, aiding the first in maintaining the uterus in its proper situation. The pelvic tampon is removed in a few days; the vaginal is left longer in position.

Pelvic Colpo-hysteropery.—This is the name which might be given to the operation of Freund in cases of prolapse or serious retroflexion with a largely developed Douglas' pouch. He thinks that both of these displacements may be due to persistence of the great extent of this cul-de-sac in the fœtus, for up to the seventh month of intra-uterine life the peritoneum descends to the middle of the vagina. Freund made a large opening in the posterior vaginal pouch, entered the peritoneum, and sutured the posterior surface of the supra-vaginal portion of the cervix to the serous membrane above the promontory near the utero-sacral ligaments, taking care not to wound the rectum; then he packed the cavity with iodoform gauze and partly closed the vaginal wound; afterward he restored the perineum if it was necessary. This operation, which furnishes a radical cure for congenital hernia into Douglas' cul-de-sac, has been applied by Freund in two cases of retroflexion complicated with hernia of this cavity. It does not seem more benign or more efficacious than abdominal hysteropexy.

The germ of Freund's conception was found in the propositions of Schultze and Sänger. Schultze proposed a transverse section of the posterior cul-de-sac of the vagina, freeing uterus and adnexa, reposition of uterus, and obliteration of Douglas' pouch by sutures in such a way that the cervix would be drawn backward. Sänger inquired whether curative adhesions could be produced by opening the recto-uterine pouch and tamponing with iodoform gauze. Freund thought of alcohol injections in the neighborhood of the utero-sacral ligaments and into the retro-cervical cellular tissue, in the hope of thus producing anteversion by the contraction of these ligaments. This was assuredly a great risk, exposing the parts to inflammation which would exceed therapeutic limits.

Most of these procedures of vaginal hysteropexy are open to two objections: they act directly upon the fundus, and fix the uterus to tissues which are movable and extensible, which is not the case in suture of the uterus to the abdominal wall.

Gastro-hysteropexy or Fixation to the Abdominal Wall (ventro-fixation, gastro-hysterorrhaphy, gastro-hysterosynaphy):

Historical Review.—When the pedice of an ovarian cyst has been fixed in the abdominal wound, it is quite common to find that a previous uterine displacement has disappeared. From this originated the idea of purposely fixing the uterus to the abdominal wall by means of the broad ligaments, with or without removal of the ovaries. The first operation of this kind was performed by Koeberlé. On March 27th, 1869, in a difficult case of retroflexion which had caused symptoms of chronic intestinal obstruction, he incised the abdominal walls, brought the uterus forward, removed a healthy ovary, and sutured the pedicle to the lower border of the wound. Sims (February 22d,

1875) performed laparatomy on a woman of thirty-two years who suffered from an extremely painful retroflexion, removed the left ovary, which was of the size of a nut and in cystic degeneration, and sutured the pedicle in the lower angle of the wound in such a way that the uterus was held in its normal position; the patient was perfectly cured. Schröder, a little later, had a patient who suffered from retroflexion and choreic symptoms, and also had a small cyst of the ovary, upon whom he performed laparatomy and fixed the pedicle to the abdomen, curing the displacement and the chorea. Lawson Tait, on February 20th, 1880, practised laparatomy for oöphoritis and retroflexion upon a woman whom nothing had benefited. He found the ovaries large and soft but not cystic, and removed them; then on closing the abdominal wound he passed a suture through the fundus and fastened the uterus to the wall. A second operation was done April 9th, 1880. Both cases remained cured in 1883. Hennig in 1881, in a case of rebellious retroflexion, performed castration and sutured the ovarian ligament on the right side and the broad ligament on the left into the abdominal wound.

After these scattered cases without definite system, Olshausen, in an article which was the beginning of a new era, published an improved method including three remarkable cases, one of retroflexion and two of prolapse. He united with many sutures of silkworm gut that portion of both round and broad ligaments which is adjacent to the uterine cornua with the abdominal wall, taking great care to avoid the epigastric artery. In one case he extirpated the ovaries in a patient who was near the menopause, but remarks that this contingent to the operation was purely accidental.

At the congress where Olshausen's communication was made, a memoir of Fraenkel's was followed by a discussion, and a number of new cases were cited by Bardenheuer (reported by Frank) and Czerny. Soon afterward Kelly, in Philadelphia, published an interesting case of retroflexion cured by ablation of one ovary and fixation of the pedicle to the abdomen, together with a partial analysis of preceding papers; the other ovary had been extirpated some time before by the vagina. Kelly published at the same time two cases of castration and suture of the broad ligaments to the abdomen by Sänger. Soon after the latter author prepared a more complete study of the subject with seven personal cases. Since then he has performed ventrofixation twelve times; in nine cases he removed the appendages. Klotz, in October, 1887, had already reported to the Gynæcological Society of Dresden seventeen cases of fixation of a retroflexed uterus to the abdominal wall by means of a pedicle formed of the tube. Leopold, one month later, presented three successful cases after fixation of the fundus in the abdominal wound. In 1888 Kelly, in America, published a new paper on the subject with several new cases; four of P. Zweifel's for retroflexion (hysterorrhaphy without castration) and one of Staude's for retroflexion (hysterorrhaphy with ablation of one ovary, the other being so adherent that it could not be extirpated). Phillips published one case of ventro-fixation for prolapse in England.

Schauta has reported four cases from his practice. Czerny has given four cases of gastro-hysteropexy and described his method in an important memoir which appeared in October, 1888. In France, Terrier, and Picqué were the first to perform the operation, Terrier in August, 1888, for prolapse, and

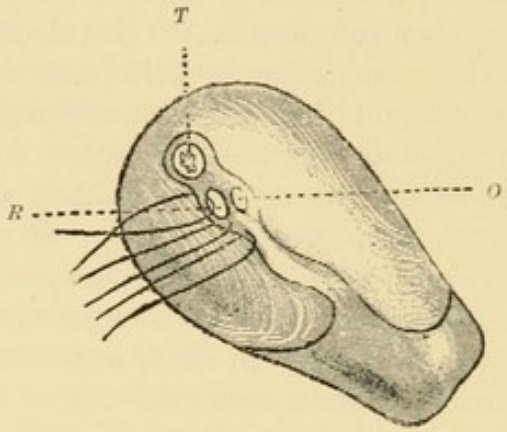

FIG. 295.—GASTRO-HYSTEROPEXY (OLSHAUSEN AND SAENGER). Profile view to show the path of the sutures. *T*, Tube; *R*, round ligament; *O*, ovarian ligament.

Picqué in September for retroflexion. Since that time the cases have multiplied in France and elsewhere, and their description offers nothing peculiar.

It is probable that many gynæcologists have practised occasional complementary fixation of the uterus after ablation of an ovarian cyst or a fibroma or to remedy a retroflexion or a prolapse, without publishing: thus, in April,

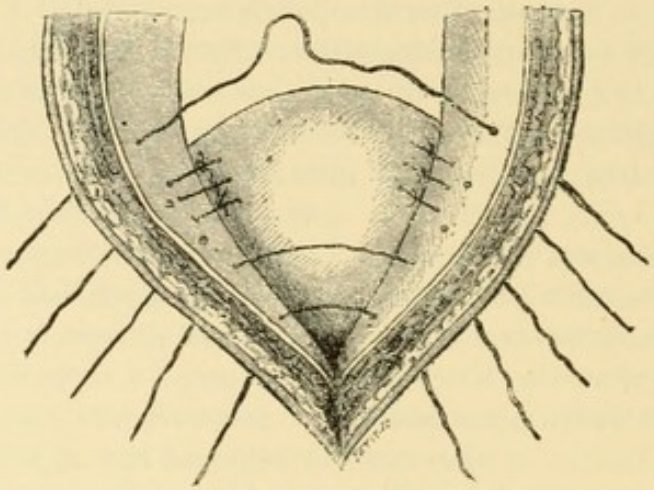

FIG. 296.—GASTRO-HYSTEROPEXY (OLSHAUSEN AND SAENGER). Front view. Two of the sutures for closing the abdominal wall are represented as cut away so as to show clearly the uterine sutures on either side which have already been tied.

1882, I fixed the pedicle of an ovarian cyst and cured a prolapse. The case was mentioned for the first time at a discussion on hysteropexy and published entire by Dumoret. Czerny practised an analogous suture of the pedicle of the ovary for retroflexion June 15th, 1886, but did not publish the case till the year 1888. At that time he had done the complementary operation three or four times in forty-six ovariotomies.

With these complementary hysteropexies it is convenient to include necessary fixation of the pedicle after supra-vaginal amputation and fixation of the uterus after extirpation of a subperitoneal fibroma. Brennecke, of Magdeburg, has sutured the uterine cornu of the right side to the abdomen in the course of an ovariotomy to remedy a prolapse; success; 1883. In a second operation of ovariotomy he sutured both cornua for prolapse; failure; new operation on the same patient; suture of ovarian pedicle; 1885. With the exception, perhaps, of this last case, these operations have nothing in common with hysteropexies deliberately proposed. Werth, of Kiel, performed castration for hemorrhage in 1887, sutured the pedicle to the wall, with cure at the same time of extreme retroflexion. In 1884, in another operation for dermoid cyst, he sutured the retroflexed uterus to the vesical peritoneum with silk; this is not ventro-, but vesico-hysteropexy, or cysto-hysteropexy. A case of Weist's, cited by Kelly, in which he was said to have attached the ovarian pedicle to the abdomen for prolapse, belongs in the class of fortuitous operations and is very different from veritable gastro-hysteropexy.

Operative Technique.—Three chief and several secondary procedures may be distinguished:

1. *Indirect Fixation.*—The ovary or tube being first removed, the pedicle is fixed in the abdominal wound. Klotz, who has employed his method in thirty-eight cases, attaches much importance to the use of a glass tube behind the uterus in Douglas' pouch, which may be withdrawn after a short time, and which has for its purpose the production of adhesions. This method has the defect that it sacrifices the ovary, twists the uterus, and produces only a temporary union; it has often failed.

2. *Direct Lateral Fixation of the Fundus.*—Silkworm-gut sutures are placed on each side, at the edges of the fundus, as shown in Figs. 295 and 296. They are inserted with care to include only the anterior serous layer and not to pierce the tube or the epigastric artery. This procedure has the disadvantage of leaving a cleft or buttonhole between the uterus and the abdominal wall which may cause internal strangulation. Kelly's method resembles Olshausen's and does not need special description.

3. *Direct Median Fixation.*—Leopold also fixes the fundus of the uterus to the abdominal wall. The abdomen is opened, the uterus replaced after rupture of adhesions, and then a strong needle, armed with silk, is passed from before backward, a little outside of the border of the wound, through the whole abdominal wall at the level of the fundus. The uterine tissue is pierced on the elevated surface of the anterior aspect of the organ in a line with the insertion of the two round ligaments. The needle is passed under the serous membrane and the superficial layer of the muscle for a distance of one centimetre, and then through the other lip of the wound, but this time from behind forward. A second suture is then inserted above in a line with the insertion of the tubes for about two centimetres, and a third a little above this one in the same manner (Fig. 297).

To facilitate the adhesion, Leopold gently scrapes the surface of the peritoneum with the back of the bistoury over that portion of the uterus which is circumscribed by the sutures, making a superficial freshening which does not bleed and simply removes the epithelium. Then he unites the lips of

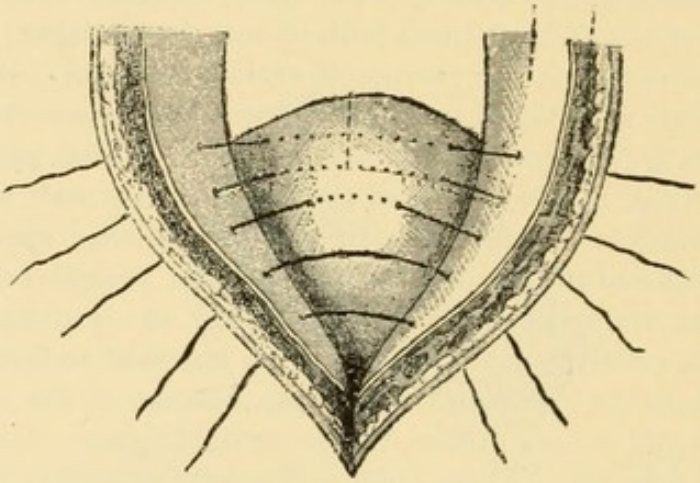

FIG. 297.—GASTRO-HYSTEROPEXY; LEOPOLD'S METHOD.

the abdominal wound at that level, tying the three sutures above the abdominal wall (Fig. 297) so that the anterior surface of the uterus is exactly applied to the parietal peritoneum at this point. The rest of the wound is then closed below and above. The uterine sutures are removed at the end

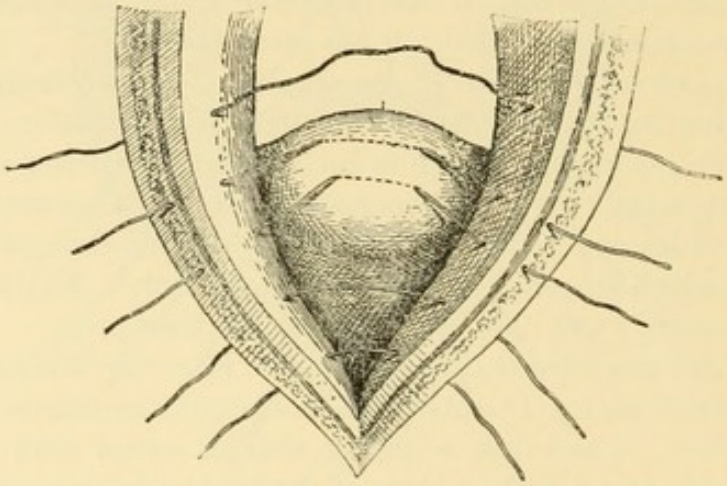

FIG. 298.—GASTRO-HYSTEROPEXY; CZERNY'S METHOD.

of about twelve days. None of the sutures are hidden. Leopold thinks that he thus produces lax adhesions, with little risk to the bladder. It is well to insert a Hodge or Smith pessary for the first month to prevent strain on the sutures and maintain the good position gained.

Czerny pierces the abdominal wall near the fundus with a very strong needle furnished with bichloride catgut (he first used chromic catgut). The needle passes through the muscles and the peritoneum and then the opposite

side, but does not include the integument, which is a capital difference between this and Leopold's method. One or two threads are thus placed with care not to exert traction upon the uterus, a point being selected where the organ may be easily applied to the abdominal wall; they are then tied, the ends cut and the wound closed (Fig. 298).

Terrier's procedure is a variation of the preceding. He begins by placing a provisional suture of silk in the fundus, through but little of the tissue, for the purpose of drawing the organ upward. Large catgut is used for the three permanent sutures on the anterior surface of the uterus. The first is passed at the junction of cervix and body, the next at the middle of the body, and the last near the fundus. The threads pass through the superficial

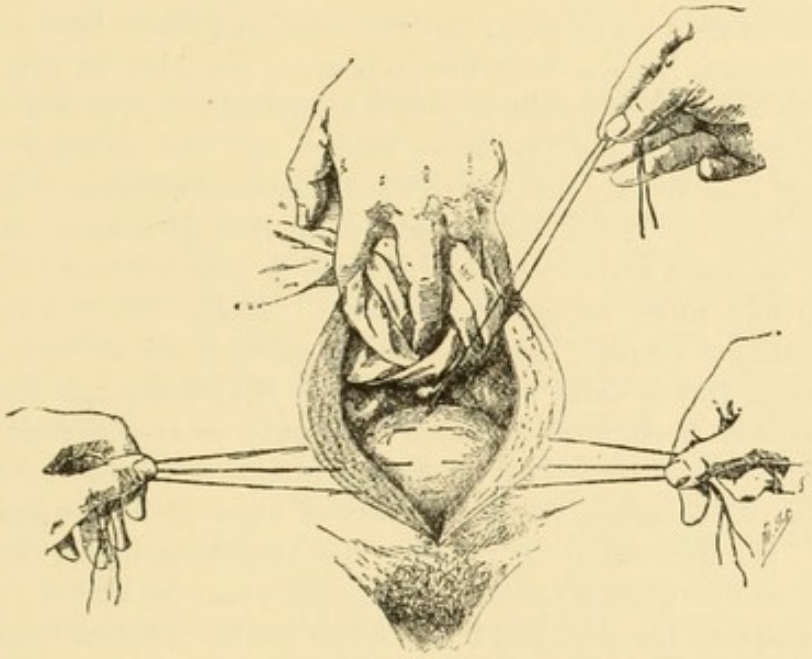

Fig. 299.—Gastro-hysteropexy; Terrier's Method.

layers of the uterus, and the whole thickness of the abdominal wall, with the exception of the cellular tissue and the skin. This is the real difference between Leopold's and Terrier's procedures; the latter being distinguished from Czerny's by the care which is taken to pass the sutures like basting stitches so that they are not wholly hidden in the tissues of the uterus, but a portion is interposed between the organ and the abdominal wall; he thinks that the production of adhesions is thus better assured (Fig. 299). The threads are tied and form a "suture perdu," above which the integuments are brought together, superiorly by three silver sutures through the peritoneum and below by three strands of silkworm gut.

I have long employed the continuous hem suture, no matter how great the extent of the wound. At present I have returned to the method of Olshausen, Sänger, and Kelly, and use silkworm-gut.

On many secondary points of technique surgeons are not agreed. Should

the suture be one which cannot be absorbed (silk or silkworm gut) as Leopold, Olshausen, Sänger, and Phillips propose, or silver as Olshausen advises for support in prolapse, or large catgut which is absorbed, as Terrier and Czerny suggest? Should we employ a Hodge pessary immediately after the operation, tampon the vagina when the case is one of retroversion, or keep the patient on a bed which is inclined toward the head to prevent intestinal pressure when the operation has been done for prolapse? These are points of detail which I will not discuss.

Immediate Abdominal Hysteropexy, without Laparatomy.—The old fear of the peritoneum formerly caused many surgeons to avoid opening it; and, on the other hand, the possibility of replacing a retroflexed uterus in such a way that its fundus came in contact with the anterior abdominal wall a long time ago gave rise to the idea of direct anterior fixation without laparatomy. According to Emmet, Marion Sims first conceived this idea, in 1859, and constructed a special hollow needle to pass a silver suture, with this object; but having one day begun the operation, he had not the audacity to finish it. Caneva, more than twenty years afterward, proposed abdominal hysteropexy for prolapse by piercing the serous membrane through a small exposed surface, but he does not seem to have performed it. Kaltenbach, however, has employed it five times, using silver sutures. Kelly, still more boldly but without permanent success, has three times sutured the uterus to the abdomen by passing two or three horsehair sutures deeply through the fundus of the organ without preliminary incision; the sutures are fastened by a shot, and removed on the fifteenth day. Assaky proposed this operation and furnished Roux, of Lausanne, the opportunity of showing its dangers by a personal case. Having begun to perform the operation, before suturing the peritoneum, which nothing seemed to separate from the uterus, he suddenly decided to make an incision, and found under the serous membrane a loop of very thin intestine which he must have punctured. This demonstrated the dangers of this brilliant but blind procedure.

Prognosis of Gastro-hysteropexy.—The published results give but very few deaths. The operation is not more fatal than an uncomplicated laparatomy. There is no doubt, however, that the prognosis may be aggravated by intra-abdominal laceration of great extent (as in a case of Klotz), when the uterus must be freed from strong adhesions, and in particular from adhesion of its surface to the rectum. It is only in these cases that drainage is indicated. Experience has proved that the bladder is not often involved and that there is seldom much urinary trouble. The results appear to be permanent. Leopold has had cures lasting three years and Korn sixteen months, in retroversions; but Olshausen has had one striking failure after ventro-fixation for prolapse. In one of Sänger's patients three months after operation there was already a tendency toward return.

A question which it is very important to answer otherwise than by theoretical considerations is concerning the influence which pregnancy might

have on a uterus sutured to the abdominal wall. Would the adhesion be ruptured? Would the course of the pregnancy be interfered with by the obstacle produced to its increase in size, or would such increase go on very easily above and outside of the small surface immobilized? One of the reasons why Olshausen, Sänger, etc., have adopted the suture of the uterus along its edges rather than on its anterior surface seems to be just this fear of obstructing the development of the organ during gestation. But their procedures assure insufficient adherence; and the cleft which Olshausen leaves between the bladder and the uterus is, in spite of all precautions, a dangerous point for the production of internal strangulation. Experience has sustained some of the theoretical objections on this point. It has now been demonstrated that pregnancy and delivery at term are not rare after hysteropexy, and recently many cases of pregnancy terminating normally have been reported.

Sänger has performed hysteropexy upon two women in whom pregnancy occurred and ended normally. One of them aborted the first time, but carried the second to term; the other was delivered at term. Olshausen reports a case of labor at term, following an operation by Kaltenbach. Fraipont found, in 6 cases in which hysteropexy had been performed by von Winiwarter, 1 delivery at term, 1 premature labor (traumatism), and 1 delivery at the eighth month (child living). Jacobs has seen 1 of his patients confined at term. Klotz has observed 4 pregnancies—4 deliveries at term. Leopold has noted 3 normal pregnancies in 19 cases of ventro-fixation for retroflexion. Gottschalk has seen pregnancy in 1 of his patients, with abortion at the third month. Flaischlen has published a case of confinement at term from the practice of Carstens; 1 of his patients, four months pregnant, was under observation. Howitz has observed pregnancy in 1 of his cases some weeks after operation; the labor was normal. Routier has seen 1 of his patients successfully delivered; 2 of mine have been confined without accidents; a second patient of Routier, 1 of Michaux, and 2 of Terrier have also had normal labors at the Baudelocque Clinic.

Goubaroff has recently recorded a case in which he was obliged to perform Cæsarean section upon a woman who had submitted to an abdominal hysteropexy four years before.

J. Miländer has collected 74 cases of pregnancy in women upon whom gastro-hysteropexy has been performed; 65 times pregnancy terminated by a normal labor, 3 times by premature labor, and 6 times by an abortion. Eight women had had two pregnancies and 3 had been pregnant 3 times after the operation. The uterus had been maintained in anteversion in all cases except 2; of which one belonged to Fraipont, the other to Olshausen. In these the retroversion had returned.

Generally speaking, it may be said that the cases of pregnancy and labor which have been enumerated have not been followed by a recurrence of the retro-deviation; neither in von Winiwarter's 3 cases, Sänger's 5, Klotz's 4,

nor in those of Leopold nor of Howitz. Six weeks after delivery the uterus of Kaltenbach's patient was still anteverted. Jacobs has presented his patient, completely cured, to the Gynæcological Society of Brussels. Routier has noted that in his patient the adhesions were not destroyed. Carstens' patient was not seen again; Flaischlen's had the uterus in anteflexion at the fourth month of pregnancy. As a *résumé* of the most recent works, gastro-hysteropexy seems to give durable therapeutic results and not to create obstacles to subsequent pregnancies and labors. Observations show, however, that fixation of the uterus by the fundus predisposes to malpresentations by causing an exaggerated anteversion.

Indications for Gastro-hysteropexy in Retroversion.—Should the operation be performed for cases in which the uterus is movable, that is to say, the displacement reducible, trusting to the benign character of antiseptic laparatomy, when a properly selected pessary, with perseverance on the part of the physician and with patience on the part of the woman, has demonstrated that the case is not to be cured by the employment of such an instrument and that the symptoms persist? It seems to me, it should not be. Shortening of the round ligaments is too valuable a resource to be neglected in such a case. It is so also with vagino-fixation (Mackenrodt), at least in patients who are near, or have passed, the menopause. It is better not to perform it in young women, as subsequent pregnancies may expose them to real dangers. If I reject gastro-hysteropexy at the outset of the treatment as an exaggeration of its province, yet when we have tried Alexander's operation or vaginal fixation without success, I think that the first operation is legitimate.

The principal indication for abdominal hysteropexy seems then to be found in those cases of retroflexion which are irreducible, where there are adhesions which can be destroyed only under chloroform, which keep the fundus always in Douglas' pouch, except possibly after a false reduction where the uterus is replaced by drawing with it the anterior wall of the rectum. When, with the patient under an anæsthetic, we are convinced that the uterus cannot be reduced by the use of external means aided by the sound or the repositor within the organ; when, especially after dilatation, the finger in the uterus, as Schultze advises, is not able to effect the reduction—in such cases there are but two things to do: either abstain from new attempts to reduce the organ, which cause serious accident to the adnexa and the pelvic peritoneum, or, if the intensity of the symptoms demand it, perform laparatomy, liberate the uterus, and then fix it.

So far I have considered hysteropexy only as a principal procedure, decided upon from the outset as applicable to retroversion. If its advisability in this case is doubtful, the same is not true as regards its performance secondarily, as the complement of another operation. When, in the course of a laparatomy for another lesion, fibroma, ovarian cyst, inflammation of the adnexa, etc., the uterus is found to be displaced backward, as so often happens,

the indication is to profit by the occasion and replace it. If there is a pedicle at one's disposal, it may be sutured into the wound. I think, however, that it is not well to stop here, but to render the proper position of the organ certain by passing a few sutures through the superficial layers of the fundus or its anterior face, in the median line.

Another indication for hysteropexy, secondarily performed, is found in those cases in which there are severe pains or painful reflexes dependent upon

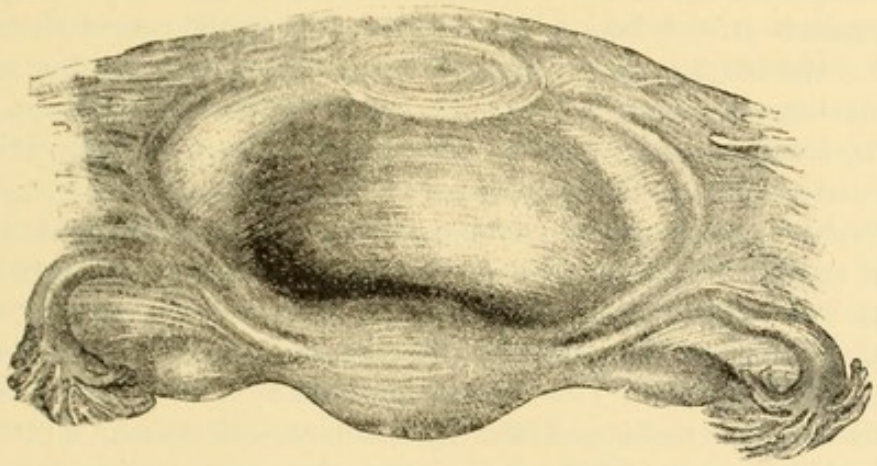

Fig. 300.—Course of the Round Ligaments as Seen through the Transparent Peritoneum (Wylie).

the state of the adnexa, which may be simply prolapsed (movable retroflexion), or adherent (resistant or irreducible retroflexion), or involved in inflammation. Sänger and Leopold have combined castration with hysteropexy in

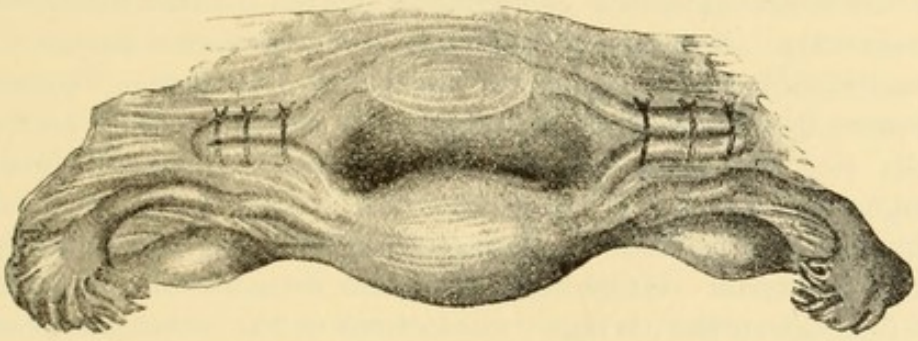

Fig. 301.—Hysteropexy; Wylie's Method. Shortening the round ligaments by intra-peritoneal fold.

the latter case. Hysteropexy alone suffices in simple prolapse of the ovary, thus becoming a conservative operation, for, as the pains disappear after the uterus is fixed, Battey's operation is unnecessary.

The following modifications of abdominal hysteropexy are of considerable interest, although they seem to me inferior to those already mentioned.

Shortening the Utero-sacral Ligaments by the Abdominal Method.—This procedure, proposed by Kelly, consists in passing a suture on each side of the rectum at the bottom of Douglas' pouch from within out, and then

There remain now only the adherent retroflexions. Here the diagnosis appears to me to be of the greatest importance. I can almost agree with Wylie that in nine cases out of ten the adhesions have resulted from a co-existent salpingitis. It is dangerous, therefore, to make repeated attempts at reduction, either with the finger introduced into the dilated organ or with sound and repositor. If, after a moderately thorough trial under chloroform, reduction cannot be accomplished, I abandon it. If there is metritis, I limit myself to the surgical treatment of this (curette and amputation of the cervix), with the hope that the pains will disappear with the cure of the inflammation. If there is serious disease of the tubes, old and persistent, I perform laparatomy.

If there is severe and persistent pain with no appreciable tubal disease, laparatomy, which is always exploratory to a certain degree in such cases, may be performed, when, if any developing lesion of the adnexa (pyo-salpinx, parenchymatous salpingitis, oöphoritis, sclerocystic degeneration of the ovary, etc.), is found, the diseased organ should be removed.

After castration on both sides and destruction of the adhesions, the uterus will frequently return to a normal position. Strictly speaking, the operation of hysteropexy could then be dispensed with, but for fear that it may again be displaced posteriorly it is well to suture it to the abdominal wall.

In cases in which the retroversion coincides with a certain degree of general enfeeblement of the pelvic floor and of the supports of the uterus, marked by relaxation of the vagina and the gaping vulva, the patient is usually a multipara in whom the retroposition constitutes the first stage of prolapse. In these complex cases the various contributing factors must be eliminated by a combination of operative measures; the metritis, by curetting and amputation of the cervix; the uterine deviation, by shortening the round ligaments if the uterus is movable, and by abdominal hysteropexy if it is adherent; the perineal weakness, by colpo-perineorrhaphy. Plastic operations on the perineum and vagina should be deferred until the uterus has been fixed, that we may better appreciate the amount of surface which needs to be denuded.

As it seems to me unadvisable to devote a whole chapter to the consideration of the less important displacements of the uterus, I will simply enumerate them.

The uterus, from the pressure of a tumor posterior to it, may be pushed directly forward—anteposition; retro-uterine hæmatocele offers a striking example of this displacement, which is invariably an epiphenomenon.

Retroposition is a posterior displacement of the entire organ without any change in the long axis. This follows posterior para- or peri-metritis, and may occasionally be observed in its typical and uncomplicated form; though as a general thing it is usually complicated by an anteflexion. The symp-

toms observable are due to the inflammatory adhesions, and treatment should be directed to these alone.

Upward Displacement of the Uterus is also merely a symptom. Tumors in the pouch of Douglas, in the ligaments, or those imprisoned in the pelvis may lift the organ out of place; in some cases it seems to be upheld and prevented from returning to its normal position by adhesions formed during pregnancy. In all cases the cervix is elongated.

CHAPTER XIX.

PROLAPSE OF THE GENITAL ORGANS.

Following Trélat's example, I include under one head prolapse of the uterus, that of the anterior vaginal wall pulling upon the bladder (cystocele) and of the posterior wall dragging forward the rectum (rectocele). These several displacements have been artificially classified as separate, but in reality should be described together, since the cases when they occur independently of each other are quite exceptional. The etiology and the treatment of these lesions also serve to give them absolute clinical identity. Moreover, hypertrophy and elongation of the cervix should be included in the anatomy and symptomatology of these displacements.

Etiology.—Hart very wisely compares these displacements to hernia. But there is this difference between them: in an ordinary hernia, the parts pushed outward by intra-abdominal pressure are freely movable (intestines, omentum), while in a uterine prolapse we have to do with organs fixed or limited in situation by their firm attachments, and which consequently when displaced are likewise distorted. This is the chief reason for the hypertrophic elongation of the cervix. As in herniæ, however, we recognize displacements due to violence and those due to weakness. The first follow a violent effort of some kind, which is either sufficient in itself to cause the injury, or which is injurious because of predisposing conditions. A fall upon the back, an epileptic seizure, a violent attack of coughing have all been the direct cause even in virgins of what some authorities term acute prolapsus. In the majority of cases, however, the uterine supports have been enfeebled by one or more labors, and some violent strain is merely the determining factor of the prolapse. Pregnancy is often a predisposing cause of this displacement, a fact which can be readily understood when we consider the changes which have taken place in the parts surrounding the gravid uterus. All the ligaments are elongated and at the same time softened; intra-abdominal pressure is increased, and bears with more than the usual force upon the weak points of the pelvic floor, where the vagina forms a line of cleavage which seems always ready to give way under increased strain.

Whatever may have been said to the contrary, rupture of the perineum is a predisposing cause of prolapsus uteri. It permits of a gaping condition of the vulva which admits air into the vagina, separating its walls, and diminishing the support offered by the perineal floor. It has been asserted [and truly] that the transversus perinæi and the levator ani may have sus-

tained a subcutaneous laceration, or may have been paralyzed during labor, without giving any external evidence of the injury. The relaxed condition of the peritoneum, which has been stretched by the gravid uterus, also tends to favor the prolapsus induced by parturition.

Shall we go further and admit the existence of an hereditary congenital predisposition to prolapse, or consider the predisposition to be simply an individual peculiarity due to the weakness of the supporting genital apparatus? The latter view certainly seems reasonable, and would account for the fact that the same cause is productive of varying results in different individuals. It is the same in the case of hernia.

Pathological Anatomy.

In this connection it is absolutely essential to observe a certain classification of the disorders under consideration.

1. *Prolapse of the Vagina Alone (Cystocele and Rectocele).*—In the great majority of cases, prolapse of the vagina precedes that of the uterus, the uterine displacement following in the course of time as a result of the downward dragging. The anterior vaginal wall is the more easily displaced. In women who have borne many children it is not unusual to observe a small cystocele when the bladder is full. This is, however, in no sense a pathological phenomenon; the anterior vaginal wall simply exceeds the posterior in length, and, providing that the perineum possess a sufficient degree of tonicity to support it, the results are of little consequence. If, however, the perineum be deficient in tone, a form of vesical hernia follows, as the posterior wall of the bladder is intimately associated with the vagina and cannot be separated from it. This vesical protrusion is sometimes more apparent than real, the protuberance (compare Figs. 302 and 304) being mainly the subinvoluted and thickened vaginal wall. The posterior vaginal wall soon follows the anterior, and the dilated rectal pouch becomes insinuated between its folds; though as the intestinal and vaginal walls are only loosely connected, rectocele occurs less frequently than cystocele. When both are present, a finger introduced through the anus can be hooked into the posterior part of what appears at the vulva as a vaginal protrusion, while a curved catheter can easily be inserted into the cavity of the cystocele. We have then a double-lobed protrusion into the vagina (the lobes being usually of unequal development), which enlarges and becomes tense upon straining, and the surfaces of which still retain the folds and the color of the vagina. Under the influence of the air and friction it thickens, hardens, and sometimes ulcerates. If there be no prolapse of the bladder (which is rare) or of the rectum (less rare), the peritoneum may insinuate itself into, and greatly deepen, the anterior and posterior culs-de-sac. This condition presupposes immobility of the uterus and flaccidity of the serous membrane, or else (according to Freund) lack of development, for in the fœtus the folds of peri-

toneum are relatively much lower down. A portion of the small intestines may now fall to the front or back, pushing down the vaginal wall, and forming what have been called herniæ or vaginal enteroceles. These lesions are

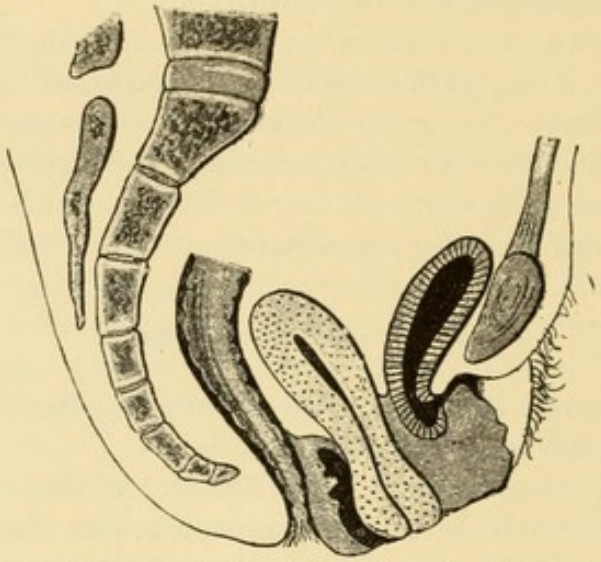

FIG. 302.—PROLAPSE OF GENITAL ORGANS. Procidentia of thickened anterior vaginal wall; slight cystocele; persistence of posterior cul-de-sac; hypertrophy of middle portion of cervix.

exceedingly rare in their occurrence, there being on record but few cases of vaginal prolapse with anterior enterocele, and still fewer of vaginal prolapse with posterior enterocele.

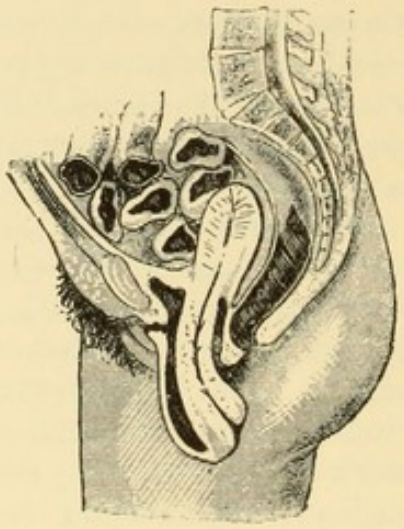

FIG. 303.—PROLAPSE OF GENITAL ORGANS. Procidentia of anterior vaginal wall with cystocele, and hypertrophic elongation of the middle portion of the cervix (Schröder). The posterior cul-de-sac is intact.

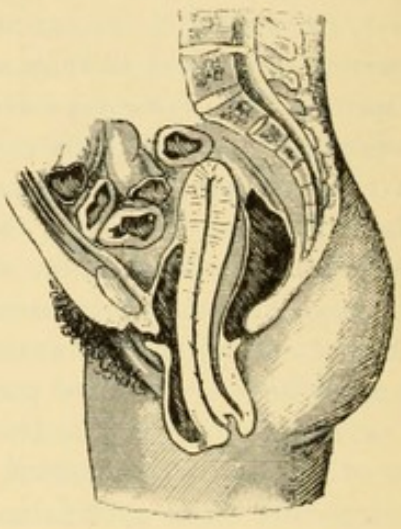

FIG. 304.—PROLAPSE OF GENITAL ORGANS. Complete procidentia of vagina, with cystocele; no rectocele; hypertrophic elongation of the supra-vaginal portion of the cervix; the posterior cul-de-sac is inverted.

2. *Vaginal and Uterine Prolapse with Secondary Hypertrophic Elongation of the Cervix.*—The constant dragging of a prolapsed vagina upon its attachments to the cervix soon affects the uterus itself. These attachments are loosened by degrees, and finally slip down in such a way that the projection

of the cervix completely disappears, being covered by the portion of vaginal wall which formerly constituted the culs-de-sac. The uterus being still immovable, and the vagina continuing to drag downward, the cervix, which is now entirely supra-vaginal, gradually elongates. Occasionally it is lengthened without any hypertrophy, but more often the passive congestion and the inflammation in the prolapsed organs bring about a hypertrophic condition—this hypertrophy being entirely a secondary process. The preliminary disappearance of the cervical projection is what marks the beginning of this process, the cervix then being perceptible to palpation as a cylindrical column in the centre of the inverted vagina.

If, as not infrequently occurs, the posterior vaginal wall gives way later and less completely than the anterior, the vaginal procidentia will be in front

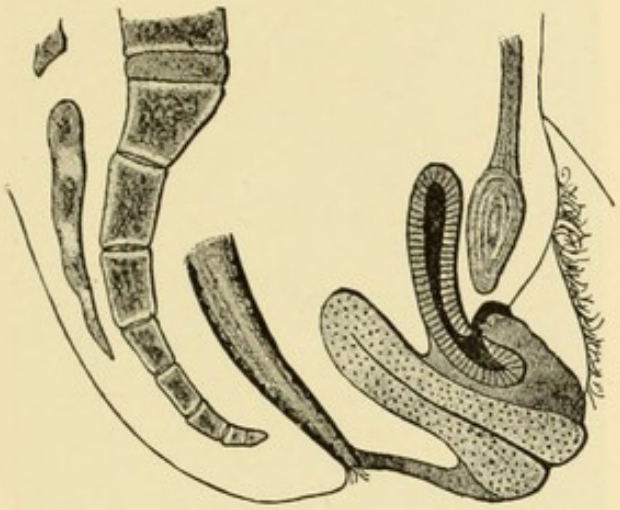

FIG. 305.—PROLAPSE OF GENITAL ORGANS.—Complete procidentia of thickened vagina; slight cystocele; posterior cul-de-sac obliterated; hypertrophy of supra-vaginal portion of cervix.

only, and the posterior cavity of the vagina will still remain; a finger introduced into the posterior cul-de-sac (Figs. 302 and 303) will be able to appreciate the fact that the posterior portion of the cervix is hypertrophied.

This somewhat singular condition of things is quite accounted for by the preceding considerations, although Schröder gives a more elaborate explanation. He thinks it due to the fact that the hypertrophy begins in the middle portion of the cervix, intra-vaginal posteriorly, supra-vaginal anteriorly (Fig. 308, *b*, *b*).

3. *Prolapse of Vagina and Uterus Resulting from a Primary Hypertrophic Elongation of the Supra-vaginal Portion of the Cervix.*—This condition was for a long time unrecognized and is still disputed by some authorities; it nevertheless exists, although it is of less frequent occurrence than Huguier supposed. In some virgins with firm vagina and perineum, and no prolapse of the uterus, an inversion of the upper part of the vagina may be observed, coexistent with a supra-vaginal hypertrophy of the cervix. I operated upon such a case when with my lamented preceptor Gallard. We

are forced to admit that the initial elongation of the cervix drags upon the vaginal attachments, yet, although the starting-point of the process is always the cervical hypertrophy, later the rôles may be reversed, and the vaginal procidentia become of chief importance, in its turn causing elongation of the cervix. The position of the intra-vaginal cervix will aid in determining whether this condition of things exists; it is so often lengthened by hypertrophy that if we find it in normal position we may be quite sure that the

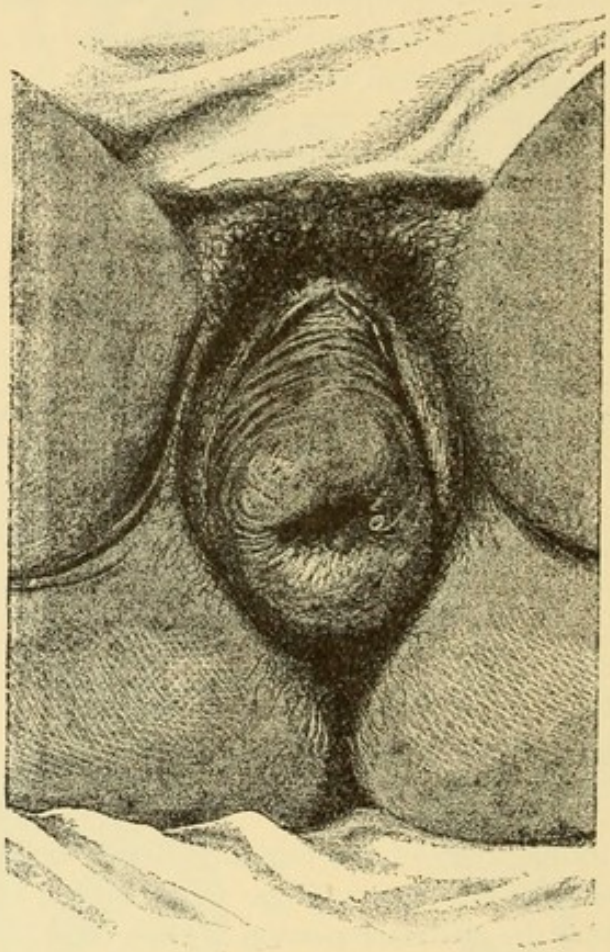

FIG. 306.—PROLAPSE OF THE UTERUS, with considerable hypertrophic elongation of the cervix; cystocele.

vaginal attachments are not dragging upon it. This influence exerted upon prolapse of the genitalia by hypertrophy and elongation of the cervix above the vaginal attachment had been observed and remarked upon by several authorities, but was given no special prominence until Huguier published his celebrated treatise upon the subject. With sovereign ability he demonstrated, by the aid of clinical and anatomical material, the fact that in the great majority of cases downward displacement of the uterus has been wrongly interpreted; there has not been prolapsus or falling or precipitation of the uterus in its entirety out of the abdominal cavity through the vulvar opening, hernia-fashion, but rather a lengthening of the supra-vaginal portion of the cervix which, undergoing hypertrophy and being unable to ex-

tend into the abdomen, pushes downward into the vaginal aperture, dragging after it the vagina and neighboring viscera, which are more or less closely adherent. This theory advanced by Huguier was revolutionary to the ideas previously entertained, which held that the prolapse of the uterus was the last step in its downward displacement, this being divided into three degrees: 1st. Simple downward displacement. 2d. Descent, the cervix appearing between the labia. 3d. Prolapse or precipitation, where the fundus has followed the cervix and is entirely outside of the vulva. According to Huguier, this order of progression without a preceding cervical hypertrophy

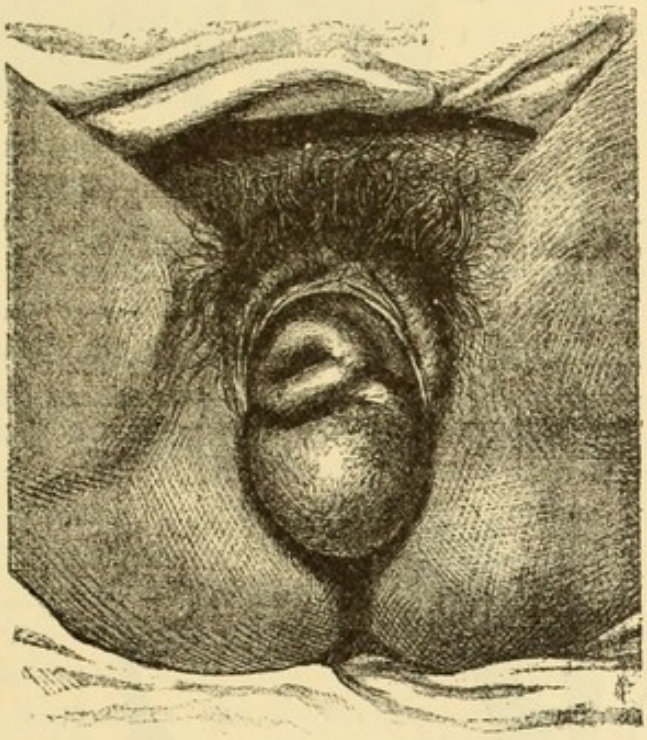

FIG. 307.—PROLAPSE OF THE UTERUS. Hypertrophic elongation of the cervix; rectocele.

is very exceptional, the cervical changes constituting the initial lesion and causing the real displacement of the vagina and the apparent displacement of the uterus. It forms the point of chief importance in the condition, and to it should the treatment be directed. Huguier performed conoidal amputation of the cervix; he first dissected it out from the vesical and rectal attachments, and then amputated as high as possible (Fig. 309). I have frequently performed this operation and found it valuable. But if done according to Huguier's method, without approximating and fastening the mucous membrane by sutures, it will lead to contractions, of small importance in women who have passed the menopause, but of great inconvenience to those still menstruating. A proper appreciation of the value of Huguier's theories upon this point will give it a high position, without, however, rushing to the extreme of Gallard and others who undoubtedly overestimated it.

From an anatomico-pathological point of view, he established the fact of

the frequent occurrence of a hypertrophic elongation of the supra-vaginal portion of the cervix, in prolapse of the genital organs.

It is true that this hypertrophy is not invariably the primary manifestation that he supposed. It is, in fact, usually the secondary elongation due

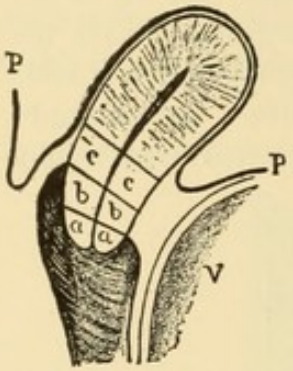

FIG. 308.—SUBDIVISIONS OF THE CERVIX (SCHRODER). *P*, peritoneum; *V*, bladder; *a*, intra-vaginal portion; *b*, middle portion (intra-vaginal posteriorly, supra-vaginal anteriorly); *c*, supra-vaginal portion.

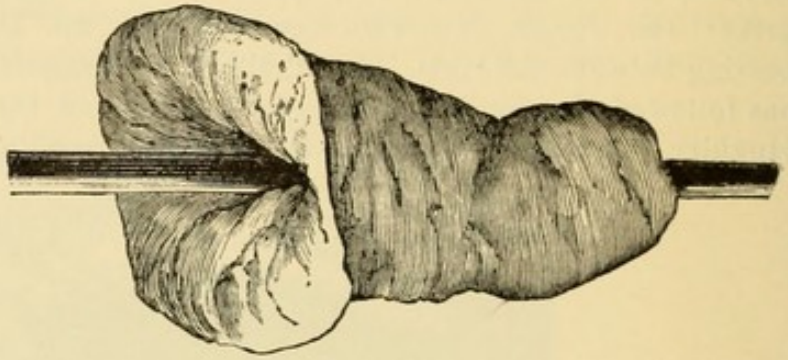

FIG. 309.—CONOIDAL AMPUTATION OF THE CERVIX (Huguier's method). Portion of cervix thus obtained (transfixed by a sound). Natural size.

to the traction exercised by the prolapsed vagina; while the hypertrophy is the result of venous stasis favoring a parenchymatous cervical endometritis. Yet the fact remains, that it had been unrecognized, and to him belongs the

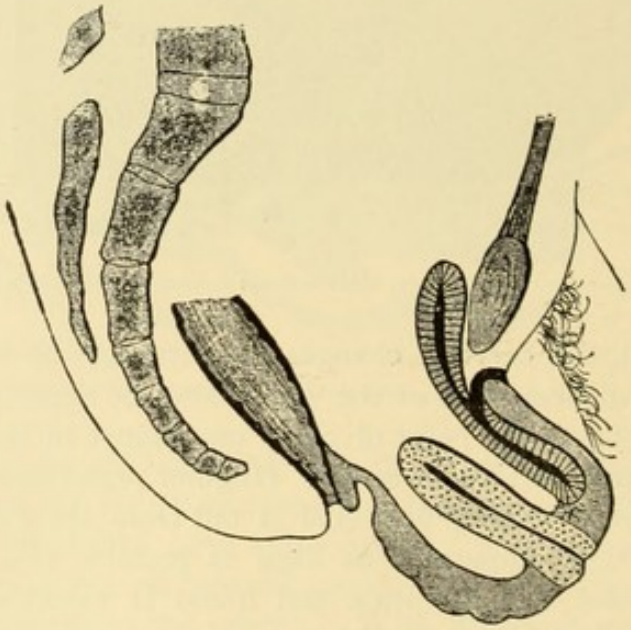

FIG. 310.—PROLAPSE OF THE UTERUS, following a retroversion; no hypertrophy of the cervix.

credit of bringing it into notice, and of calling attention to and causing the adoption of amputation of the hypertrophied cervix as a method of treatment. That it is of less value than he at first supposed scarcely detracts from the merits of his discovery, when we recall the almost constant failure of all plastic operations before the introduction of antisepsis. Amputation

of the cervix still holds its own in therapeutics as an important preliminary step in operation for prolapsus.

What is the nature of this hypertrophy of the cervix? When it follows the continuous traction of a prolapsed vagina, it is undoubtedly an inflammatory process. But when it constitutes the first step in the process, what is its origin? Is it the result of a congenital predisposition to malformations, manifested only when the organ is completely developed either at puberty or from the nutritive activity called into play by pregnancy? Is it the indication even, in the latter case, of a localized cervical endometritis, as Gallard supposes? Each of these factors may operate singly or together. The histological examination does not give any very satisfactory result. Olivier has given a *résumé* of such examinations upon cervices which I had removed, according to Huguier's process, when in Gallard's service. He found no hypertrophy, but he did find a localized arterio-sclerosis. The sections examined were similar in structure to those of a uterus with endometritis. Moreover, the distinction was not carefully observed between sections taken from a cervix where the hypertrophic elongation was a secondary process and those where it was primary. Inflammatory lesions may often be secondary, for every prolapsed uterus is almost certain to become infected.

4. *Prolapse of Uterus and Vagina without Hypertrophy of the Cervix.*—A slight sinking of the uterus, rendering it more easily accessible to the examining finger, and deepening the vaginal culs-de-sac, is frequently observed. But complete prolapse is rare, because of the resistance to be overcome. (Bastien and Legendre certainly exaggerated the amount of resistance encountered. According to their statements, it takes a force of from twenty to twenty-five kilograms [forty-four to fifty-five pounds] to pull the cervix to the vulva upon the cadaver, and of over fifty kilograms [one hundred pounds] to draw it below this opening. Daily clinical experience proves that upon the living subject this same thing can be done without any violent exertion, but owing to the elasticity of the tissues the organ returns to its normal position as soon as released. In a pathological condition this elasticity is lost, and the organ remains out of position.)

It may be termed a hernia from violence, since so great an effort is required to produce it. In this case the uterus usually drags the vagina after it; the organ itself is usually retroverted, this displacement rendering the occurrence of prolapse more probable under strain (Fig. 310). After the uterus has emerged beyond the vulvar opening, it may undergo deviations from its normal axis, and, suspended in its hernial sac, become ante- or retroflexed (Figs. 311, 312). Inversion combined with prolapsus has also been observed.

The relations of the neighboring organs vary according to the kind and degree of the displacement; as a general rule, the greater the cervical hypertrophy (and by cervix we here mean exclusively the supra-vaginal portion)

the farther are the folds of peritoneum from the uterine orifice; on the other hand, in the variety shown in Fig. 310 they would be very near to it.

With a marked rectocele (Fig. 312) fæcal matters tend to accumulate and harden in the pouch.

A cystocele usually results in the formation of a wallet-shaped bladder, whose lower pocket is situated below the internal urethral opening, this fre-

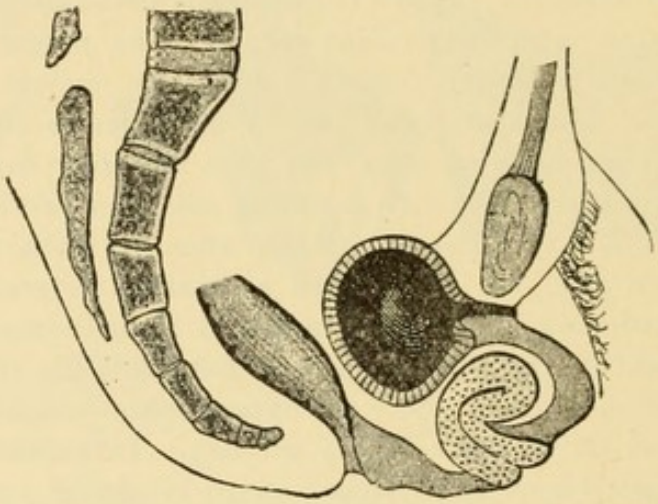

FIG. 311.—PROLAPSE OF THE UTERUS WITH ANTEFLEXION: it is no longer connected with bladder and rectum; these organs meet above the uterus.

quently giving rise to stagnation of the urine (Figs. 303 and 310). There is often dilatation of the bladder, and even of the ureters and the pelvis and

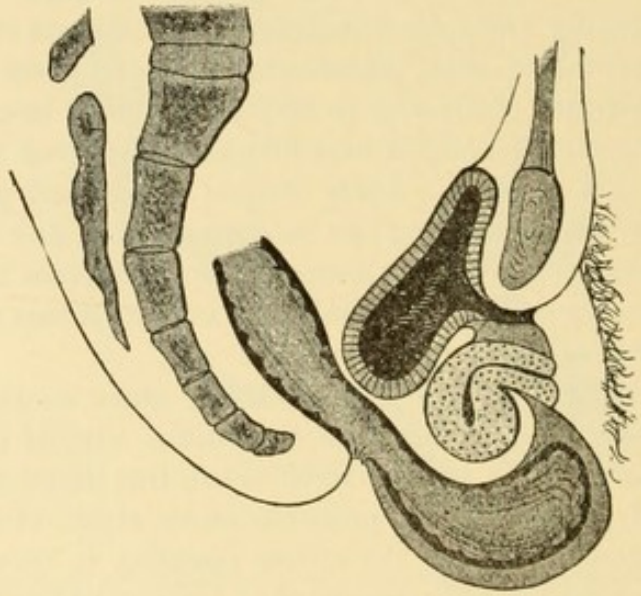

FIG. 312.—PROLAPSE OF THE UTERUS WITH RETROFLEXION; rectocele.

calyces of the kidney, owing to the strain upon or compression of the lower end of the ureters. Calculi are said to have been found in the cystocele, but there are fewer cases reported than the theories advanced would lead one to expect.

The vaginal mucous membrane is thickened, often resembling skin or leather, and becomes blanched or violet-colored. The prolapsed portions are œdematous, and we frequently notice ulceration of the cervix, ectropion of the os, or excoriations and ulcerations due to friction of the surface of the tumor. Endometritis almost always occurs in a prolapsed uterus, and salpingitis is not infrequent.

Symptoms.—Acute prolapsus, as it has been termed, meaning that which immediately follows some violent strain, is rare, yet cases have been reported. Immediately after the accident, a tumor formed by the anterior wall of the vagina alone, or by the uterus as well, is seen hanging out of the vulva. Intense pain, sometimes syncope and peritonitis, accompany the lesion. Usually, however, the prolapse is gradual, and gives rise to no well-marked symptoms; a feeling of heaviness referred to the perineum, a dragging sensation in the loins and abdomen, fatigue upon walking, are the chief, accompanied by the ordinary symptoms of endometritis, besides troubles connected with micturition, dysuria, polyuria, incontinence, or retention, with or without cystitis. If there be a very large cystocele, the patient may be obliged to assist micturition by external pressure upon the protruding bladder. Menstruation is unaffected. Fecundation is rare, though possible, in complete prolapsus. Abortion may follow, but, again, the gravid uterus may develop normally in the abdomen, causing a temporary disappearance of the displacement.

In prolapsus, as in hernia, the severity of the rational symptoms does not always depend upon the gravity of the lesion. Often women apply for admission to the hospital, with a uterus suspended between the thighs, who have, in despite of this condition, continued to perform hard manual labor with apparent ease, until some accident obliges them to stop and undergo treatment. On the other hand, some patients whose uterus is only slightly fallen, and is not even near the vulvar opening, complain of intense pain when walking, and are reduced to a state of invalidism. It would seem as if, in the former case, a new and definite static condition of the uterus had been developed, giving tolerance to a well-marked lesion, while in the latter case this species of compensation had not been acquired; the unstable condition of the uterus giving rise to numberless twinges of pain and nervous reflex phenomena, which make a prolapsus uteri one of the manifestations of "enteroptosis," that group of symptoms so ably classified by Glénard.

The physical signs are very characteristic. In the early stages of a prolapse, the vaginal mucous membrane, though very flaccid, does not appear beyond the vulvar opening unless the patient strains. By placing her in the dorsal position and bidding her bear down, one may see the anterior vaginal wall bulge outward by a sort of rotary motion, forming a soft, pinkish tumor, which returns in place with the cessation of the downward straining.

It is well to bear in mind that the anterior and posterior vaginal walls

are normally in apposition, so that a section of the canal in a state of rest would be well represented by the letter **H**. The procidentia of the vagina could scarcely be cylindrical, as in the case of the rectum; the anterior or posterior walls simply slip down, either singly or together. This first degree of cystocele soon gives place to the permanent and more severe form, and later the os uteri appears just behind it, discharging the mucus produced by the cervical catarrh. If the posterior vaginal wall be involved, the os seems to be in the centre of a pyriform tumor which opens out the labia minora, and whose surface is dry, wrinkled, darkened by exposure to the air, and occasionally, in addition to ulcerations around the os, suffers a loss of substance from friction and lack of cleanliness. A furrow surrounds the tumor at the base, especially near the fourchette. The size of the tumor varies from that of an egg to that of two doubled fists (Figs. 306 and 307).

Palpation will give different results according to whether the uterus shares in the prolapse or not. Everything included in the vaginal procidentia is soft and flabby. Tension and elasticity of the cystocele increase when the bladder is full. The existence of an enterocele (which is of rare occurrence) is shown by gurgling. When the uterus is prolapsed without any cervical hypertrophy, the body even of the organ may be felt in the interior of the presenting tumor (Figs. 310, 311, 312). But in the typical cases described of prolapsus either preceded or followed by hypertrophy of the cervix, only this portion of the uterus is to be found in the tumor (Figs. 302, 303, 304, 305) of which it forms the axis. It is more or less thick and rigid according to circumstances, imparting to the hand the sensation of a cord, or of an elastic cylinder; by bimanual palpation it is found to be continuous with the body of the uterus, which is behind the pubic bone.

The insertion of the uterine sound will reveal pathognomonic signs in the case of cervical elongation; it passes for a length of from four to eight inches. [A curious fact often noted in these cases of cervical hypertrophy is the apparent "ductility" of the tissues, a uterus which when prolapsed is seven or eight inches in depth measuring only about four when fully replaced.] We must remember that in aged women there may be obliteration of the cervical canal. The tumor is perfectly reducible when the uterus has not participated in the prolapse; even if it has done so, it may be reduced, but is with great difficulty kept in position. A permanent cure is almost always impossible; the firm column in the midst of the tumor formed by the hypertrophied cervix could only be pushed into place by a degree of violence that might be the cause of injury.

The exact position of the bladder may be determined by the use of a male catheter, which is introduced with the tip turned downward. The bladder often reaches the immediate neighborhood of the uterine orifice (case of secondary elongation of the cervix from traction) (Fig. 304); in other cases the os uteri, which has remained normal, causes another and sometimes large bulging below the lower extremity of the bladder (primary hypertro-

phic elongation of the supra-vaginal portion of the cervix) (Figs. 305 and 306).

Course and Prognosis.—The course of the disease is chronic in its nature, and, if untreated, results in a complete prolapsus. In some patients this descent of the genital organs is coexistent with other large herniæ, and forms a pelvic condition quite as incurable as the abdominal disembowelling. Cases have been referred to in which a spontaneous cure followed the temporary reduction of a prolapsus, when the uterus was bound down by adhesions formed by peritonitis. These cases seem to me to need confirmation.

Diagnosis.—By bimanual palpation, rectal touch, and the use of the uterine sound and the catheter, we may distinguish the tumor which emerges through the vulvar opening, from a polypus or an inverted uterus. The chief difficulty consists in determining precisely what parts have shared in the prolapsus, and to what extent they have altered, whether in position, form, or size. A male catheter introduced into the bladder will determine the boundaries of the displacement; a finger hooked into the rectum will appreciate any folds of intestine anteriorly; while the hypertrophied condition of the cervix may be felt by means of palpation and the uterine sound. The condition of the peritoneal culs-de-sac it is impossible to tell, except when efforts at reduction result in a gurgling sound and give rise to the supposition that loops of intestine are to the front and behind the prolapsed uterus. As I have before observed, these enteroceles are of rare occurrence, and are never found where there is supra-vaginal hypertrophy of the cervix. In this case the peritoneum is farther away from the vagina than in the normal condition; in simple descent without cervical hypertrophy it is, on the contrary, nearer to the vagina (Fig. 310).

Urethrocele is an interesting variety of vaginal prolapse, which may almost be considered a special form of cystocele; Duplay has published an important treatise upon the subject. The tumor is formed by the dilatation of the urethra, or by a cavity opening into this canal, the bladder not being implicated. A tumor, rarely larger than a walnut, appears at the vulva, and is situated immediately beneath the urethra, apparently in the meatus; straining brings it more into view. It is only by a careful examination that we are able to distinguish it from cystocele; we then see that it extends only a little way upward and is not connected with the bladder, which has no tendency to prolapse. The catheter passes into the pouch of the urethrocele and then into the bladder; the inferior wall of the urethra, which is deflected, is much longer than the anterior wall, which has retained its normal position. The urethro-vaginal wall is sometimes greatly thickened and sometimes much thinned. It is doubtful whether a urethrocele, by continuing to dilate, can ever pass into the bladder and become a cystocele.

Treatment.—The prophylaxis of prolapse of the genital organs consists in the careful conduct of labor and subsequent rigid observance of hygienic

laws. Belts and pessaries give little help; yet we must not neglect to support the abdomen by a well-constructed bandage, which will keep the intestines from bearing down with their full weight upon the pelvic organs.

Pessaries are of use only when the perineum has preserved a degree of tonicity; their action is often aided by a perineal pad (Figs. 313 and 314). Breisky claims good results from an egg-shaped pessary, which is held suffi-

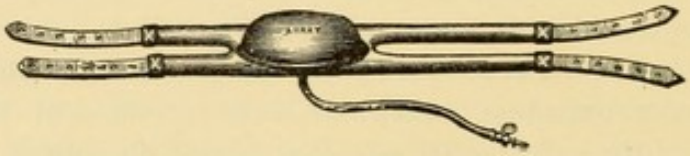

FIG. 313.—PERINEAL AIR-CUSHION.

ciently in place by the narrow vaginæ of aged women. Dumontpallier's ring pessary, Hodge's pessary, Schultze's sled-runner pessary, the "gimblette" pessary, Gariel's air pessary, should all be given a trial. Zwanck-Schilling's winged pessary is well known, but of little value [and so dangerous that it should be mentioned only that it may be avoided].

In order that any kind of pessary be of use, I repeat that a certain degree of tonicity in the perineum is essential, and a somewhat small vulvar opening. They are valuable in cases of cystocele, but fail when the uterus takes

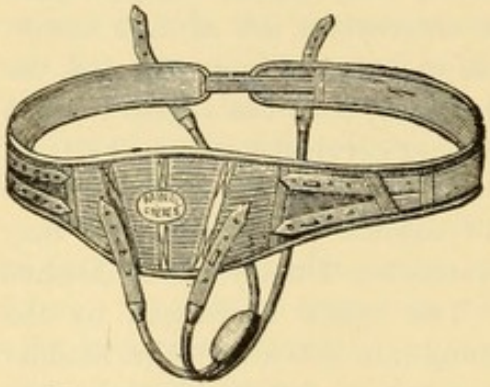

FIG. 314.—BELT WITH PERINEAL PAD.

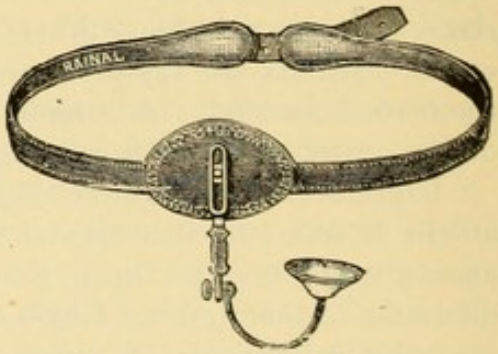

FIG. 315.—BASIN-SHAPED PESSARY.

part in the prolapse. In any case, they should never be used except as a palliative measure, trusting to a radical operation for cure.

Nevertheless if the patient positively refuses surgical aid, or if it offer but small chance of relief, as in the case of complete prolapse in enormously stout women, with pendulous abdomen, whose vagina and uterus seem to have lost all connection with the pelvic cavity, the only resource seems to be a stem pessary supported by a belt. Very similar varieties have been devised by Scanzoni, Courty, and Grandcollot (Figs. 315 and 316). The Dumontpallier pessary may be fixed to a stem which has an abdominal support, but the ring must be very unyielding to be of use. Borgnet's cork pessary recommends itself, especially for hospital use, by its simplicity of construction, its solidity, and its cheapness (Fig. 317). Whatever the pes-

sary used, its insertion should be preceded by a reduction of the prolapse, and treatment tending to diminish the congestion of the parts. If there be œdema or inflammation, the patient should be kept in bed; frequent baths and prolonged tepid vaginal injections are to be given, tampons applied, and massage administered. As soon as the tissues have lost some of their rigidity, reduction of the prolapse is attempted, the patient being in the Sims or

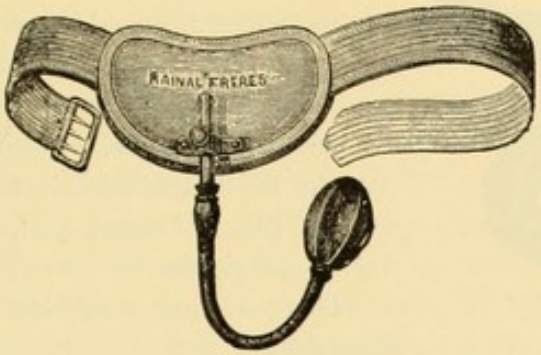

FIG. 316.—THE ROSER-SCANZONI PESSARY.

else the genu-pectoral position, both of which favor the entrance of air into the vagina. The bladder and rectum must be empty. If much difficulty be experienced in restoring the prolapsed organs to place, it is better to wait patiently and not use force.

[Much may be accomplished in the prophylaxis of these displacements by the avoidance of any exertion during the puerperium; confinement to bed until involution is well under way; the avoidance of constipation or the use of clothing which compresses the waist, and the immediate suture of perineal lacerations. Any relaxation of the vaginal tissue should be treated

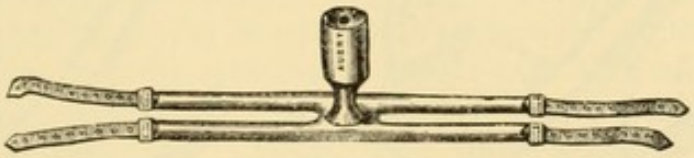

FIG. 317.—BORGNET'S PESSARY.

by hot astringent injections. Chronic cases of slight degree are benefited by the tonic effect of the hot douche and by astringent tamponade, and according to many writers by elevation of the uterus and massage by Thure Brandt's method. Pessaries in general are unsatisfactory, as stated above, though many cases of cystocele receive great benefit and relief from the pessary devised by Gehrung (Fig. 318). This instrument, while most efficient, needs to be carefully fitted, and is difficult to adjust unless fully understood. As it sustains a considerable weight, it must be watched to see that its superior bar does not cut into the vaginal wall. It is inserted as follows: Place the pessary on a table, with the superior arch (*S*) below and the in-

ferior (*I*) above, the curves *R* and *L* pointing toward you. Take the pessary by curve *L* with the right hand and insert curve *R* into the vagina to the right of the patient, until three-fourths of the instrument is buried within. Then push curve *L* toward the fourchette and the left side of the patient, so that it slips into the vagina at the same time that *S* turns upward in front of the uterus and *I* under the pubic arch. The curves *R* and *L* should rest squarely on the posterior vaginal wall, while *S* and *I* support the rectocele between the uterus and symphysis.]

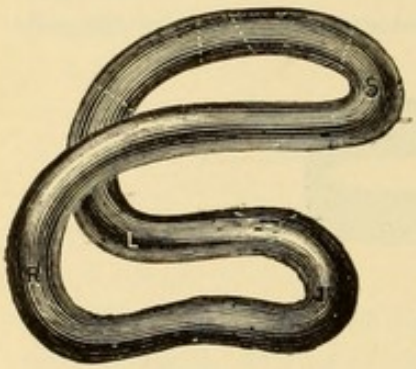

FIG. 318.—GEHRUNG'S PESSARY FOR CYSTOCELE.

Surgical Treatment.—This offers so much chance of relief, and is attended by so little danger, that it ought to be much preferred to the use of pessaries.

The various methods used may be thus classified:

1. Support derived from the vagina, vulva, or perineum.
2. Uterus raised by shortening the round ligaments.
3. Uterus sutured to neighboring structures (hysteropexy) through the vagina or by means of a laparatomy.
4. Hysterectomy.

Before going into the details of these various operations, we must devote a few moments to the consideration of a valuable preliminary operation, de-

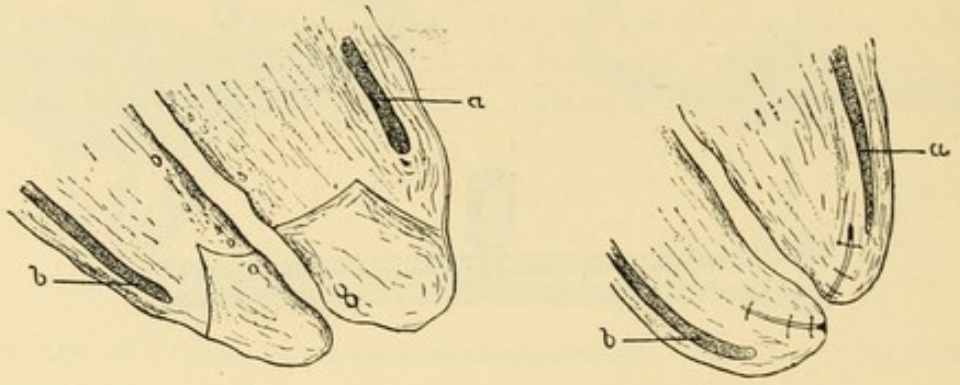

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FIG. 319.—UTERINE PROLAPSE; AMPUTATION OF THE VAGINAL PORTION OF THE CERVIX. 1, Before the suture. 2, After the suture. *a*, Bladder. *b*, Douglas' cul-de-sac.

signed to favor the replacing of the uterus when the cervix is hypertrophied, viz., amputation of the cervix. Instead, however, of following Huguier's method without reference to subsequent reunion, we should always try to bring the mucous lining together, after the excision of a conoidal portion of each lip (Fig. 319).

We may avoid wounding the bladder by introducing a male catheter into it, which is to be held by an assistant, and which will serve as a guide; the peritoneum posteriorly and the rectum may be preserved from injury by

keeping the cutting edge of the bistoury constantly turned toward the part to be excised. The vaginal mucous membrane may be sutured to that of the cervix, but in order to accomplish this it is necessary that the segment of the cervix removed be not too large; indeed, it is not needful to remove more than a small portion to insure the result aimed at.

I. *Support Derived from Intra-vaginal Parts.*—The great majority of operations for the cure of prolapsus come under this head. I shall merely enumerate those no longer used, reserving a detailed description for those whose use I recommend.

Among the old methods, I will name episiorrhaphy, or suture of the labia majora, to contract the vulvar opening; freshening the surface and suturing of the vulvar opening; infibulation by means of a metallic ring; cauterization of the vaginal walls with various caustic agents, or with the actual cautery—all detestable methods, that have recently been recalled to our notice. I have the same opinion of treatment by ligation. Franck performs an operation whose object is the formation in the vagina of a vertical fold, projecting anteriorly like a tampon. He dissects up the vagina almost to the posterior cul-de-sac, and with buried catgut sutures forms the spur-like projection. This is, however, not the only result of this operation, which is a species of colpo-perineorrhaphy.

Elytrorrhaphy or colporrhaphy, the excision and suturing of a portion of the vaginal wall, was first introduced by Marshall Hall. His operation, although incomplete, served as the starting-point for the perfected operations of colpo-perineorrhaphy and perineauxesis of the present day, which follow the plan of procedure initiated by Simon, who was the first to realize the importance of freshening a large surface of the perineum as well as of the vagina. His denudation was in the form of a trapeze. Colporrhaphy, or anterior elytrorrhaphy, was first done by Sims. Since Simon's day, the size and shape of the denudation in this operation have been indefinitely varied. I shall describe only the methods of Hegar and A. Martin, and Doléris' for perineoplasty, besides Le Fort's operation for closure of the vagina. The modified procedure of Lawson Tait, which I employ exclusively in these cases, will be described later (see Laceration of the Perineum) in detail.

Colpo-perineorrhaphy (Hegar's method).—The patient's bowels and bladder are to be evacuated, and she is to be thoroughly washed, after which she is anæsthetized and placed in the dorsal position. The extent of surface to be denuded is determined by grasping the posterior wall of the vagina with the forceps and drawing it into view. In cases of minor importance, it will be quite sufficient to make a denudation in the shape of an isosceles triangle —about two inches broad at the base (which is at the fourchette) and about two inches long. When the prolapsus is very great, we may add from a quarter to half an inch to these measurements. During the operation, continuous irrigation should be practised; the stream of tepid water should be

slow, and should consist of either a weak antiseptic solution (carbolic acid, one per cent), or of filtered water with salt, 6 : 1,000.

One assistant will administer the chloroform, two will hold the thighs and the forceps, while a fourth will hand the instruments.

Retractors are of small use in bringing the parts to be denuded into view. A blade of a speculum temporarily pushes up the anterior wall of the vagina, and the surgeon grasps the posterior wall with tenaculum forceps, about two inches above the fourchette, at a point which is to constitute the apex

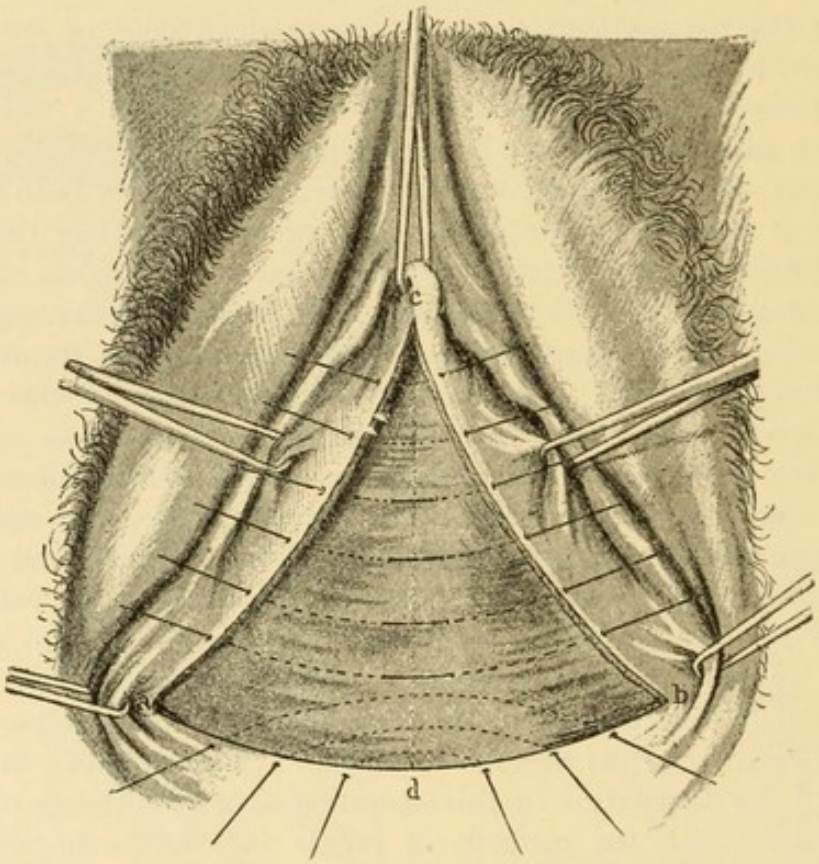


FIG. 320.—COLPO-PERINEORRHAPHY BY HEGAR'S METHOD.

of the freshened surface. The labia are separated and two forceps placed at the ends of the base of the triangle at the lower extreme inferior limit of the vagina and about two inches apart.

Two additional forceps mark the middle of the sides of the triangle. When the assistants hold out all these forceps, the operating field is conveniently spread before the surgeon. With a sharp-curved bistoury he outlines the triangle, making the base slightly concave, and the sides very slightly convex to the centre. The mucous membrane is now grasped at the apex with mouse-toothed forceps, and dissected sufficiently to allow of the finger replacing the instrument, strong traction being at the same time exerted upon the detached membrane to facilitate its dissection. If the recto-vaginal septum be very thin, it is well to avoid the danger of puncturing it, by in-

troducing a finger through the anus. In view of the possibility of this procedure, the rectum should have been previously subjected to a thorough cleansing with boric or salicylic acid solutions; the assistant who attends to this preparatory measure must thoroughly disinfect himself after its application. If there be hemorrhage, the bleeding points are to be seized with forceps. The whole thickness of the mucous membrane, which has often undergone hyperplasia, is to be stripped off, and the surface of the wound is

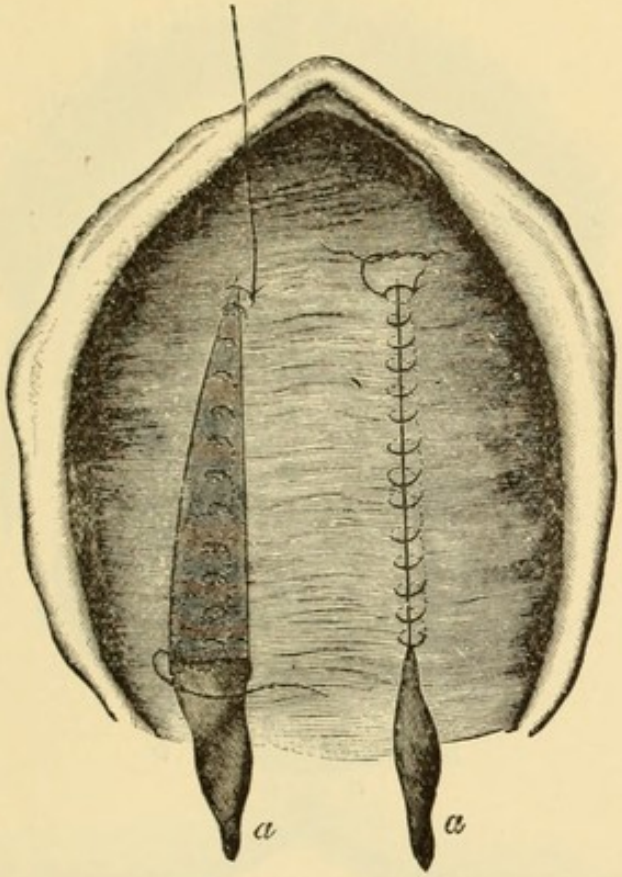


FIG. 321.—COLPO-PERINEORRHAPHY BY MARTIN'S METHOD. Bilateral denudation of posterior vaginal wall. Continuous suture in layers.

to be made thoroughly smooth with curved scissors. Perforation of Douglas' cul-de-sac has not infrequently occurred during this operation. Schauta seized the opportunity offered by this accidental opening to draw down and resect the peritoneal cul-de-sac. This manœuvre is somewhat similar to Freund's operation, which I have described on page 458.

For the suture, Hegar uses silver wire, which he introduces under as much of the surface of the wound as possible, adding a few superficial sutures between these deeper stitches.

It seems to me preferable to use the continuous buried catgut suture.

Colpo-perineorrhaphy or Perineauxesis.—Martin's chief object in this operation is to save the posterior column of the vagina, which is the most resistant portion, and which Freund first pointed out as a part to be care-

fully handled in all plastic operations. Besides this, the denuded portion, while quite as extensive as in Hegar's operation, instead of forming one continuous surface, consists of several segments in close juxtaposition, which allows of more accurate suturing and more perfect union.

Having taken the same preliminary measures as in the former operation, Martin grasps the posterior wall of the vagina, just below the cul-de-sac, with two pairs of tenaculum forceps, which forcibly stretch it so that the

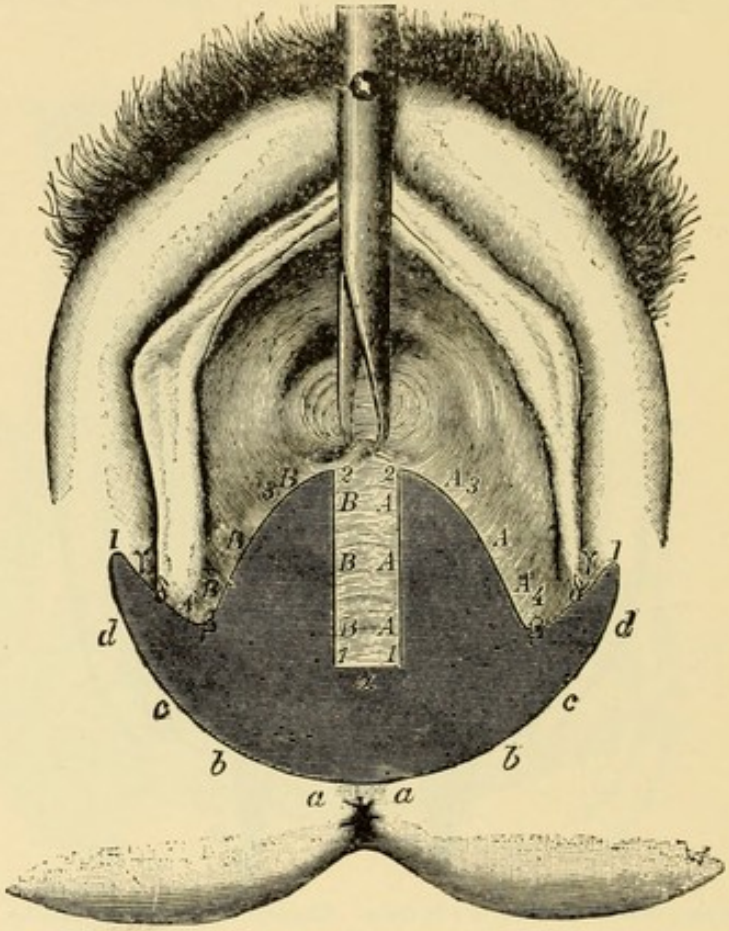


FIG. 322.—COLPO-PERINEORRHAPHY BY MARTIN'S METHOD, SHOWING DENUDED SURFACE. 1, 2, Incisions by the side of the posterior vaginal column; 3, 4, incision upon the lateral wall of the vagina; *I*, extremity of denuded surface, at the level of the vulvar opening; *A-A*, *B-B*, *a-a*, *b-b*, *c-c*, *d-d*, β-α-β, δ-δ, γ-γ, indicate the points which will be in contact after the suture.

vaginal column (columna rugarum) has the appearance of a long, projecting fold. An incision is made with the bistoury on either side and two narrow lateral strips are dissected off as far as a finger's breadth above the fourchette. Tenaculum forceps are applied to both extremities of these freshened surfaces to keep the operating field as tense as possible. These two small wounds are now sewed up by a continuous suture in layers (Fig. 321), the forceps are removed, and the first step in the operation, double lateral elytrorrhaphy, is now completed. The second step, perineorrhaphy, remains to be done.

A transverse incision is made at the muco-cutaneous junction, which in-

tersects the column of the vagina, and ascends on either side to about half the extent of the vaginal opening [to the inferior caruncles]. From the extremities of this incision a second concentric incision, forming an acute angle with it, intersects the lower part of the vertical incisions made in the elytrorrhaphy. The result is a semilunar transverse strip whose concavity is turned upward in a condition of rest (Fig. 322), but which, when pulled

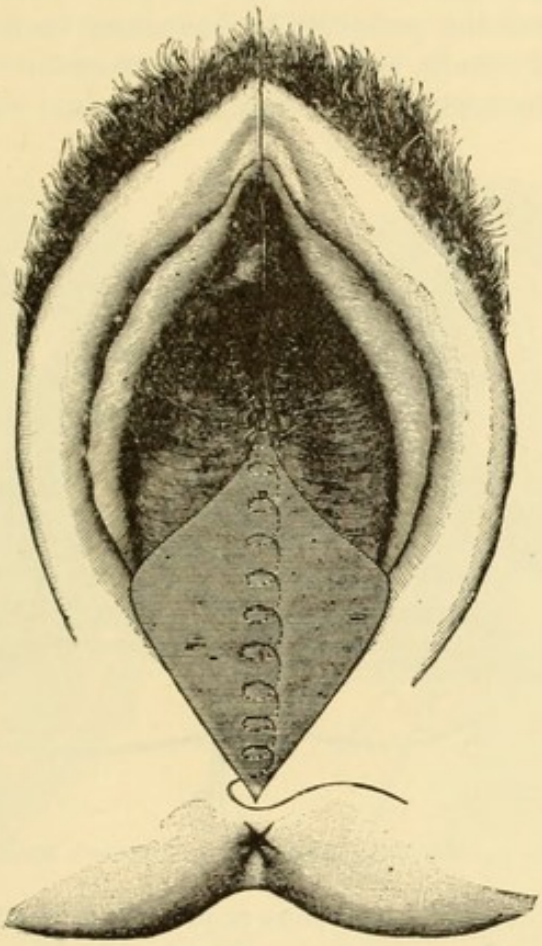


FIG. 323.—COLPO-PERINEORRHAPHY BY MARTIN'S METHOD. Continuous suture in layers of the denuded perineal surface (deep layer of stitches).

upon at its end, becomes lozenge-shaped. This strip is now denuded, and the surface reunited by a continuous catgut suture in layers as in Fig. 323.

Martin uses a trowel-shaped bistoury for the dissection of these strips of membrane, rolling them up on a slender staff with lateral teeth (*râteau*). It seems to me that an ordinary curved bistoury and long forceps are equally good. Bischoff has adopted a method which, like Martin's, preserves the normal condition of the vaginal column (Fig. 324). Winckel denudes the lower third of the vagina for about an inch above the remains of the hymen, and laterally to 1.5 inches from the meatus, making first a vertical median incision and separating the mucosa so as to form lateral flaps. He then brings the freshened surfaces into apposition vertically, as in Martin's oper-

ation, and after shortening the two flaps one half, sutures them so that they form a bridge across the remainder of the denudation.

Colpo-perineoplasty by Flap-splitting.—This is an ingenious combination of Lawson Tait's flap-splitting, Schröder's removal of the mucous membrane, and Emmet's suture, and is chiefly applicable where the uterine prolapse is only slightly marked, but where the vulva gapes so widely that there is danger of vaginal prolapse, with or without partial laceration of the perineum. It strengthens the perineum by increasing its length and thickness, without any vaginal suture, and is rapidly performed. The weak point of the process is the shortening of the posterior vaginal wall, which interferes

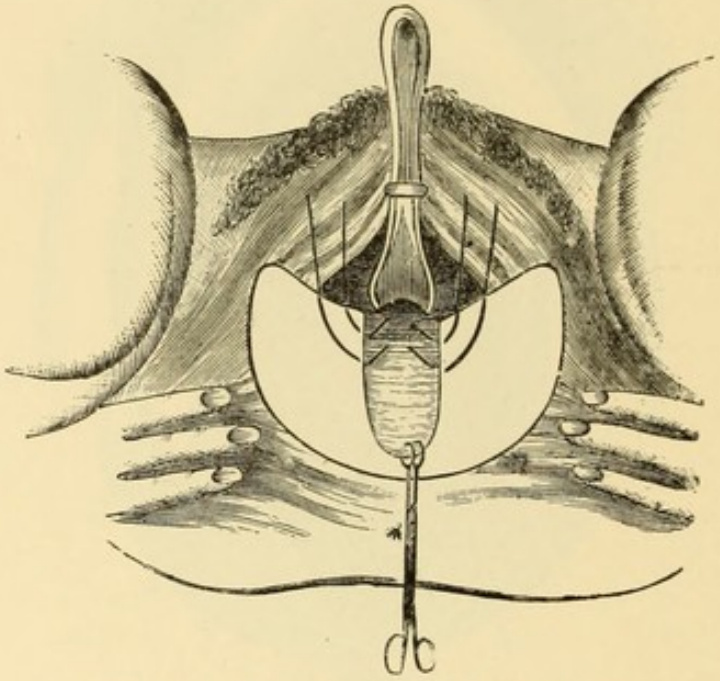


Fig. 324.—Colpo-Perineorrhaphy by Bischoff's Method.

with any ascent of the uterus and thus renders it of doubtful utility in cases of marked prolapse. It cannot be combined with Alexander's operation, as can Hegar's and Martin's methods. Moreover, it does not contract the vagina itself, but only the vulvar orifice, and is in fact merely a perineoplasty, since the portion of vagina removed is very small. With a bistoury, Dolëris makes a deep curved incision at the juncture of skin and mucous membrane. Forceps are inserted at the two ends of the incision, to stretch the tissues. The upper, mucous lip of the wound is dissected slightly from the submucous tissue, and then uplifted by forceps. The operator, now using the index finger of the left hand instead of an instrument, gently pushes the tissues apart, separating the vaginal and rectal walls as far as necessary. The vaginal flap is now drawn outside of the vulva and resected, and its edge then united to the edge of the first incision with curved needles and three strands of heavy silkworm gut. The first stitch is in the centre; it is inserted just to the left of the anus, goes deeply through the tissues, and

into the vaginal flap close to the wall, entering the vagina or not as the operator prefers; it is then brought back in the same manner to the right side. This first suture brings the vaginal wall near the vulvar commissure, also serving to unite the cutaneous lips of the wound. The second and third sutures are inserted in the same way, each slightly outside the other. The portion of the flap in excess of the reconstructed fourchette is now cut off, and the mucous and cutaneous lips united (see Fig. 325).

While *colpo-perineorrhaphy* is the chief operation for prolapse of the genital organs, it needs often to be supplemented by other operations, as amputation of the cervix, already described, and anterior colporrhaphy or elytror-

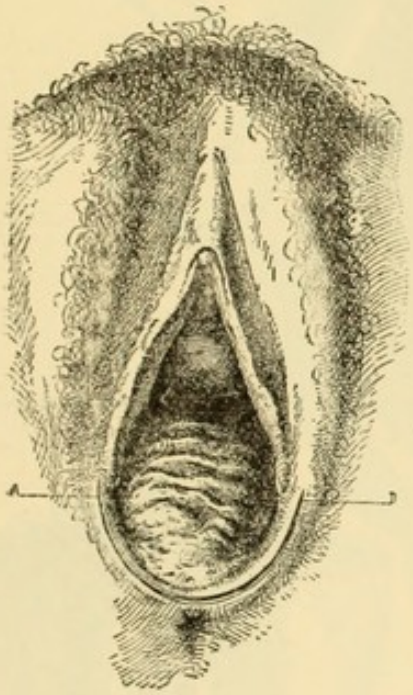


FIG. 325.—COLPO-PERINEOPLASTY BY FLAP-SPLITTING (GLISSEMENT). Doléris' method. Semicircular incision following the outline of the posterior vulvar commissure, at the point of union of skin and mucous membrane, from *A* to *B*.

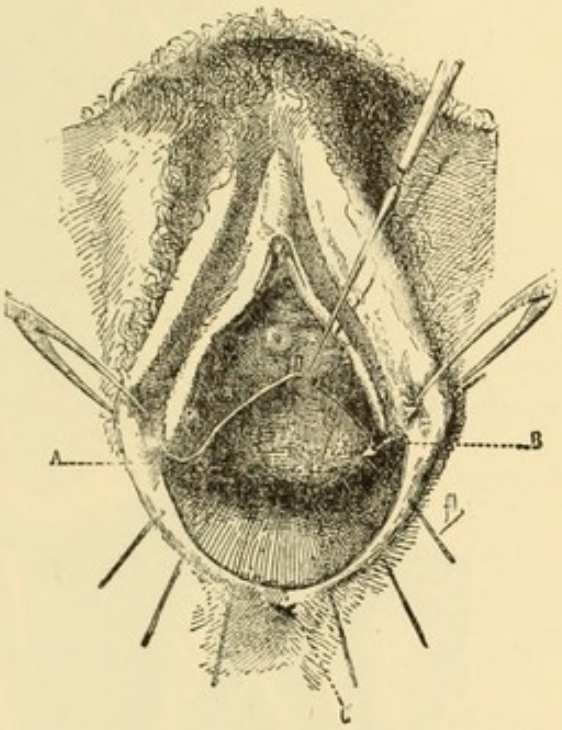


FIG. 326.—COLPO-PERINEOPLASTY BY FLAP-SPLITTING. Dissection of vaginal flap, *A*, *B*, *D*, by bistoury and fingers. Insertion of three stitches which are to bring the under surface of the flap into apposition with the cutaneous lip of the wound.

rhaphy. The object of the first is to facilitate the restoration of the uterus, while the latter acts directly upon the procidentia of the anterior wall. Anterior elytrorrhaphy was performed by Sims, whose denudation was in the shape of a horseshoe, with its convexity toward the urethra. Emmet made it trowel-shaped. Hegar advises an ellipse, with as blunt an upper end as possible. As a rule, it is folly to waste time in trying to obtain a flap of any special shape: the exuberant portion of the vagina is simply to be excised.

Hegar unites the two lips of the wound with silver sutures. I prefer a continuous suture in layers. I cut off the mucous fold, stretch the tissues

by means of forceps (Fig. 330), and insert the sutures according to the method described on page 42.

Stolz has devised a very ingenious method of suturing in anterior colpor-

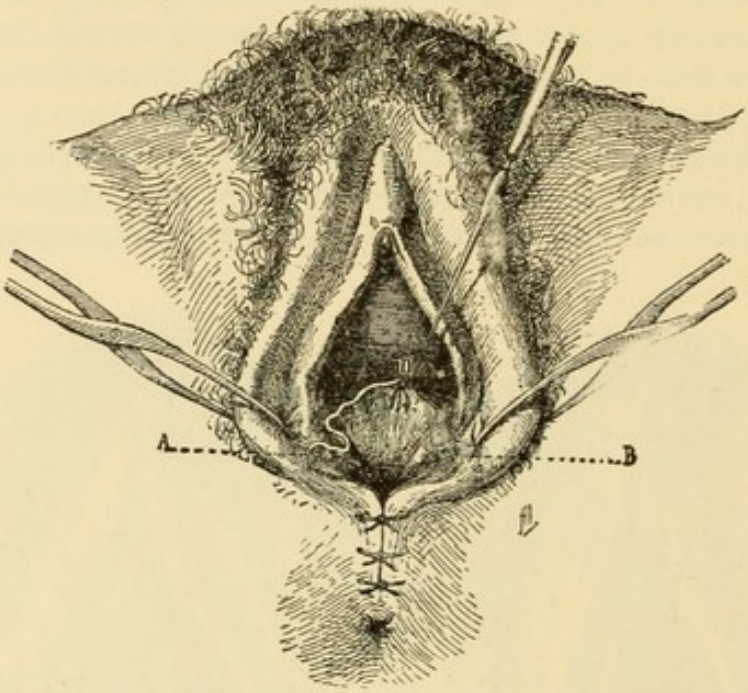


FIG. 327.—COLPO-PERINEOPLASTY BY FLAP-SPLITTING. Stitches drawn. The flap *A*, *B*, *D*, lifted; to be resected on the line *A* to *B*.

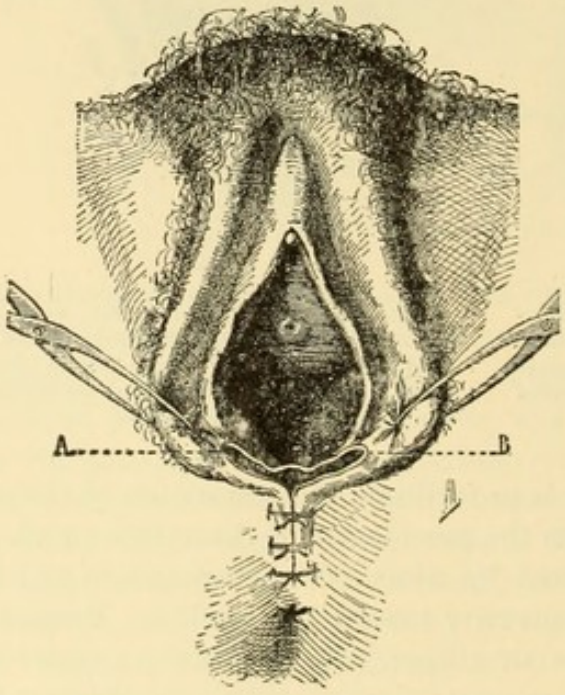


FIG. 328.—COLPO-PERINEOPLASTY BY FLAP-SPLITTING. The flap has been excised; two lateral openings are still unsutured.

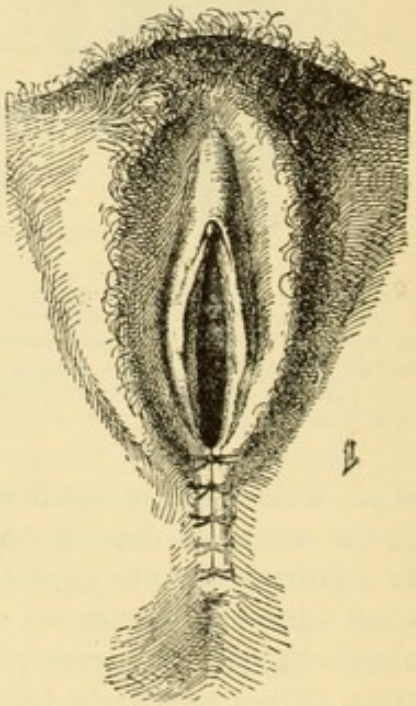


FIG. 329.—COLPO-PERINEOPLASTY BY FLAP-SPLITTING. Suture completed. Stitches all on external surface.

rhaphy. After freshening an oval surface similar to that shown in Fig. 330, two curved needles are threaded on a silk suture, one needle at each end, and

beginning near the cervix the suture is passed in and out of the whole circumference of the wound, about half an inch from the edge, something like the draw-string of a tobacco pouch (Fig. 331). The denuded surface is pushed inward toward the bladder and the ends of the silk closely drawn and tied. This was the most expeditious procedure known before the use of the

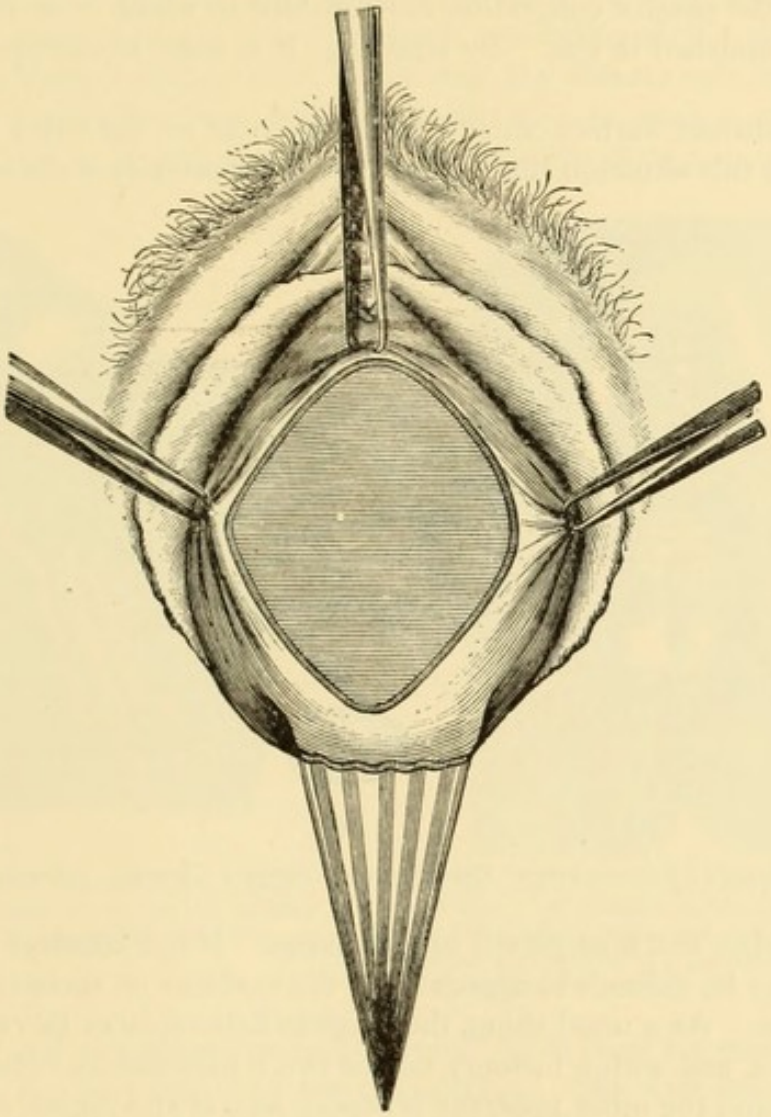


FIG. 330.—ANTERIOR ELYTRORRHAPHY. Flap removed. The raw surface, stretched out by forceps, is to be united by a continuous suture in layers. At the lower part of the picture is the bundle of stitches from the suture of the amputated cervix.

continuous suture in layers, which should be given the preference. Stolz freshens the anterior vaginal wall with curved scissors, after rendering it prominent by the pressure of a thick sound introduced into the bladder.

Closure of the Vagina.—Le Fort calls attention to the fact that the prolapse of the uterus is almost always preceded by that of the vagina, the walls of which fall, as it were, from a straightening out of their folds. If, he reasoned, these walls which face each other could be joined together, all prolapse would be prevented. The next step was the uniting of the

walls by suture after freshening a longitudinal strip on each (Figs. 332 and 333).

Sometimes the prolapsed uterus becomes so enlarged that it is difficult to restore it to place at once. That the reduction of the displacement may be effected by degrees, the patient is kept in bed from eight to fifteen days, after which the passive congestion has subsided in whole or in part, and the uterus is diminished in size. By straining, it is made to emerge again from the vulva.

The freshened surface should begin as near to the vulva as possible, since it is in this situation that the anterior and posterior walls tend to sepa-

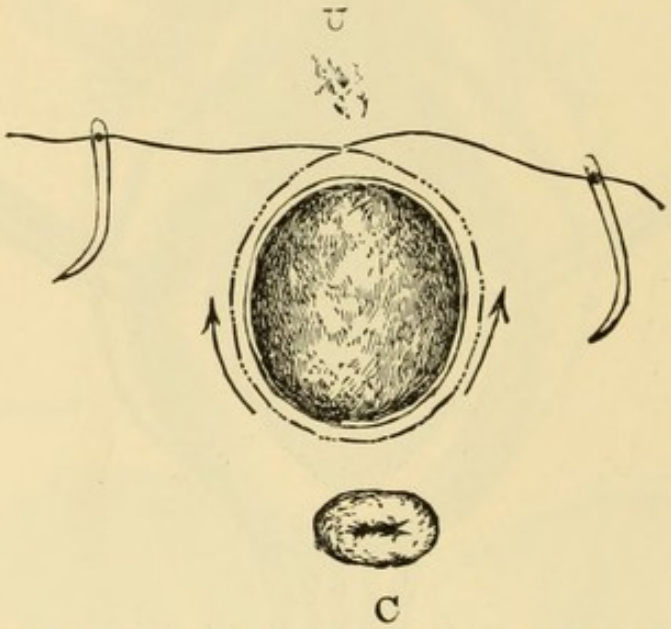


FIG. 331.—STOLTZ'S "TOBACCO POUCH" OPERATION FOR CYSTOCELE (MUNDÉ). *C*, Cervix; *U*, urethra.

rate most widely and thus permit of a prolapse. If one operates too near the cervix, it may be difficult to approximate the surfaces on account of the size of the uterus. As a usual thing, the surgeon first replaces the uterus, opens out the vulva, and with a bistoury makes two transverse incisions, one upon the anterior and the other upon the posterior wall of the vagina, at the lowest point where these two walls meet (the uterus being in place). These two incisions form the lower borders of the two denuded surfaces.

The vertical length of the freshened surface is from 2.1 to 2.5 inches, the vaginal walls having been unfolded and stretched by the prolapse of the uterus, which was induced by straining just before the operation. The breadth of the freshened surface first advised by Le Fort was from half an inch to three-quarters of an inch. At the present time he makes it about an inch wide. If the surface be too large, it will interfere with perfect union. The tissue taken off should be as thin as is compatible with the exposure of a raw surface. The removal of the whole thickness of the vaginal portion of the posterior wall would endanger the cul-de-sac. Tillaux

perforated it once, and the patient died of peritonitis, but Le Fort thinks this the only time that such an accident has occurred. He usually begins by making four incisions to outline the flaps and thus facilitate their dissection. In the early days of the operation, Le Fort used silver wire for the suture; and although it is difficult to find the stitches afterward, even when the ends are long enough to hang outside the vulva, he still uses them, for he had two failures with silk which irritated and inflamed the tissues. He several times tried the experiment of passing the sutures only through the edges of the wound, but met with small success; in such a case, if the freshened surface be of any size, the central portion does not unite, blood

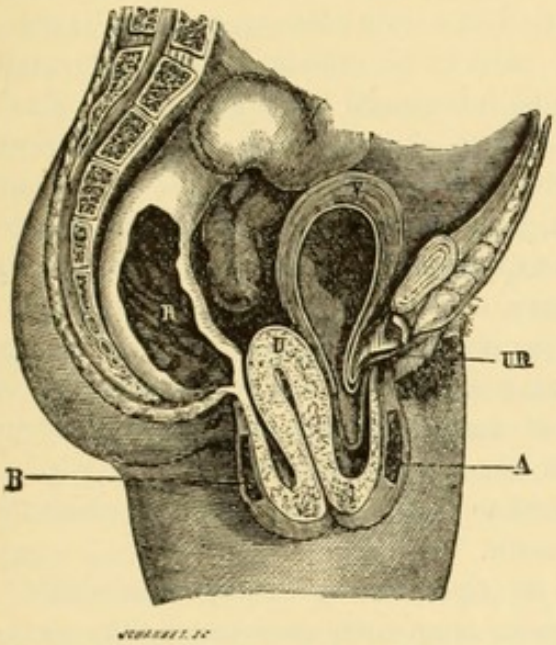


FIG. 332.—LE FORT'S OPERATION FOR CLOSURE OF VAGINA. *R*, Rectum; *U*, uterus; *UR*, urethra; *A*, anterior denudation; *B*, posterior denudation.

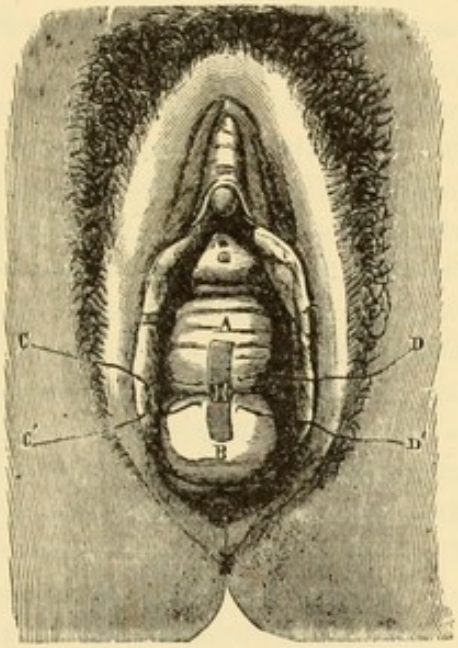


FIG. 333.—LE FORT'S OPERATION FOR CLOSURE OF THE VAGINA. *A*, Denuded surface upon the anterior wall of the vagina; *B*, denuded surface upon the posterior wall of the vagina; *C*, *C'*, a suture on the left side; *D*, *D'*, suture on the right side.

collects in it, and the operation is a failure. It is now his custom to pass the sutures to the very centre of the denudation. The first one is inserted at the middle portion of the end of the denuded surface nearest to the uterus, this stitch serving as the support to the prolapsed uterus. When the surfaces *A B* are once in apposition from the return of the uterus to its normal position, all that remains to be done is to suture the edges. The needle is inserted into the mucous membrane of one of the vaginal walls, traverses the wound, and enters in the other denuded surface, emerging at the mucous membrane of the opposite vaginal wall. The sutures are left in place two weeks, or even three weeks at times, and no attempt is made to remove them until certain perfect union has been secured. No dressings are necessary.

Out of forty operations, André records thirty-five successful results, of which thirty-one were successful immediately. It is an interesting fact that

this operation does not interfere with coition, fecundation, or labor. One of the first patients upon whom Le Fort performed this operation went through a perfectly normal labor. To deliver the child, it was only necessary to cut the artificial frenum with the scissors.

After-treatment of Colpo-perineorrhaphy.—The care of the patients, after these plastic operations for strengthening the perineum and narrowing the vagina, has an important bearing upon primary union; should this primary union fail, the success of the operation will be endangered, in spite of cases quoted to prove that granulation or immediate secondary union have given excellent results.

The line of suture is to be dusted with iodoform and covered with iodoform gauze. The catheter should not be left in the bladder, as there is danger of its causing cystitis, but, if the patient be unable to pass her urine spontaneously, an aseptic catheter may be introduced every six hours. Shall the bowels be rendered constipated or loose? I consider it best to prevent defecation until the fourth day, and then to give an enema. The patient will of course have been thoroughly purged, and the rectum washed, before the operation. Two tablets of opium daily, one-third of a grain each, will be quite sufficient to prevent premature evacuations if the diet be light. Should the patient still feel a desire to defecate, a suppository containing 1-4 grains of the extract of opium may be used. On the tenth day it is my custom to administer an ounce of castor oil, and two hours later an enema of four teaspoonfuls of the oil of sweet almonds with two of glycerin. After this, the bowels are closely watched to insure regular daily movements. The patient is to keep her bed for a month.

Immediate and Remote Results of the Operation of Colpo-perineorrhaphy.—Those gynæcologists who have the most frequently performed this operation are unanimous in testifying to its safety and efficacy. In what follows, I refer more especially to the operation of Hegar, which seems to me the most practical, and to that of Martin, which is of the greatest use where the vaginal walls are exceptionally loose and flabby; in this latter case Hegar's method, if used, would have to be preceded by an elliptical posterior elytrorrhaphy, as he himself admits.

The accidents to be feared are: Puncture of the peritoneum, which, if the operation be conducted under strict antisepsis, is not of grave import; wounding the rectum, which a well-applied suture will remedy; suppuration and destruction of the suture, which may be avoided by a careful preparation of the catgut and the minutest precautions against possible infection. Out of 400 cases operated upon in his clinic, Hegar has seen but 2 deaths from septicæmia, and in both cases it was ascertained that the infection was carried from cases previously operated upon. Dorff, who is Hegar's assistant, has published an interesting series of statistics upon the remote results of 136 operations. He was able to secure positive information in only 63 of the cases; of this number 53 reported a perfect cure

(some after a lapse of ten years), 9 reported successful parturition without subsequent relapse; in 10 patients the operation had failed, either in the first place or at a later date, in 2 of them after labor. The immediate results are even more gratifying: For a period of three years and a half, during which he has performed this operation 150 times, Hegar has not had one failure. Ernest Cohn, in a scholarly treatise upon the cases in Schröder's clinical and private practice, reports that of 74 women whom it was possible to keep under observation after the operation, 46 were permanently cured; that is, 62.2 per cent. Hospital cases alone give 56 per cent, and clinical cases report 86.7 per cent. (These are all cases in which Hegar's method was employed with a continuous suture in layers, using catgut prepared in oil of juniper.) Three of the patients went successfully through labor.

II. *Shortening the Round Ligaments for Prolapse of the Uterus.*—This is the Alquié-Alexander-Adams operation. For a detailed description the reader is referred to the chapter on Retroflexion (page 389). The success of this operation alone, when performed for the relief of prolapsus, is not in the main brilliant, although some good results have been reported. But it is of undoubted usefulness when combined with plastic operations upon the perineum and vagina, especially in thin women whose abdominal walls are not too lax. It seems to me that its chief action is the correction of the retroversion which accompanies and is a prominent feature of prolapsus.

III. *Suture of the Uterus to the Abdominal Wall—Ventro-fixation.*—The history and description of this operation are given in the preceding chapter (page 400).

If an abdominal tumor, fibroid or cystic, complicate the case, it will be an excellent procedure after laparatomy to fix the pedicle into the wound.

It is important to remember that ventro-fixation is not adapted to the cure of prolapse of the genital organs *in toto*, but only to prolapse of the uterus itself. Unless this have fallen, it would not be justifiable to fix it to the abdominal walls simply because of the existence of a cystocele and rectocele. Neither would ventro-fixation alone suffice to cure a prolapse of the uterus if it were accompanied by prolapse and distention of the vaginal walls and a supra-vaginal hypertrophy of the cervix. From a theoretical as well as a practical point of view, this operation is adequate only in those relatively rare cases in which an unenlarged uterus alone is prolapsed. In all other cases, supplementary operations upon the cervix, vagina, or perineum will be found necessary; the conoidal amputation of Huguier, or biconical amputation of Simon; anterior and posterior elytrorrhaphy, the various forms of colpo-perineorrhaphy, Le Fort's closure of the vagina, etc.

It would seem then that ventro-fixation possesses no advantages over Alexander's operation, which is also rarely adequate in complicated cases, but a very valuable auxiliary. It is really between these two operations that a comparison should be instituted, from the point of view of both danger and

efficacy It is unnecessary to dwell upon the first point, the relative safety of Alexander's operation being well known. This fact does not by any means settle the question of a choice, but it should influence the conscientious surgeon not to resort to the more serious operation before having tried the less serious one. As to the question of efficacy, experience will not as yet justify a judgment in favor of gastro-fixation, as the operation has too recently come into prominence and has been too seldom performed.

The first patient operated upon by Olshausen had a speedy return of the displacement, but it would seem that in her case the sutures were insufficient (two stitches of silkworm gut at the insertion of each round ligament). The second operation by the same surgeon, where fixation was superadded to an ovariotomy, was successful, the patient reporting a complete cure in 1886, a year and a half after the operation. Phillips reports a case in which the cure had lasted for six months, the last observation being taken at the moment of publishing the report; in this case, also, the pedicle of a removed ovary was fastened to the abdominal wall. Dumoret reports eight successful cases out of eleven such operations. Terrier's three cases and those of Tuffier are of too recent date to add much to our knowledge of results. Two failures and one death are facts not to be overlooked, and scarcely justify the enthusiasm displayed by some surgeons over this operation. Foreign operators do not seem to favor ventro-fixation for prolapsus. Kelly disputes its value. Müller has performed it from twelve to fifteen times without good result, the prolapse of both uterus and vagina soon recurring. In some cases the adhesions to the abdominal walls have given way; in others they have remained, but the walls have been dragged down out of place. Hofmeier has seen no good results from Schröder's operations; Freund, to explain these failures, calls attention to the fact that even after a myomotomy with extra-peritoneal fixation of the pedicle, the latter often becomes detached from the abdominal wall. Fehling, out of three cases, had one successful result.

Moreover, if there be much hypertrophy of the cervix and vaginal prolapse, though the uterus be firmly fixed in place or even removed, the vaginal prolapse will return. This has happened when vaginal hysterectomy had been performed. Müller has met with this deplorable result after the serious operation of abdominal supra-vaginal hysterectomy, with fixation of the pedicle in the abdominal wound. The woman was thirty-eight years of age, had had one child, and suffered from complete prolapsus of the uterus. Müller had performed Bischoff's operation of colpo-perineorrhaphy upon her in December, 1878, but without good results. June 16th, 1879, he made an incision in the linea alba about 2.5 inches in length, and by means of a sound in the uterus brought this organ into the abdominal opening, placed a clamp upon it and excised the upper portion, suturing the lower portion to the lips of the external wound. The patient left her bed on the 16th of July,

cured. In November of the same year her menses had returned twice, as a sanguineous oozing through the vulvar and the abdominal cicatrix. The latter was much depressed, or rather was at the base of a narrow infundibulum —formed by the abdominal walls. The uterine prolapse had returned in full force, the cervix protruding from the vulva about 3.5 inches. Its lips were swollen and admitted the first phalanx of the index finger. It seems to me that this case proves conclusively that support from above does not suffice to keep the uterus, or even a stump of the uterus, in place when a hypertrophied cervix and prolapsed vagina are continually pulling upon it from below. Ventro-fixation, like Alexander's operation, unless the case be one of simple uterine prolapse, should always be combined with an operation upon cervix, vagina, or perineum if durable results are to be obtained.

We might rank with ventro-fixation a new procedure described and performed by H. T. Byford for the cure of cystocele, and which he proposes to use as a complement to Alexander's operation, utilizing the same incision and carrying it more deeply into the cellular tissue in order to suture the vagina. Byford carries the incision through the inguinal canal to the retropubic cellular tissue (cavity of Retzius), which he separates from the pubis, being careful to ascertain the exact situation of the ureter by bimanual examination. He next passes a needle threaded with silkworm gut from above downward through the vaginal wall into the left lateral cul-de-sac. The needle is then carried from below upward through the vagina about a quarter of an inch from the point of entrance and emerges through the inguinal wound. A loop of silkworm gut thus holds a small portion of the anterior vaginal wall; another suture is firmly embedded in the cellular tissue, the threads are drawn taut and tied over the inguinal canal, and the incision upon the posterior wall of this canal is closed. The same operation is repeated upon the other side, and the vaginal wall is drawn up to the middle of the pubic bone, uplifting and supporting the bladder. Byford claims that it is of the utmost importance to include in the suture some of the vaginal mucous membrane in which the thread sinks and is gradually buried, thus imparting additional strength. When operating upon both sides, especial care must be taken not to bring the sutures too near the urethra, for fear of diminishing its calibre. The ureter also is to be avoided. Byford has twice performed this operation. The first time it resulted in a failure, which he attributes to a lack of experience in the details. The second operation was a success, although he inserted one suture only, on the left side. This second case, however, proves little or nothing. The patient had already had a vaginal hysterectomy performed on her; and at the same time that he did the ventro-fixation, Byford also did a double elytrorrhaphy, besides Martin's colpo-perineorrhaphy. It is very probable that this last operation alone would have sufficed; at all events, it is difficult to decide how much of the credit belongs to the first operation. Byford calls his process colpo-cystorrhaphy, which seems to me a misnomer, since, although the bladder is up-

lifted, it is the abdominal wall, and not that organ, which is sutured to the vagina. Either laparo- or ventro-fixation is a better term.

IV. *Vaginal Hysterectomy.*—Except in case of fibromata, I consider abdominal hysterectomy unjustifiable. As to vaginal hysterectomy, though less severe than this, it is more serious than plastic operations, and should only be resorted to as an extreme measure.

Leopold has performed this operation, but does not recommend it. Müller performed it three times, and in two of the cases had to supplement it with a colporrhaphy. Baumgarten has witnessed the occurrence of vaginal hernia as a sequel. On the other hand, Kehrer has used it successfully in the cure of a uterus prolapsed for the second time, and Robert Asch reports no less than eight cases of hysterectomy for prolapsus in Fritsch's clinic. This surgeon combines an extensive resection of the vagina with this operation.

Braun has also removed the entire uterus, in a case in which recurrence took place in spite of plastic operations.

In France, vaginal hysterectomy has been performed a number of times for complete prolapse. I have used it successfully in many cases. I consider hysterectomy only a complementary step, though initial, in the complex treatment of complete genital prolapse. Removal of the everted portion of the vagina, colpectomy, and colpo-perineorrhaphy should always follow extirpation of the uterus. The capital point in the treatment of all cases of prolapsus is the reenforcement of the pelvic floor, the correction of the gaping, the physiological if not anatomical occlusion of the vulva.

I employ the following technique:

I first mark out, with a bistoury, on the anterior vaginal wall, a large triangular flap, whose apex is not more than two or three centimetres from the meatus urinarius. Its base includes the cervix, along whose sides it extends. A small similar triangular flap is marked out with the bistoury on the posterior wall. These two triangles of unequal size are united by their bases (Fig. 335). I then dissect off with scissors the two lips of vaginal mucous membrane. This manœuvre is aided by inserting a male sound into the bladder and keeping its point under the region where the dissection is being done. The parts should also be kept tense by forceps applied within the limits of the operative field. When the two vaginal flaps have been dissected, and remain in front of and behind the cervix, the conditions are the same as in ordinary vaginal hysterectomy, except that the bladder is in this instance more closely connected with the elongated cervix and more stretched out by it. I dissect off the bladder with scissors; as the cervix is freed I incise its anterior face from below upward and attach forceps to the divided surface, so as to draw the organ progressively lower. If this proves too difficult, one may proceed at once to the following step of opening Douglas' cul-de-sac with scissors. Through this incision the fingers may be hooked around the uterus, depressing the vesico-uterine cul-de-sac, so as to allow it

to be incised. Both faces of the uterus being thus completely liberated, the broad ligaments are ligatured with silk and divided. A ligature is first passed through the lower part of each ligament, allowing the uterus to be freed sufficiently to seize its posterior face, and tip it backward in order to tie the broad ligaments from above downward. No special manœuvre is needed to attach the upper end of the vagina to the pedicles of the broad ligaments; this is accomplished by the process of cicatrization. The vaginal wound, which leaves a large portion of the surface of the bladder exposed, is closed by three tiers of continuous catgut sutures. The wound at the back, resulting from the removal of the small posterior flap, is united by several interrupted stitches of catgut. Before tying them, a strip of iodoform gauze is placed in the region formerly occupied by the uterus.

The final step is a perineorrhaphy by flap-splitting, according to a modification of Lawson Tait's method. This is, as I have said, the essential part of the operation, though the short time which it requires and its simplicity make it appear merely an accessory step.

The indications for vaginal hysterectomy for complete prolapse are limited. It should be employed only when palpation and use of the sound show that the uterus is elongated or hypertrophied, so that its reduction would evidently interfere with restoration of the perineum. In such a case the everted vagina is also so large that a segment requires removal. The vaginal hysterectomy should be under these circumstances a colpo-hysterectomy, in the full etymological meaning of the term. I recognize three contra-indications to this chief indication: relative youth, that is to say, the possibility of future child-bearing, senile debility, and poor vitality from an organic lesion of her heart, lungs, kidneys, or any other cause. If the patient has passed the menopause it may be sufficient to remove the cervix, after having dissected it off as high as possible, without opening the peritoneum. After this high amputation of the cervix, like that of Huguier, a stenosis or even a cicatricial atresia of the canal occurs, but this is to be dreaded only in a woman who is still menstruating.

The therapeutic indications of the various types of prolapse of the genital organs may be thus grouped: We may employ pessaries or palliatives (page 426) after reducing the displacement by rest, baths, and tampons, and if necessary amputation of the hypertrophied cervix. Massage has been much extolled of late as a remedy in most of the uterine affections, especially prolapsus. I think it destined to render real aid, when combined with baths and rest, in diminishing the size of the prolapsed parts and facilitating their replacement. Brandt recommends massage with two operators; one of them lifts the uterus by means of two fingers introduced into the vagina; the other places both hands between the uterus and the symphysis, and slowly presses the ends of the fingers as deeply as possible, lifts them and presses them down again about a dozen times. A daily application for about eight days will be sufficient. It would be useless to expect a permanent cure from this

treatment. It will give only a temporary relief, and cannot replace a plastic operation.

In the consideration of curative treatment we must divide the cases into several classes.

1. *Simple Prolapse of the Vagina without Hypertrophy of the Cervix or Marked Sinking of the Uterus.*—Anterior elytrorrhaphy and colpo-perineor-

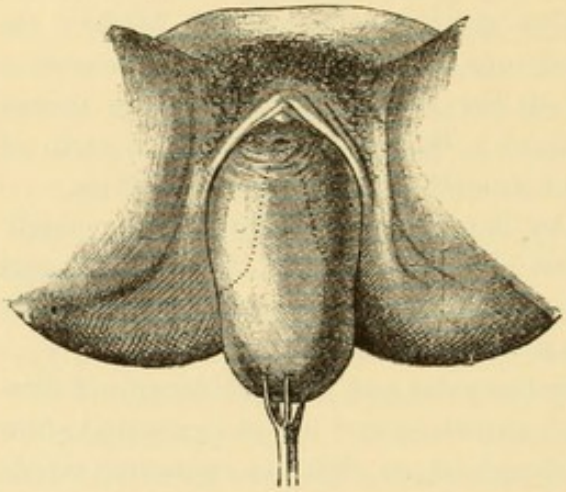


Fig. 334.—Vaginal Hysterectomy and Colpectomy for Prolapsus Uteri. Shows the line of incision on the anterior vaginal wall.



Fig. 335.—Uterus and Portion of Vagina Removed by the Operation. *A*, Anterior vaginal flap; *P*, posterior vaginal flap.

rhaphy if the vagina be much enlarged; when the cystocele is small, anterior elytrorrhaphy followed by colpo-perineoplasty by flap-splitting to increase the perineal resistance.

2. *Vaginal and Uterine Prolapse with Hypertrophic Elongation of the Cervix.*—Amputation of the cervix, anterior elytrorrhaphy, and colpo-perineorrhaphy. I use exclusively for this last operation a modification of Lawson Tait's operation.

If the body of the uterus be much prolapsed, it will be better to shorten the round ligaments at once, after amputating the cervix, before attempting a plastic operation upon the vagina. This combination of several processes for the cure of prolapse of the genital organs, and in especial the union of Alexander's operation to colpo-perineorrhaphy, was first suggested by Alexander himself. Mundé and Doléris warmly praise this mixed method. It seems to me that shortening the round ligaments is of especial value in correcting the retroversion which frequently accompanies a prolapsus and is so powerful a cause of relapse. It may sometimes be necessary to do as many as five operations upon the same patient; but they are all simple and rapid of performance, as all may be acccomplished within an hour, thanks to the time gained by the use of the continuous suture in layers.

When the prolapse of uterus and vagina is complete, and the fallen organs hypertrophied and replaced and maintained in position with great difficulty, when they have in fact apparently lost their connection with the

pelvis, it will be quite justifiable to perform a vaginal hysterectomy, with extended excision of the vagina, followed by colpo-perineorrhaphy to diminish the vulvar opening.

3. *Prolapse of Uterus and Vagina without Hypertrophy of the Cervix.*— Shortening the round ligaments, then colpo-perineorrhaphy. As every case of prolapsus is accompanied by endometritis, one will always begin by curetting.

CHAPTER XX.

INVERSION OF THE UTERUS.

INVERSION of the uterus may be defined as the turning in of the organ upon itself, so that the fundus, which is pushed down like the end of a glove finger, protrudes either into the uterine cavity or the vagina.

The first stage of that process usually escapes notice, and may indeed be only temporary in its duration. To attract the attention of the physician, the fundus must protrude through the cervix and form a tumor which touch or sight can appreciate. The various degrees into which the classic authorities divided inversion (Fig. 336) have merely a theoretical interest. The

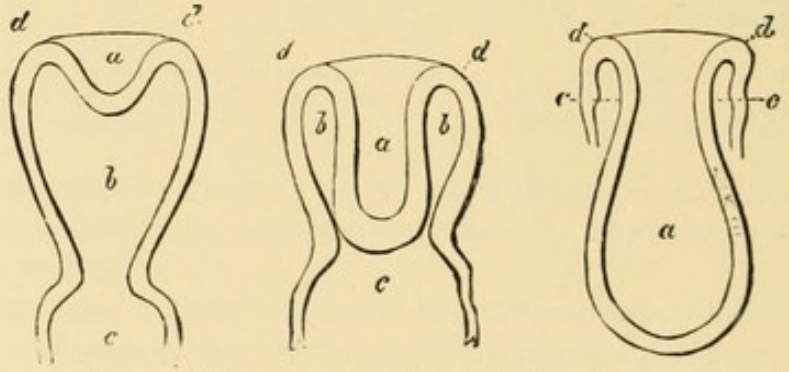


FIG. 336.—INVERSION OF UTERUS. Schematic representation of the three degrees. *a*, Fundus inverted; *b*, in uterine cavity; *c*, in vagina; *d*, upper edge of the depression formed by the inverted fundus.

division into complete and incomplete has not much more value; complete inversion, where any projection of the cervix is entirely obliterated, is so rare that the existence of even the few cases quoted is a matter of dispute.

The only classification of any clinical importance is that of simple inversion and of inversion with prolapsus.

Pathology and Etiology.—For the production of inversion, there must be a loss of tone of some portion of the uterus which excites the contraction of the uterine muscles just above it. These conditions are found after labor, or as the result of a fibroma growing into the cavity. In both of these conditions the uterus is hypertrophied and dilated; in both a zone of its surface is inert and depressed. After labor, this zone is at the placental site, so that Rokitansky has described the affection as a "paralysis of the placental zone." In the case of fibroma it is at the site of the implantation of the tumor. Traction exerted from below upon the umbilical cord, or an impulse from above produced by exaggerated action of the abdominal walls

when there is uterine inertia, may in this case depress the fundus. If the rest of the organ is then about to contract, the depressed portion is seized upon, as it were, and, by an automatic motion which may be compared to deglutition, carried down through the cervix. A light inversion will give rise to contractions in a direction opposite to their usual one.

Among the more frequent causes we may mention: shortness of the umbilical cord with excessive dragging upon the placenta; abnormal adhe-

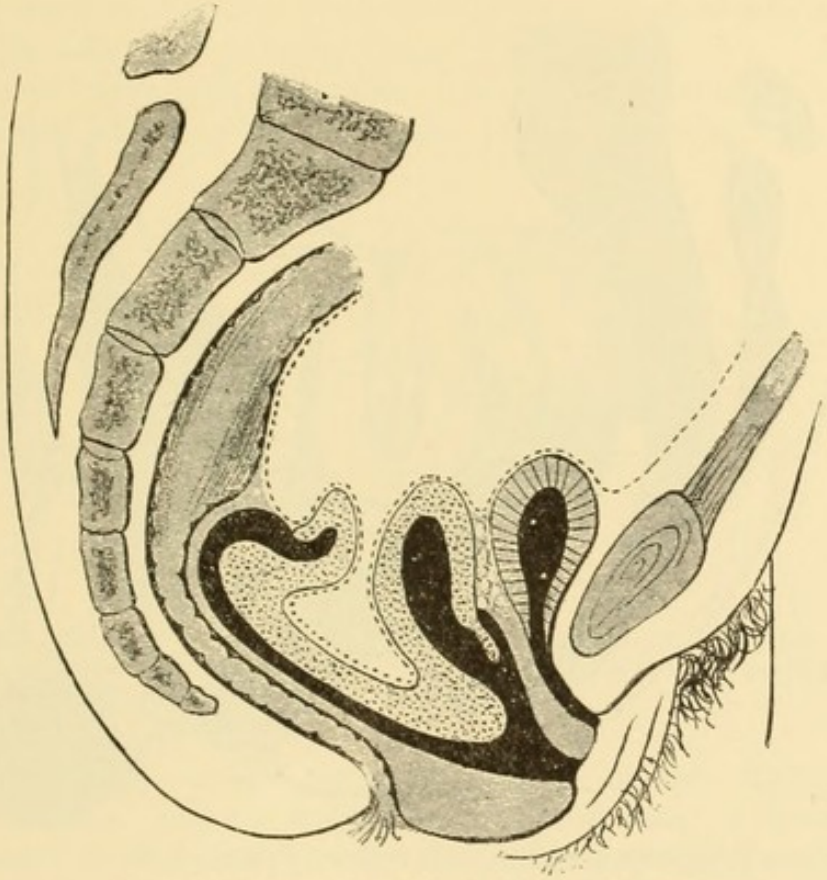


Fig. 337.—Inversion of the Uterus Without Prolapse.

sion of the placenta or its insertion upon the fundus; labor in an erect position. Partial inversion often occurs without the knowledge of the attending physician, and the fundus, which is cupped like the bottom of a bottle, to use Mauriceau's expression, continues to descend in the first few days following parturition, and the inversion which occurred in the first moment is noticed only after a lapse of several days. Sometimes it becomes slowly appreciable, sometimes very suddenly. Its origin at the puerperal period is the most frequent. Cross out of four hundred cases of inversion found that three hundred and fifty were due to labor and fifty to polypus. Fibrous bodies, fibro-sarcomata in the fundus, especially if they have been subjected to traction, may cause an inversion even in nulliparæ. The existence of these tumors leads to a condition of hypertrophy and vascularity bearing a close resemblance to the gravid uterus (*grossesse fibreuse*).

Inversion is a rare affection. According to Beigel's statistics, it occurs only once in one hundred and ninety thousand cases of labor.

Pathological Anatomy.—A marked distinction should be made between recent inversions in the puerperal state and chronic inversions in the same condition. The peculiar condition of the uterus at the moment of delivery establishes a radical difference between the two. Under the first head there is one variety which may be called acute and which is so formidable an

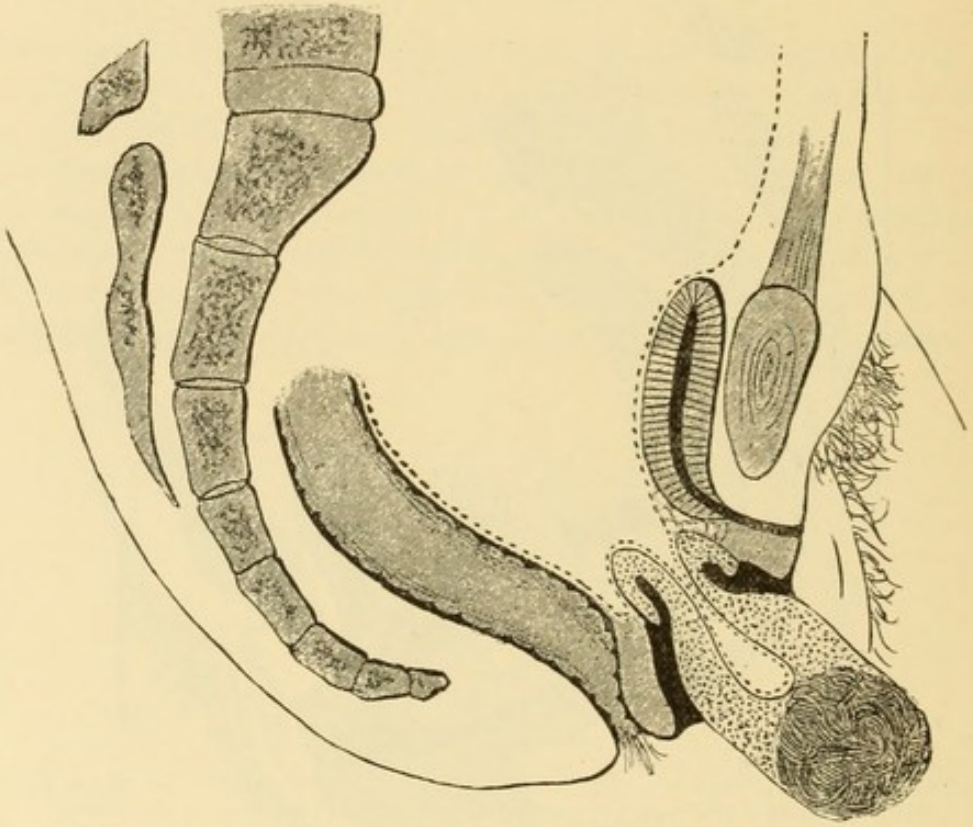


FIG. 338.—INVERSION AND PROLAPSE OF THE UTERUS CAUSED BY A FIBROID TUMOR.

occurrence that it may cause death from profuse hemorrhage. It is fortunately so rare that I need not dwell upon it, but leave its description to the obstetrician.

Puerperal inversions occurring during the death struggle have also been reported. A knowledge of this fact is important on account of medico-legal errors to which such accidents might give rise.

By recent inversion I mean cases in which the inversion constitutes the chief symptom to be treated, and may be made manifest to the surgeon at any time not too far removed from delivery (usually a month and a half) when the involution of the uterus is still incomplete. By chronic inversion I mean cases of much longer standing. In the recent cases the cup-shaped depression of the fundus is usually pronounced and contains the Fallopian tubes, the ovaries, and sometimes loops of intestine (Fig. 339). At a later stage this cavity disappears, leaving only a slit. The uterine tumor is large,

its tissue spongy and vascular. The surface, which is soft and downy, is in contact with the vaginal mucous membrane. By careful observation we find two small lateral openings about an inch apart, into which we can sometimes pass a hog's bristle; these are the openings of the Fallopian tubes. The upper part of this pyriform tumor is set into the cervical ring. When the cervix shares in the process of inversion, it does so in an irregular manner —the anterior cul-de-sac being of a greater depth than the posterior. Upon the uterine mucous membrane can be seen, both macroscopically and microscopically, the lesions of glandular endometritis.

Chronic inversion without prolapsus forms a tumor which in aspect and consistence is much like a fibrous polypus, the pedicle being represented by

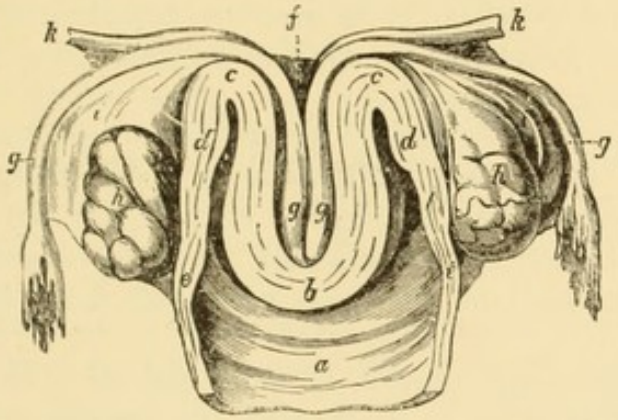


FIG. 339.—INVERSION OF THE UTERUS. *a*, Vagina; *b*, fundus; *c*, *c*, upper borders of the inversion; *c*, *d*, portion of cervix not inverted; *f*, cul-de-sac formed by the inversion of the fundus; *g*, *g*, Fallopian tubes dragged downward by the inversion; *k*, *k*, round ligaments; *h*, *h*, ovaries; *i*, *i*, broad ligaments.

that part of the body which is compressed by the cervix. The cervix remains in its normal position, though in some rare cases of complete prolapsus the cervical ring disappears and the uterine and vaginal mucous membranes are directly continuous. In a chronic inversion the mucosa of the uterus often takes on the external characteristics of the vaginal mucosa, its glands disappearing in great measure.

Chronic inversion with prolapsus is rare; it may be accompanied by ulceration due to friction and irritation. The mucous membrane becomes skin-like in its nature by the formation of layers of pavement epithelium upon its surface.

Cases have been reported of a species of spontaneous cure in which the inverted uterus was eliminated by sloughing.

Symptoms.—I shall make no reference to the acute inversion at the time of delivery, as it is a condition which cannot escape the notice of a careful physician. If this inversion is only partial, the accompanying hemorrhage may not be alarming in its nature.

Inversion in the puerperal state may occur suddenly and be accompanied by sharp pain with grave reflex phenomena, even to syncope. In a few

cases pain has been absent; hemorrhage may or may not be present. If the inversion has taken place slowly and by degrees, as is usually the case when polypi are the cause, the symptoms may in no wise differ from those of simple prolapsus: metrorrhagia, however, is the rule, and should call for careful attention. All the group of uterine symptoms have been noted: pain, leucorrhœa, reflex symptoms in the digestive tract and nervous system, and sometimes phenomena of compression of the rectum and bladder. The tumor formed by the uterus resembles a polypus, but bimanual palpation will convince us that the uterus is not behind the pubis but filling the vagina. The signs of inversion may be combined with those of prolapsus, but this is rare.

Diagnosis.—There are two mistakes possible: A simple inversion may be taken for a tumor (polypus), or an inversion complicated by a tumor may not be recognized. Whenever a supposed polypus has a large pedicle, we must be on our guard against falling into these errors. Certain positive signs will enable us to avoid them; the absence of the rounded mass of the uterus behind the pubis, demonstrated by rectal touch, hypogastric palpation, and a catheter in the bladder; a circular, padlike constriction all around the tumor behind which the sound cannot be inserted; the recognition of the openings of the Fallopian tubes—all these are the signs of a simple inversion.

Inversion accompanying a polypus is more difficult of recognition, and it is often hard to determine to which cause the symptoms are due. As a diagnostic sign, some authorities have mentioned the sensitiveness of the uterine mucous membrane in contradistinction to the lack of sensitiveness of the surface of a fibroid. The value of this sign has been disputed, and it is evidently not pathognomonic.

The greater flexibility and deeper color of the uterine tissues indicate very little, nor does the consistence of the tissue as shown by thrusting in a pin reveal much more. If a thorough examination during anæsthesia does not decide the matter, I think it would be advisable to tie an elastic ligature about the pedicle, and incise the surface of the tumor in one place after another to a sufficient depth to ascertain whether or not a fibroid be present; if a capsule be found, the tumor may be enucleated with blunt instruments, after which iodoform tampons may be inserted and the inversion reduced. If the incision give a negative result, it can be carefully closed, by a suture in layers, before removing the hæmostatic ligature. Such an exploration would not be dangerous, and would prevent the disagreeable surprises which some surgeons have experienced who have undertaken complete extirpation of the tumor without preliminary precautions.

Simple prolapsus of the uterus can not long interfere with a diagnosis. The disappearance of the vaginal cul-de-sac, the presence of the os uteri through which the sound can be inserted usually to more than the normal depth, will permit of its ready recognition. Obliteration of the os and the

coexistence of a fibroid tumor might cause difficulty and is a complication for which one should be prepared.

Prognosis.—Once acquired, inversion tends to increase. Moreover, the patients are exhausted by hemorrhages, leucorrhœa, and pain. It is useless to build any hopes upon the few cases reported of a spontaneous reduction of the displacement, or of those still more exceptional cases of gangrene, which, while effecting a cure, is by no means free from danger. We must, however, not ignore the fact that a remarkable tolerance may be acquired for even the most serious lesions.

Treatment.—Reduction is most easily accomplished immediately after the occurrence of the inversion. As soon as possible after delivery, having assured himself that no fragments of the placenta are left behind, the physician will introduce one hand into the uterine cavity and push the depressed fundus into place, which the other hand, strongly pressing upon the abdomen, will seize and hold.

In a chronic case, the reduction is accomplished with far more difficulty, and yet some apparently permanent inversions have been cured. Audigé reports a successful reduction in a case of thirty years' standing.

The methods of reduction employed may be divided into forcible and gradual reposition.

Forcible Reposition.—I shall merely enumerate these methods, without dwelling upon them, for I believe that they will fall into disuse; the great majority of inversions can be reduced by the gradual method, and the exceptional cases which will not yeld to this treatment are better treated by extirpation of the organ than by forced taxis.

For manual reduction the patient is anæsthetized; three fingers are introduced into the vagina and seize the tumor; the other hand grasps the uterus through the abdominal walls and serves to direct the pressure. Two methods have been suggested. One the reduction in mass, by grasping the whole of the inverted uterus; the other a gradual reduction, replacing first one horn of the uterus and then the other (Noeggerath). Emmet recommends dilatation of the cervix with the fingers of one hand, while the palm of the other presses upon the fundus. Courty draws down the uterus with Museux's forceps, fixes the cervix in place by two fingers hooked into the rectum, and with the thumb and index of the other hand presses upon the pedicle so as gradually to diminish the utero-cervical groove. Courty sometimes lessens the constriction by two or three longitudinal incisions which start from the os and extend upon the cervix, dividing its circular fibres. Barnes also uses this method. Emmet advises, when the fundus has been replaced within the cervix but not completely reduced, the suture of the os for a few days to prevent a possible return of the inversion.

Instrumental taxis by means of Viardel's drumstick repositor or White's instrument, which has a sort of cup to hold the tumor and an elastic spring

at the other end which is held against the chest of the operator, possesses for us only an historic interest.

Gaillard Thomas, on account of the difficulties encountered in operating through the vagina, because of the cervical constriction, performed a laparatomy, dilated the cervical ring with an instrument shaped like a glove-stretcher, and with great difficulty pushed the uterus upward through the vagina. The vagina was perforated, and the patient had a severe hemorrhage but recovered; a second one died. In view of these risks, I cannot agree with a recent writer who considers this operation as one to be highly recommended, for even in patients young enough to have children hysterectomy seems to me safer.

Gradual Reduction.—Rest in bed, hot vaginal injections, and massage should all be used to diminish congestion and reduce the size of the uterus. With these aids continuous pressure upon the tumor is the chief curative method and, if persisted in, it is almost sure to succeed. Hofmeier has never seen it fail. There are many ways of applying it. Tyler Smith, who was soon followed by Teale, West, Bokenthal, Courty, etc., was the first to reduce an inversion of twelve years' duration, by the continuous pressure exerted by an air pessary. One of these can be introduced empty, and then distended as much as possible. Its action seems to be exerted in many ways: by direct pressure upon the tumor it diminishes its volume; its prolonged contact with the cervix serves to loosen it; and finally the presence of the pessary may excite uterine contractions which work from below upward and help in the reduction. In other countries, a colpeurynter, a rubber bag filled with water, is often used. It may take a month or more to accomplish the reposition, which is usually preceded by sharp pain. Thomas, Barnes, Duncan, Aveling, etc., speak in praise of a cup and stem pessary which is fastened to a belt by elastic bands. I consider it a dangerous instrument and one likely to cause sloughing.

Tamponade with iodoform gauze is far preferable to these methods, as it is simple, easy of application, and requires no especial instruments. It is to be renewed every two or three days, and to be done with the utmost care, using long strips of gauze about two fingers' breadth wide, which is packed around and above the tumor, being pressed in place with some force. The patient is to be kept in a horizontal position, the bowels to be kept open by enemata, and, should micturition be difficult, the catheter is to be regularly passed.

Removal.—A few cases will resist even a long-continued pressure treatment. The removal of the inverted portion of the uterus is then justifiable, for the accidents caused by inversion often threaten life itself. The history of the methods used for excision of the inverted uterus before the days of antisepsis is as long as it is wearisome, and contains the oldest records of hysterectomy. Amputation by means of a straight écraseur is not to be tolerated. It is a very slow procedure, gives rise to agonizing pain, does

not prevent hemorrhage, and may wound neighboring organs. Incision immediately preceded by the application of a ligature or a clamp; section by the galvano-cautery; slow ligature with iron wire or rubber tubes frequently tightened, preceded by the formation of a groove with the thermo-cautery (Courty), are ancient methods which should be obsolete, although, used properly, they are capable of giving good results.

Perier has greatly facilitated the application of the slow ligature by invention of his process of elastic ligation with traction, in which he uses a toothed ligature tightener. Those practitioners who are not familiar with the operation of vaginal hysterectomy could utilize this method with profit.

Kaltenbach advises the immediate amputation of the inverted portion of the uterus, after the application of a temporary elastic ligature.

The technical details of total extirpation of the uterus through the vagina have been so accurately tested, and the operation has given such excellent results (page 313), that, for my part, if reduction were not possible, I should not hesitate to perform it rather than an amputation limited to the inverted portion.

CHAPTER XXI.

MALFORMATIONS OF THE CERVIX—ATRESIA. STENOSIS. ATROPHY. HYPERTROPHY.

Atresia.

By atresia of the cervix we mean that the os uteri is imperforate or occluded.

Congenital atresia is in the great majority of cases found only as accompanying other and graver malformations, as double uterus and vagina, whose description belongs to the general history of malformations of the genital organs. Theoretically we should here include a description of those rare but incontestably existing cases in which the only congenital lesion has seemed to be an imperforate cervix, the occlusion being either at the internal or the external os, but as the clinical results of this anomaly are identical with those of absence of development of the upper portion of the vagina, its description would involve needless repetition.

Acquired atresia follows sloughing after labor, cicatrices resulting from excessive cauterization of the whole periphery of the cervix, amputations which have not resulted in lining the circumference of the cervical opening with mucous membrane but have permitted a concentric retraction of the inodular tissue. It may also follow the cicatrization of ulcers of the cervix coincident with senile atrophy of the uterus; finally it may, in old women, be due to a tumor in the cervix or lower portion of the body of the uterus. Atresia also occurs, in prolapsus uteri, as a result of the friction of a pessary or of the thighs upon the os if there be complete prolapse. It may occur spontaneously in old age; and some cases, to my mind of doubtful occurrence, have been reported of atresia appearing during pregnancy

The results of this obliteration vary as the patient has or has not reached the menopause. If not, we must be on our guard against hæmatometra and hæmato-salpinx (see chapter on Malformations). If she have ceased menstruating, the lesion usually causes no disturbance unless some cause of septic infection exist in the uterine cavity causing an accumulation of pus (pyometra) or gas (physometra). I have seen two cases of pyometra from cancer of the body of the uterus and fibroma in aged women. The treatment in such a case consists in incising or puncturing the cervix if it be necessary to disinfect the uterine cavity, and then in meeting the indications called for by an existing fibroma or cancer.

Stenosis.

Stenosis is a narrowing of the cervical canal, which may be congenital or acquired. When congenital, it is usually accompanied by a conical cervix, often hypertrophied in inverse proportion to the development of the body of the uterus. The conical or sugar-loaf cervix is firm in consistence and has at its apex a pinhole os (Fig 342). The anterior lip may protrude a little, giving the appearance of hypospadias of the canal, or it may resemble the trumpet-shaped snout of a tapir, in which case the stenosis is usually

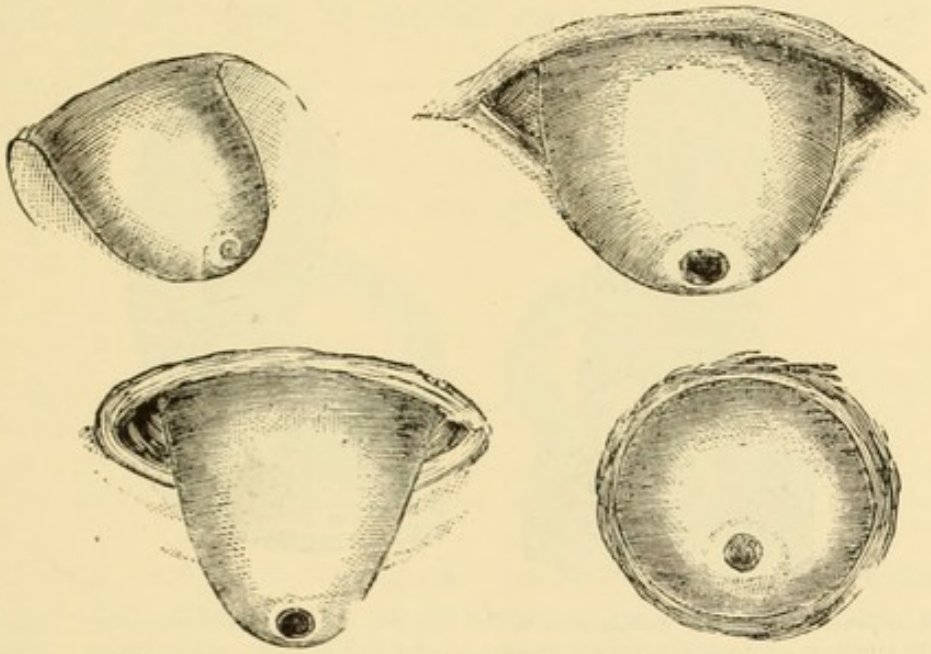


Fig. 340. Cervical Stenosis—Various Forms of Conical Cervix.

accompanied by congenital hypertrophy of the cervix (Fig. 340). Congenital stenosis may be the result of an anteflexion of the uterus, pronounced enough to obliterate the cervical canal. Acquired stenosis is due to the same causes as atresia. One of the consequences of the narrowing is the retention of the cervical mucus, which accumulates, and dilates the cavity of the cervix. Catarrhal inflammation of the mucous membrane follows, causing an increased secretion of discolored, tenacious, viscid mucus (Fig. 341). The use of speculum and uterine sound will speedily decide the question of the existence of this condition; when the sound has passed the os it enters an ampulla-like dilatation of the cervical cavity.

Dysmenorrhœa and sterility are the two more prominent symptoms, though is some cases dysmenorrhœa is absent.

The pain experienced during menstruation, the obstructive dysmenorrhœa of English writers, is usually situated in the lumbo-iliac and sacral regions; it is colicky in its nature, coming on spasmodically, when the amount of blood exuded is too great to be immediately carried through the

narrowed canal, or when the cervix is obstructed by a clot. Relief follows a breaking of the clot. The pain is frequently so intense that the patients develop marked nervous reflexes, as syncope or uncontrollable vomiting, which leave them in a condition of extreme prostration. These patients are usually chlorotic, anæmic, dyspeptic, and neuropathic. Endometritis frequently results from the imperfect evacuation of the mucus and blood from the uterine cavity, and the group of uterine symptoms then persists in the intervals between the menstrual periods. This is a frequent form of the endometritis of virgins.

Stenosis oftentimes causes sterility, although its influence in this particular has been exaggerated since the days of Sims. The mechanical ob-

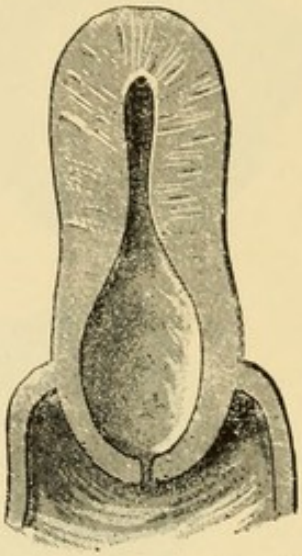


FIG. 341.—CERVICAL STENOSIS. Dilatation of the cavity of the cervix by retention of mucus, in a case of cervical endometritis with narrowing of the external os.

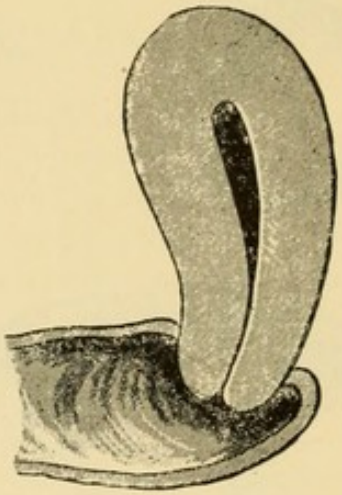


FIG. 342.—CERVICAL STENOSIS. Uterus with narrow cervical canal, without flexion. (Typical case for Simpson's operation.)

struction to the entrance of the spermatic fluid is a less important factor than the mucous congestion of the cervical canal. Normally, during coition, the cervix, by a species of erethism which Rouget has compared to true erection, expels the mucus which it contains. From aspiration succeeding the cessation of the venereal orgasm, or simply from capillarity, the alkaline vaginal mucus mixed with spermatic fluid enters the cervix in its place. This exchange is prevented by the narrowness of the external aperture, which is completely stopped up by a plug of acid mucus.

Diagnosis.—The most interesting and delicate point of diagnosis consists in localizing the exact point of maximum of constriction. Where there is a conical cervix with a pinhole os hidden by a drop of viscid mucus not unlike the small concrete masses of sputum from the larynx, the external os is without doubt one of the points at fault. But it may not be the only one; for, as Bennett justly remarks, there is normally another narrow opening at the upper end of the cervix which may be constricted (Fig. 342).

Stenosis of the internal os has been said to be due to contracture, but I

consider this doubtful. It seems to me to be the result of incomplete development, with or without congenital anteflexion. Acquired stenosis from excessive cauterization is more rare at the internal than the external os, and worthy of passing mention only.

If difficulty is experienced in passing the sound through the internal os, we must not jump to the conclusion that there is necessarily a constriction at this point. We must first be certain that the tip of the sound has not come against a fold of mucous membrane or the angle of a flexion; and to ascertain if this be so, we bend the sound in accordance with the presumed direction of the cervico-uterine canal, press down the handle toward the fourchette, and draw down the posterior lip of the cervix in the case of an anteflexion, and the anterior lip in case of a retroflexion. We must grope gently with the sound a great many times before the diagnosis can be established with certainty.

Prognosis.—Congenital cervical stenosis, which is the most frequent form, disappears after fecundation and labor, not so much from the excessive dilatation as from the structural changes undergone by the uterus in pregnancy. The efforts of the surgeon should be directed toward favoring fecundation, and the various methods of artificial dilatation are to be regarded as merely temporary and palliative.

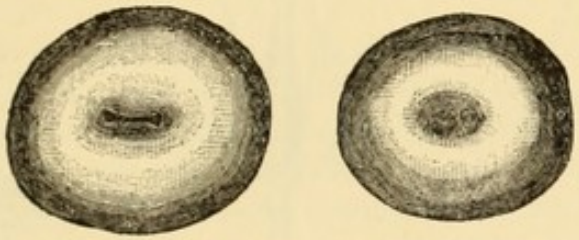


FIG. 343.—CERVICAL STENOSIS. Normal and pinhole os.

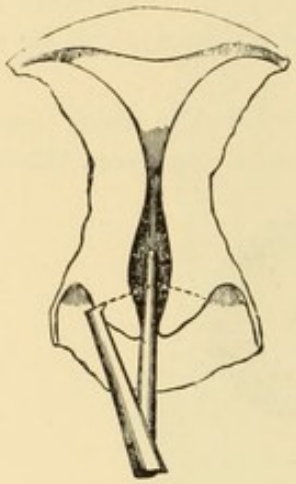
Treatment.—Slow dilatation with laminaria tents, or rapid progressive dilatation with graduated bougies, gives merely ephemeral results, yet it may be used to advantage before each menstrual period. I prefer Hegar's dilating bougies, and believe that their frequent use may stimulate the vitality of a more or less incompletely developed uterus (for details, see page 90 *et seq.*).

This operation, although a minor one, must be considered worthy of antiseptic precautions. Some serious accidents have been known to follow it, and doubtless a greater number still have not been reported.

Division of the *external* os may be done with a bistoury, with strong scissors, with Küchenmeister's scissors (which have hooked ends to prevent slipping), or with some one of the many forms of hysterotome which have been invented since Simpson first recommended this operation. Marion Sims made great use of this method of treatment, and brought it into a prominence which is at this day hard to understand from an exclusively scientific point of view. Since his time gynæcology has passed through a period

when discission of the cervix was carried to an extreme. Any young wife in whom pregnancy was a trifle delayed, any young girl or woman suffering during menstruation, was considered a fit subject for this operation. Now, however unimportant it may seem to be, it has most certainly led to fatal results, especially before the days of antisepsis.

We must distinguish between section of the external os (which may be median, posterior, bilateral, or crucial) and an incision which is carried into the cervical canal and to the *internal* os (Fig. 345). The incision may be made with a probe-pointed bistoury, after drawing the cervix down and steadying it. This operation is far more serious than the one first mentioned. To arrest hemorrhage, the wound may be loosely tamponed with



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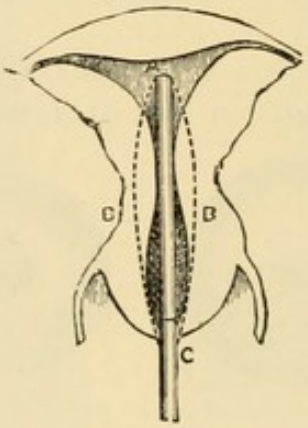


2

FIG. 344.—DISCISSION OF THE CERVICAL CANAL. 1, Division by Küchenmeister's scissors. 2, Division with a double hysterotome. The dotted line *A*, *B*, *C*, indicates the segment incised by the separation of the blades.

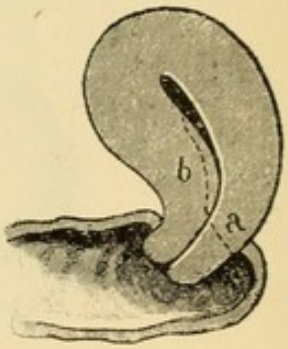


FIG. 345.—STENOSIS OF THE CERVICAL CANAL. Line of incision at the internal os. *a*, Incision of the external os on a level with the posterior lip; *b*, incision of the internal os on a level with the anterior wall.

small pledgets of cotton soaked in perchloride of iron, which are to be taken out on the following day. The patient should be kept three days in bed. Barnes' small elastic-stem pessary or Thomas' glass stem may be worn for several days in the cervix.

I do not describe these operations in detail, because I consider them bad practice. Incisions of the external os either by cicatrization cause stenosis again, or by gaping cause an eversion of the mucous membrane and consequent cervical catarrh. The deeper incisions are not unattended by danger, for, however carefully one may use the hysterotome, the instrument with which we are working in the dark may easily slip and cause serious accidents. I much prefer the probe-pointed bistoury, which is more manageable.

Dilatation of the cervix by either the bloodless or bloody operations may give excellent results in those cases in which the stenosis is slight and accompanied by quite disproportionate nervous reflex phenomena. However, two opposite theories have been advanced in regard to this subject. Schauta, who advocates incision, claims to have cured hysterical neuroses by the sec-

tion of nerve filaments; he states that in such cases dilatation by the bloodless method is of no avail. On the other hand, Doléris recommends forced dilatation of the cervix under the same circumstances, claiming that it acts in the same way as nerve-stretching. It seems to me that the relief afforded by both of these methods may be fully explained by the ready flow of previously retained mucus, which removes a source of continual reflex action. Gastric troubles as well as pain are rapidly relieved.

Electrolysis has been highly praised. The advantages claimed for it are, its harmlessness and painlessness and its efficacy, due to the fact that the slough produced by the negative pole leaves a cicatrix as soft and distensible as that produced by alkaline caustics. Currents of feeble strength but long duration are recommended.

In cases of slight stenosis I prefer the simpler method of gradual dilatation with Hegar's bougies (after softening the cervix with laminaria). I sometimes combine this treatment with very small incisions upon the circumference of the os with a probe-pointed tenotome to facilitate the insertion of the laminaria.

In cases of marked stenosis, the only rational operation seems to me to be a plastic operation for the production of an external orifice of sufficient size. The operation of stomatoplasty does not affect the external os only, as one might imagine. By the functional changes which it induces in the cervix, the upper portion of the canal becomes more permeable. There are cases in which a flexion of the uterus gives the impression of a constriction situated high in the cervix. This flexion often disappears after the operation, so that I consider it advisable to wait a while before attempting to treat a suspected stenosis of the upper portion of the canal which has been diagnosed by anterior palpation. Later, should the stenosis persist, gradual dilatation with Hegar's bougies is preferable to incision, though a few slight scarifications may be made to facilitate the passage of the first bougies, but these do not in the least resemble the deep discission of Simpson, Sims, etc.

Stomatoplasty is in reality nothing more nor less than amputation of the cervix. I have minutely described it in the chapter upon the Treatment of Metritis (page 182). According to the case, one may choose one or the other process described. If the cervix is thick and fleshy, the biconical excision is to be preferred. If the mucous membrane has undergone profound alteration, the single flap operation of Schröder is the better. I have sometimes combined the two methods where the cervix was conical, taking a wedge-shaped piece from the anterior lip, but paring only one surface on the posterior lip. Whatever method be adopted, the result aimed at is the formation of a transverse opening of ample size, with the mucous membrane lining it to the very edge in such a way that it will not contract after the operation.

I have for some time preferred to treat conical cervices by a new operation to which I have given the name of commissural excision of the cervix.

The cervix is first divided laterally, so as to form two long flaps, one anterior, the other posterior. By separating these, nearly the whole cervical cavity is exposed and the mucous membrane is seen divided into halves corresponding to the flaps, and on each side of this mucosa is a raw surface extending from above downward (Fig. 346, 1, 2, 3, 4). From each of these long, narrow surfaces a long wedge-shaped piece of tissue is excised, by means of two longitudinal incisions, starting from the ends of a transverse incision parallel to the angle of junction of the two flaps, and terminating together at the divided external os. One longitudinal incision is parallel to the cervical mucous membrane, the other follows the course of the vaginal mucosa of the cervix (Fig. 346, 2), and the two extend into the substance of that organ, meeting each other (Fig. 346, 3) in such a manner as to remove a triangular pyramidal portion (Fig. 346, 3″). When the wedge-

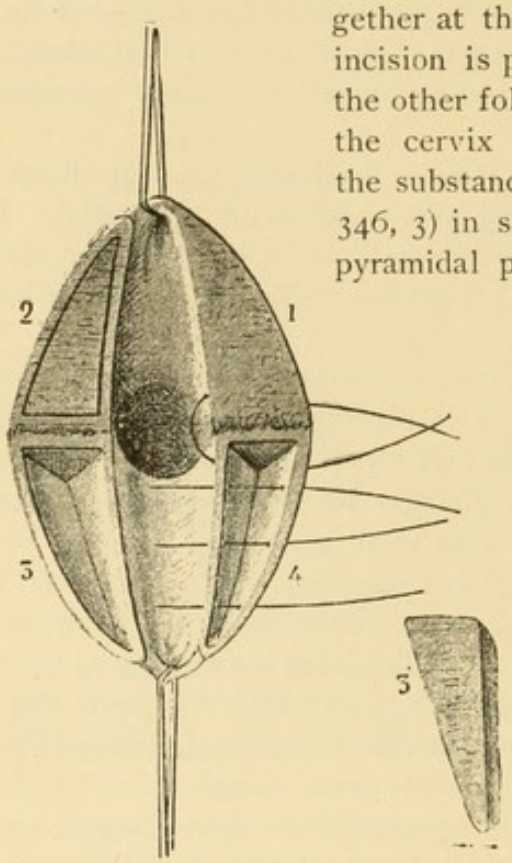


Fig. 346.—Commissural Excision of the Cervix.—1, Cut surface after incision; 2, line of excision; 3, prismatic section removed.

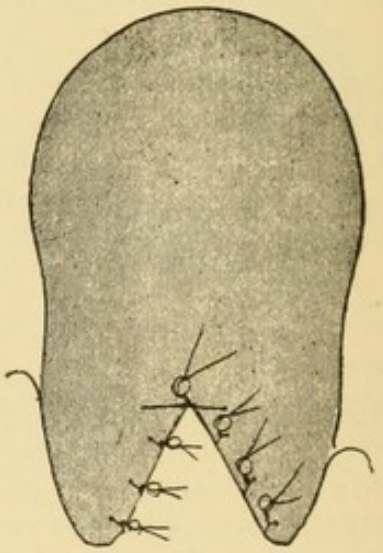


Fig. 347.—Diagram Showing the Immediate Result of the Operation.

shaped fragments have been removed, a groove with flattened sides is left in each of the original raw surfaces. The borders of each groove are sutured together transversely from the angle of junction of the two flaps to the divided external os (Fig. 346, 4). Silver wire is employed and each suture is shotted after being tied (Fig. 347). The internal or intra-cervical mucous membrane is thus united to the external or vaginal mucosa of the cervix, perfect apposition is secured, and there is no subsequent tendency to union of the original raw surfaces. The immediate result is to form an elliptical external opening for the cervical canal, the lips of the cervix resembling a duck's bill (Fig. 347); but later, by gradual retraction, the orifice is represented by a horizontal line bounded by rectilinear lips.

This operation has always given excellent results. One of my patients

who had been sterile and suffered with dysmenorrhœa for four years of married life, became pregnant four months after the operation. Another, who had been married, but sterile, ten years, became pregnant one and one-half years after this treatment. The dysmenorrhea had entirely disappeared. Both women had normal labors.

Congenital Atrophy of the Cervix and Uterus.

There is a so-called congenital atrophy to which it would be better to apply the term congenital predisposition to atrophy, for after birth the uterus may experience a general retardation of growth which cannot properly be called an arrest of development like that which occurs in prenatal life—an arrest which would produce a malformation either by the excess or absence of some portion of the organ—this general retardation resulting in an adult uterus of infantile proportions but unaltered in its type. The whole organ is small and its walls thin, but the relative proportions of body and cervix are normal, thus differing from the fœtal uterus. This type Puech calls a uterus pubescens, to show that it preserves the proportions found at puberty. Virchow calls it hypoplasia of the uterus. As a usual thing, it is accompanied by atrophy of the other internal and external organs of generation. According to Puech, the uterus pubescens weighs about 405 grains instead of 675.

This infantile condition of the genital organs is often accompanied in the female (as in the male) by a general lack of development, a young woman of twenty years and more having the appearance of a child who has not yet reached puberty. In other cases the atrophy is limited to the sexual apparatus, and there are no external signs of it visible except a narrowness of the pelvis. There is, in fact, with rare exceptions, an intimate relation between this part of the bony framework and the internal genital organs. Atrophy is to be attributed to a congenital predisposition of unknown origin. It has been supposed to be due to chlorosis or tuberculosis, but it seems to me that cause and effect have been reversed, the woman with this malformation possessing a defective nervous system and general innutrition because of the genital lesion.

Symptoms and Diagnosis.—Complete or partial amenorrhœa is the first thing noticed by the patient. The menses may fail to appear and the patient be sexless from a physiological standpoint. If they do appear, they are usually accompanied by dysmenorrhœa and serious nervous symptoms. Some of the patients inherit a defective nervous system, and belong to the neurotic class called *dégénérés* by the alienists; they possess a feeble intellect, and have hysterical or epileptic seizures. This is not, however, a general rule, for another class of patients with a uterus pubescens have a vigorous constitution in every other respect. Local examination reveals a small cervix with a narrow os; bimanual palpation, rectal touch, the passage of the

sound, all show atrophy of the uterus itself; the external genitals are usually incompletely developed; the vagina is shorter than usual. The normal proportion of the cervix in uterus pubescens distinguishes it from the fœtal or infantile uterus * where the cervix is large and the body atrophied.

Treatment should be at first directed to the general condition. Tonics, nourishment, hydrotherapy, sea air, all tend to improve the health and favor development. As to local treatment, there is scarcely any of value. It has been suggested that pessaries with galvanic stems of iron and copper might induce feeble electric currents and act as local stimulants, but this method is not without difficulties and dangers, and a good result is by no means certain. It would be far more rational to apply electricity directly, using a continuous current. Symptomatic treatment should be directed to the dysmenorrhœa. If this be very severe and the nervous symptoms marked, it would be reasonable to suppose that the development of the ovaries was out of proportion to that of the uterus; if an examination under chloroform established this fact, ovariotomy might be indicated.

Acquired Atrophy, or Superinvolution of the Cervix and Body of the Uterus.

Pathological Anatomy and Etiology.—Normally, the termination of sexual functions in the female is marked by a shrinking in size of the uterus, which is progressive, so that in aged women the uterus is extremely small, unless, as frequently occurs, it contain a fibroid body.

Senile atrophy affects both body and cervix, the latter being often only a shapeless stump, or even disappearing entirely with the exception of the os, which is seen at the end of the vagina. This occurs most often in women who have borne many children. Atrophy sometimes begins before the menopause, after a labor which seems suddenly to exhaust the vitality of the uterus, the normal involution being carried beyond physiological limits. James Simpson estimates the occurrence of this atrophy at about 1.5 per cent, and Frommel at one per cent. But these superinvolutions are sometimes only temporary in duration. Frommel considers prolonged lactation as one of the principal causes of atrophy. Profuse hemorrhages during labor seem to exert a predisposing influence, as do all debilitating diseases—tuberculosis, chlorosis, syphilis, diabetes, Bright's disease, morphinism, Basedow's disease, etc. Diseases of the genital organs, as prolonged endometritis, and oöphoro-salpingitis, often terminate by atrophy.

Pelvic peritonitis during the puerperal period, or rather the septic perioöphoro-salpingitis which sometimes follows labor or abortion, may, by causing sclerosis of the ovary, bring on a premature menopause and superinvolu-

* This second term must not be misunderstood. It is derived from *infans*, and means properly a fœtus at term. The name *puerile* or *childish* might be applied to the uterus pubescens, indicating that it is analogous to that of a child (before puberty).

tion. Finally, I have noted that the diminution in volume of the body of the uterus, which Braun observed to follow amputation of the cervix, may go on to atrophy of the uterus. In an old woman upon whom four years ago I performed a conoidal amputation of the cervix, according to Huguier's method, for prolapsus, the uterus had become reduced to the size of a walnut. In the case of a young woman in whom I excised a portion of the cervical mucous membrane for severe endometritis, the uterus was for a time greatly diminished in size, but finally returned to its normal condition.

[Hardon has noted nine cases and Hawkins two in which superinvolution occurred after the closure of a lacerated cervix by Emmet's operation. In eight of these eleven cases which were treated by intra-uterine faradization the menses returned, while in three which received no treatment the condition persisted.]

Removal of the ovaries is a cause of uterine atrophy, and some authorities have not hesitated to perform an ovariotomy for the cure of persistent, painful endometritis.

In senile atrophy, the uterine tissue is sclerotic; in post-puerperal superinvolution it may be soft and friable from incomplete absorption of the fatty substances produced by the disintegration of the muscular fibres.

Symptoms and Diagnosis.—The cessation of the menses and the diminution in volume of the cervix and body of the uterus, as proved by the various methods of exploration, establish the diagnosis. The greatest caution should be exercised in the use of the sound in post-puerperal atrophy, as the walls may be thinned. In cases of senile atrophy, the sound can penetrate only to the depth of about two to two and a quarter inches, while in puerperal superinvolution the cavity is usually normal, but may seem to be deepened from the yielding nature of the uterine tissues.

Prognosis and Treatment.—This post-puerperal superinvolution may be only temporary in its nature; and the observation of many cases has gone to prove that fecundation and pregnancy may afterward take place. A return of the functional activity of the uterus should be aided by general tonics, hydrotherapy, salt baths, the intra-uterine application of electricity, and local stimulation produced by hot injections and the often-repeated passing of the sound into the uterine cavity. I prefer these methods to the use of a galvanic or elastic stem pessary, which seem to me to play the harmful part of a foreign body rather than to benefit.

Hypertrophy of the Supra-vaginal Portion of the Cervix.

Hypertrophy may affect the supra- or the intra-vaginal portion of the cervix. I have already described the first lesion under the head of Prolapse of the Genital Organs, which it so frequently accompanies. Polaillon records a case in which both the supra-vaginal portion of the cervix and the body of the uterus had undergone a gigantic hypertrophy; the uterus, which was not altered in shape and in which there was no tumor, filled the whole ab-

domen. The patient was thirty years old; etiology unknown; symptoms of endometritis present. Polaillon advised injections of ergotin into the substance of the uterus, the continuous electric current, and, as a last resort, ovariotomy. These exceptional cases of a gigantic uterus could not be mistaken for hypertrophy of the supra-vaginal portion of the cervix. The hypertrophy following upon the presence of fibrous body or "*grossesse fibreuse*" could also be easily recognized by the special symptoms caused. The only symptom common to all of these conditions is the unwonted depth to which the sound may be carried.

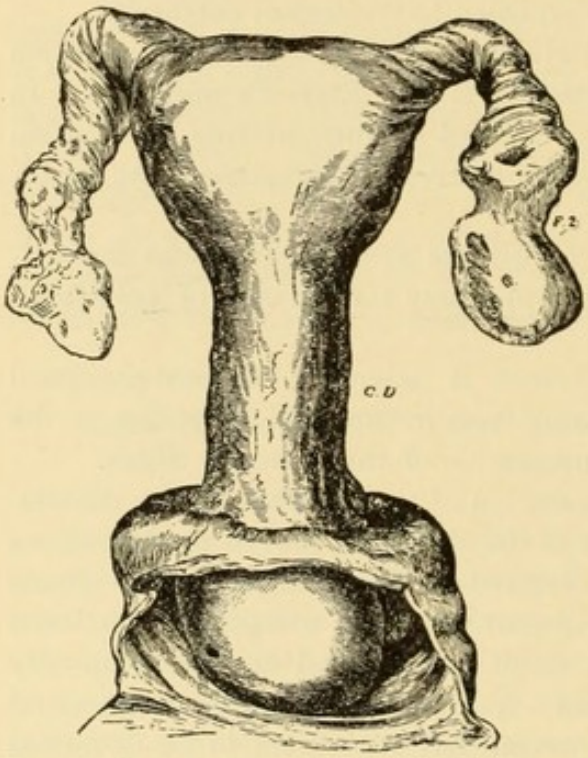


FIG. 348.—HYPERTROPHY OF THE SUPRA-VAGINAL PORTION OF THE CERVIX.

Hypertrophy of the Intra-vaginal Portion of the Cervix.

Etiology and Pathological Anatomy.—I shall not dwell upon acquired hypertrophy, following endometritis, having already fully described it (page 126). I would simply recall the fact that there are two varieties: Follicular hypertrophy, which especially affects the mucous membrane, which is filled with newly formed glands that have undergone cystic degeneration; and sclero-cystic hypertrophy, where the substance of the cervix is distended by the production of connective tissue and small cysts or glands of Naboth.

The first of these varieties is fungoid and soft to the touch; the second nodulated (tubereuse) and firm. They both often give the cervix the appearance of a club or of a bell-clapper (Figs. 349 and 350). Very different in form and structure are the congenital and developmental hypertrophies which appear at puberty and subsequently progress more or less. In this case the change of size is not due to inflammation. The whole structure of the uterus seems to undergo hyperplasia simultaneously, without deviation from the normal type; the mucous membrane is in a healthy condition. The cervix is elongated, conoid or cylindrical in shape, sometimes like a tapir's snout because of the prominence of the anterior lip. It may fill the vagina and project from the vulva, leading the patient to suppose that there is uterine prolapse. Stenosis of the external os frequently accompanies this affection, as I have already stated (Fig. 340).

Symptoms and Diagnosis.—Dysmenorrhœa often precedes the appearance of the cervix at the vulva; in young girls this is what usually first calls at-

tention to the affection. Married women suffer from dyspareunia. If the hypertrophy is not very marked, the male organ pushes it to the front, and forms a species of false vaginal passage by depressing the posterior cul-de-sac, which is found to be of increased depth. Pain, leucorrhœa, and metrorrhagia complete the group of uterine symptoms. The vaginal touch and use of the speculum will reveal the nature of the tumor; the location of the fundus in its normal position will prevent a diagnosis of prolapsus or inversion; the connection of the cervix with the body of the uterus, and the perception of the external orifice, will exclude a polypus. Careful bimanual palpation,

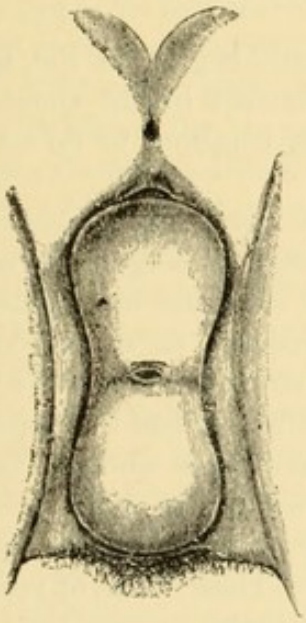


FIG. 349.—HYPERTROPHY OF THE INTRA-VAGINAL WITH ELONGATION OF THE SUPRA-VAGINAL PORTION OF THE CERVIX.

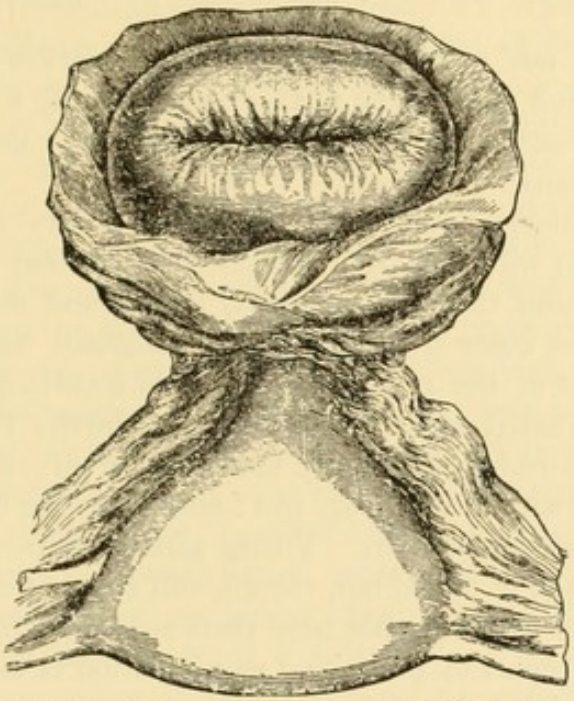


FIG. 350.—HYPERTROPHY OF THE INTRA VAGINAL CERVIX WITH A DEEP BILATERAL LACERATION.

and the use of the sound, will show whether there be also any hypertrophy of the supra-vaginal portion of the cervix.

Prognosis and Treatment.—There is no tendency to retrogression. Operative procedures alone will remove this source of continual pain and discomfort.

Biconical amputation of the cervix is the best of all operations (page 182). If hemorrhage be feared, or if the operator be not sufficiently experienced to perform the operation rapidly, temporary hæmostasis may be secured by tying an elastic cord above a strong needle which is thrust through the cervix just below the vaginal attachment and which will prevent the cord from slipping. This manœuvre is rendered very easy of accomplishment by the use of my elastic-ligature carrier.

After amputation of the intra-vaginal portion of the cervix, the supra-vaginal portion, if hypertrophied, may undergo a retrogressive process and become normal in size.

CHAPTER XXII.

DISORDERS OF MENSTRUATION.

Precocious and Protracted Menstruation.

In our temperate climate, menstruation usually begins in the fifteenth year, and ends in the forty-seventh, giving a menstrual life of about thirty-two years. Those who menstruate early usually continue to do so longer than usual.

Puberty occasionally occurs at a very early age. The pubes become covered with hair, the breasts and external genitals undergo rapid development, and the menses finally appear and either continue with great regularity or cease in a few years. Campbell has recorded an excessive development of the generative organs in a child of four years, who had regularly menstruated every three weeks since birth; Prochownick had the opportunity of performing an autopsy upon a little girl of three years who had begun to menstruate at one year, and found upon the ovaries all the signs of both old and recent ovulation. Young girls have become pregnant at the incredibly early age of eight, ten, eleven, and twelve years. These cases of precocious puberty in the female have their analogues in the male.

A report of protracted menstruation is to be received with some reservation. Women not far from the menopause are apt to consider any intermittent or irregular hemorrhage as a continuation of the menses, especially if the interval between them and the last period has not been long.

The flow, however, may be caused by some uterine affection whose existence had not been suspected, as endometritis, mucous polypi, fibromata, and especially cancer. It is true, however, that some indisputably authentic cases have been reported of menstruation lasting until the fifty-sixth or fifty-seventh year.

Amenorrhœa.

By amenorrhœa we mean the absence of menstruation, and not simply the lack of a periodical discharge through the genital tract. Menstruation may in fact exist, but in a latent form, as in the case of retention of the menstrual flow from atresia, etc. We must carefully distinguish between these two classes of cases. In the second, the amenorrhœa which might appropriately be called obstructive, is merely a secondary symptom; it is considered in the chapter upon Malformations of the Genital Organs.

Primary or permanent amenorrhœa is the term used where menstruation

has never occurred; it has also been called emansio mensium. The amenorrhœa which is called transitory or secondary, or accidental, has been called suppressio mensium.

Pathology and Etiology.—The female organism between puberty and the menopause may be said to live simultaneously two lives—that of the individual, and that of the species; that of the organs in general, and that of the generative apparatus in particular. This dual existence, whose physiological and psychological effects are so important, may be interrupted by the influence of sickness, as it is by that of age. Amenorrhœa is simply the absence or suspension of sexual life, produced either by organic impotence or by a profound disturbance of the general nutrition of the individual. We must look at the matter from this point of view in order to fully understand the unexpected and excessive disorders caused by the disturbance of this equilibrium. The sexual apparatus is not, so to speak, an accessory wheel in the female mechanism: it is, on the contrary, the chief wheel, and it is to secure its proper action that constant economies and reserves are made by nature. The whole economy of nutritive receipts and expenditures bears directly upon the fact that a woman is, according to nature's plan, liable at any time to conception. The Hindoos, not without some show of reason, consider all menstruation which has not been preceded by intercourse to be infanticide; hence young girls are married just before puberty, to prevent their committing the crime even once. We might say, with paradoxical conciseness, that a woman's normal condition is pregnancy or lactation. During these periods menstruation ceases; it returns only when the excess of nutritive material is no longer required for these purposes. Menstruation may then be considered a safety-valve; its absence indicates a lowering of nutrition, when it is not the normal result of the utilization of the nutritive materials for the reproduction of the species.

There are no well-authenticated exceptions to the general rule that menstruation is suspended during pregnancy; there are many exceptions, however, for the period of lactation, but the milk is usually more or less altered in quality during the menstrual flow.

The conditions necessary to a normal and regular menstruation may be enumerated as follows:

a. Integrity of the genital apparatus.

b. Normal condition of the blood.

c. Normal state of the nervous system.

Any disturbing influence originating in one of these systems may prevent the maturing of the ovum, or disturb ovulation, or, by an inhibitory influence upon the sympathetic or vasomotor nerves, interfere with the intense congestion which is the necessary precursor of the menstrual flow. Anything impairing the integrity of the ovaries—cysts, sclerosis, periovaritis—acts directly upon the starting-point of the reflex action, and at a sufficiently advanced state may abolish it entirely. It is, however, more usual

for these injurious agents, which have not completely destroyed the organ, to play the opposite part of excitants, and produce menorrhagia with dysmenorrhœa, instead of amenorrhœa.

Does removal of both ovaries absolutely cause a cessation of menstruation? This question, the answer to which at one time seemed positive, has of late been asked by surgeons after a vast number of experiments whose results were contradictory. In considering the matter one great distinction must be observed. The same importance should not be given to cases in which cystic or papillary tumors have been removed, as to those in which ovariotomy is performed for slight changes, as sclero-cystic degeneration, which have modified but little the size and connections of the organ, or even when it is performed upon perfectly healthy ovaries (Battey's operation). Cases of the first class should be carefully inquired into, for in the case of a large tumor it is often impossible to affirm positively that a small fragment of ovarian tissue has not been left in the pedicle, and that would in itself be quite sufficient to allow of the continuation of menstruation. There remain a large number of well-authenticated cases belonging to the second class, in which, in spite of a double ovariotomy, menstruation continues with more or less regularity. But if the cases are attentively followed for any length of time, it will be found that this *posthumous* menstruation, so to speak, invariably ceases after a few months. It is quite unnecessary to suppose the existence of a supplementary ovary: the well-known law of the persistence of habit will sufficiently account for the phenomenon. The nervous system automatically reproduces congestion of the generative apparatus. The process seems to continue from its own momentum for a while, and finally becomes slowed and ceases because of the lack of further impulse. Another factor which may cause the temporary prolongation of the menstrual molimen is the existence of any impairment of the mucous membrane or substance of the uterus, such as always remains after the performance of ovariotomy for a fibroid tumor, and is apt to be present after removal of the appendages for obstinate cases of oöphoro-salpingitis. Therefore I consider it essential in such cases to follow the principal operation by a complementary curetting of the uterus. Czempin attaches some value, as a factor in the process, to the passive congestion due to the compression of veins by the cicatricial tissue resulting from the operation. The amenorrhœa following ovariotomy is accompanied by certain general physical changes: an increase of embonpoint, atrophy of the mammary glands, and sometimes a marked change in the disposition, which often becomes more placid. Removal of the Fallopian tubes alone does not seem to influence menstruation, providing that the ovaries be healthy, which fact upsets Lawson Tait's theory of the paramount influence of these organs upon this function.

Primary amenorrhœa may be due to malnutrition, which causes a delay in general development. Over-stimulation of the intellectual faculties, with too little physical exercise, a condition of things found in certain convents

and schools, may cause amenorrhœa as well as chlorosis. Weakly young girls with a strumous taint are especially predisposed to it. On the other hand, the change of regimen, the rapid substitution of an abundant and stimulating diet, and the absence of their accustomed exercise in the open air in young girls who are transplanted from a country to a city home, while causing sudden plethora, often causes a delay in the appearance of the menses.

Secondary amenorrhœa may follow impoverishment of the blood, and the profound debility resulting from a chronic disease or following an acute illness. Anæmia, chlorosis, Bright's disease, diabetes, alcoholism, morphinism, cancerous or malarial cachexia, pulmonary tuberculosis, convalescence from fevers, are all potent in producing amenorrhœa; acute or chronic surgical affections may act in the same way. These facts, which have recently elicited much study, were observed and commented on by Dupuytren. It is to the profound anæmia accompanying the onset of the diathesis to which we must attribute the amenorrhœa of syphilitic women upon which A. Fournier lays such stress, and that of young women who are the victims of obesity, often a most debilitating dystrophia. The condition of the nervous system has a decided influence upon the production of amenorrhœa. Fright may cause a temporary suspension of the menses. On the other hand, there are cases on record in which amenorrhœa has been cured by some sudden emotion. The amenorrhœa of prisoners and of insane women confined to asylums is due as much to the mental depression as to the anæmia consequent upon seclusion. Chlorosis, which causes amenorrhœa, seems to be a disease of the nervous system. Absence of menstruation is often noted in the hysterical. Sudden chilling, which is often given as a cause of amenorrhœa, probably acts through the vasomotor tract. The emotional amenorrhœa of the newly married, or of women who are very desirous of having children, is probably to be referred to the inhibitory power of the nervous system; its occurrence simultaneously with tympanites has often been the cause of bitter disappointment. Anxiety may induce amenorrhœa in women who, because of the irregularity of their lives or from some other reason, dread pregnancy (Raciborski). I have seen several instances of this. The last two forms may be due in part to auto-suggestion. Atrophy of the uterus from superinvolution after repeated pregnancies, prolonged lactation, etc., causes amenorrhœa.

Symptoms.—The chief sign is of course the absence of the periodical flow through the genital tract. But we should not overlook the accompanying nervous symptoms, which may be very serious, and which occur in the form of chlorosis or of hysteria. Sensory disturbances, such as impairment of vision and of hearing, and paraplegia, seem to depend as much upon anæmia as upon hysteria.

Amenorrhœa is some patients is accompained by the cutaneous eruptions which in other women occur during menstruation—acne, eczema, herpes,

urticaria, pemphigus, erysipelas. Hyperidrosis and a swelling of the hands and feet have been known to occur, doubtless from angio-neuroses.

These curious facts lead naturally to the study of vicarious menstruation, as they demonstrate the harmony existing between different parts of the organism, and the possibilities of an interchange of function between the external integument and the uterine mucous membrane. Science has on record some curious examples of what may be called substituted secretions. Jones reports the case of a young woman in whom menstruation was checked apparently from sudden chilling, who then suffered from amenorrhœa, and for five years had, instead of the menstrual flow, an abundant flow of milk from the breasts, which lasted thirty-six hours. In another woman, who had borne several children, the catamenial period was characterized by a profuse diarrhœa for three days, accompanied by leucorrhœa, with a subsequent scanty discharge of blood. He also mentions a case in which periodical leucorrhœa replaced the normal flow.

Vicarious or ectopic menstruation is met with in the most extraordinary and unexpected forms. The discharge most frequently occurs from the bronchial or pulmonary mucous membrane, the patient having hæmoptyses, which may lead to a diagnosis of incipient phthisis. Hæmatemesis has been observed, and epistaxis, rectal hemorrhages, especially in plethoric patients with hemorrhoids—and otorrhagia—either where a pre-existing purulent otorrhœa had made this portion of the frame a *locus minoris resistentiæ*, or when the tympanum was intact. Of rarer occurrence are cutaneous hemorrhages in the form of ecchymoses and petechial spots, or a flow of blood from the surface of some one special point where the skin is unbroken or from the surface of an ulcer. In the hospital of Saint-Louis I saw a patient, suffering from lupus of the face, who had an abundant flow of blood in this situation at each menstrual period.

Treatment.—It is a mistake to suppose that amenorrhœa calls for special medication supposed to have an elective action upon the uterine mucous membrane. Emmenagogues—rue, savine, saffron, apiol—are of use only in a few limited cases, in which some decided influence (as cold or violent emotion) has caused a suspension of the menses, and should be administered with moderation at the time the flow is expected. The same may be said of hot baths (104° to 113° F.). Drastic and saline purgatives may then be given for the purpose of causing a certain amount of pelvic congestion. Of late, permanganate of potash has been recommended as almost a specific. As a rule, we should try to reach the cause of the disease, and, amenorrhœa depending usually upon poverty of the blood or upon some nervous trouble, we must have recourse to nutrition, tonics, and alteratives, especially iron or manganese or hydrotherapy. I depend much more upon this general treatment than upon such measures as scarification of the cervix, application of a galvanic pessary, etc. Electricity (faradic or continuous) may give good results, and should not be omitted. Bigelow recommends static electricity

(franklinization) for the amenorrhœa of chloro-anæmic girls, as a general tonic. In the intermittent form of amenorrhœa found in plethoric patients we may use the continuous current, placing the positive pole in the uterine cavity. In the unmarried, one electrode may be placed upon the lumbar region, and the other externally over the site of the uterus; in the married it is better to place one electrode in the uterus and the other on the hypogastrium. Bigelow also advocates general electricity for amenorrhœa, one electrode being placed on the back of the neck, and the other in a foot-bath of salt water. He finds this particularly useful in the case of young girls who are irritable, nervous, and chlorotic. The treatment should be started a few days before the period is due, and be taken daily until that time. Physical exercise, walks in the open air, gymnastics, sea or mountain air, amusements, and distraction from all anxiety are to be prescribed as well.

Where amenorrhœa occurs in young women who are obese or threatened with obesity, I have often caused a return of the menses by treating the obesity, prescribing a diet free from fluids and starchy foods, exercise, thermal baths (Brides, Saliès de Bearn), and finally by stimulation of the uterine mucous membrane by curetting, followed by iodine injections at the date that menstruation should occur.

In women in whom amenorrhœa follows an ovariotomy, it is not unusual in the first few months to observe periodical disturbances [practically identical with those which occur at the physiological menopause]—lumbar pains, flashes of heat, vertigo, and a special form of irritability; in short, a molimen which is all the more painful because it is longer in duration than the normal crisis. In these cases I have obtained good results from scarifying the cervix and obtaining a slight local bleeding every month at the time of the disturbance. I also use saline purgatives. One of my patients came to me regularly for a year to obtain the relief afforded by this treatment. In the end these phenomena disappear spontaneously.

Menorrhagia.

A notable increase in the menstrual flow constitutes menorrhagia; a discharge of blood in the interval between the periods is called metrorrhagia.

Symptoms.—A profuse and prolonged flow, the formation of clots, and general debility are the symptoms of what is not in itself a disease, but a symptom of several diseases.

Etiology and Pathology.—The cause may be general or local.

1. General causes act by altering the composition of the blood; to this class belong the various dyscrasiæ, hæmophilia, purpura, scorbutus, severe icterus, phosphorus poisoning, Bright's disease, Werlhof's disease, obesity, and cachexia. Sometimes in these cases amenorrhœa alternates with menorrhagia. Finally, uterine epistaxis (Gubler) may mark the onset of fevers.

2. The local causes are:

A. *Reflex stimulus* from the genital organs (especially the appendages)

without any existing lesion, simply from nervous derangement, as at puberty, first intercourse, or the menopause. We must include in this class the metrorrhagia caused by lactation, which is no doubt due to reflex stimulation from the mammary glands.

B. Nearly every disease of the uterus and its appendages; endometritis, fibromata, cancer, ovarian tumors, especially those situated near the uterus, as intra-ligamentous cysts, and affections of the Fallopian tubes. As in this chapter I do not pretend to do more than outline the diseases causing menorrhagia, I shall content myself with this enumeration, without going into descriptive details; each affection will be found described at length under its appropriate heading.

Treatment.—Unless this symptom threaten serious danger it need not be treated by itself, but the cause should always be sought for. A mere mention of the hæmostatic measures at our command will suffice. The local means are: prolonged irrigations of very hot water (110° to 120° F.) and tamponade of the vagina. Emmet was the first to use temporary suture of the cervix, which may be done if all other measures fail. I have seen Martin ligate *en masse* the inferior branches of the uterine artery through the vaginal culs-de-sac (page 95), with successful result.

General measures are to be simultaneously employed; rest in bed, with sight elevation of the pelvis; opium in the form of laudanum; rectal injections; ergot, by the stomach and hypodermatically. Gallard places a high value upon the infusion of digitalis leaves given to the point of toxic effect.

[In many cases fluid extract of hydrastis, given in half-drachm to drachm doses every four hours during the time of the flow, and in twenty-drop doses before meals in the intervals, is very efficient.

All of these measures are only palliative and of very slight importance compared with the treatment of the causal factor of the bleeding.]

If menorrhagia becomes threateningly severe, would it be justifiable, in the absence of an exact diagnosis, to perform a radical operation? Vaginal hysterectomy has in some cases seemed justifiable for a hemorrhagic endometritis which resisted all other treatment (page 187). Some operators have performed ovariotomy.

Olshausen mentions the case of a woman of thirty-nine years who suffered from such severe menorrhagia, with no discoverable cause, that he performed an ovariotomy, with the greatest success. Yet we should beware of creating a therapeutic law out of such exceptional cases, and Walton has quite justly protested against the over zeal for operation of some surgeons.

Dysmenorrhœa and Menstrual Disorders of Nervous Origin.

At the menstrual period, women normally feel unwell, as they express it; that is to say, they experience a general malaise, a few vague pains in the loins, and a certain irritability of temper. These symptoms are, however,

not at all pronounced. If menstruation becomes painful it is called dysmenorrhœa, which has been divided and subdivided into: (1st) Neuralgic or sympathetic dysmenorrhœa; (2d) congestive or inflammatory; (3d) mechanical or obstructive; (4th) membranous; (5th) ovarian. This classification may be simplified by grouping the pains under two heads, according to whether they occur during the ovarian-tubal period (ripening of the follicle) or during the uterine period (expulsion of the menstrual blood).

Dysmenorrhœa of Ovarian Origin.

This may be the result of incomplete development of the genital organs, the ovaries and uterus being of the pubescent variety; or this may be the case with the uterus alone, the ovaries having attained an adult development. A want of regularity in the function of menstruation will of course result from the difficulty of ovulation, or from the disproportion existing between the intensity of the congestive phenomena in the ovaries and that in the uterus; which produces an exaggerated erethism in the ovaries, with consequent suffering.

Disease of the appendages is another frequent cause. I do not refer to acute inflammations only, or to serious affections, as salpingitis, hydro-, hæmato-, and pyo-salpinx. But the remains of old lesions (often limited in extent), adhesions, false membranes compressing the uterine appendages or binding them down in an abnormal position (producing sclerosis of the ovaries and obstruction of the tubes), are the frequent but unrecognized cause of intense pain at the menstrual period. Tubo-ovarian varicocele (Richet), or varicose dilatation of the pampiniform plexus and the veins of the broad ligament, seems to have some causative influence; a varicose condition is, moreover, usually accompanied by chronic ovaritis and ovarian atrophy, just as, in the male, it may be followed by atrophy of the testicle.

Dysmenorrhœa of Uterine Origin.

The principal factor is the existence of any mechanical obstacle to the expulsion of the blood; stenosis of the cervix with or without hypertrophy; displacements of the uterus, especially flexions; endometritis (causing swelling of the mucous membrane, and salpingitis); the various forms of tumors, fibroids, mucous polypi, cancers, etc. I have described, under the head of acute endometritis, the special form which is accompanied by complete desquamation of the mucous membrane, and which many authorities have described as a separate disease, membranous dysmenorrhœa.

Can we recognize a dysmenorrhœa due to the rheumatic or gouty diathesis? I think not, and that we are only justified in saying that patients suffering from these complaints are liable to every form of neuralgia.

Symptoms and Diagnosis.—The pain of dysmenorrhœa differs widely ac-

cording to its origin. At the onset of menstruation the ovarian pains predominate; the uterine pains are the most pronounced when the flow becomes fully established.

Inter-menstrual Dysmenorrhœa (Mittelschmerz of the German authorities), is erroneously so called. The name has been applied to spasmodic pains in the ovarian region, occurring in the intervals between the menses, and hypothetically attributed to ovulation. These are really symptoms of inflammation of the uterus or the appendages.

I have already described the character of dysmenorrhœal pain, and shall not here dwell upon it at length.

As a rule, the pain makes its appearance with the flow, and is especially severe on the first two days. Sometimes, even when there is no mechanical obstacle and no narrowing of the cervical canal, the blood is discharged drop by drop (like the urine in strangury), a phenomenon which Aëtius called stillicidium uteri. Small clots indicate a stagnation of blood in the uterine cavity, and their expulsion may cause spasms of colicky pain so intense as to produce hysterical attacks and even syncope.

The menstrual period may for a long time be a period of actual relief to the patient, and then become exceedingly painful; this is specially noted in cases in which salpingitis passes from the acute to the chronic state.

The differential diagnosis consists in distinguishing dysmenorrhœa from lumbo-abdominal neuralgia, which is increased at the menstrual period; the coexistence of neuralgia in other localities and the identification of Valleix's painful points will facilitate the diagnosis. To determine whether the pain is of ovarian or uterine origin, a careful study of local conditions will be necessary. The phenomena preceding menstruation will assist us in forming an opinion. This question of diagnosis occurs in regard to the various uterine diseases of which I have spoken.

I would call especial attention to the dysmenorrhœa and the grave reflex phenomena which may be produced by prolapse of the ovary. By vaginal or rectal touch we shall be able to find a tumor in the pouch of Douglas, pressure upon which causes a peculiar and characteristic nauseating pain. Two accompanying symptoms are, pain during defecation and coition, dyschezia and dyspareunia.

Battey, and many other gynæcologists following his teachings, especially in America, attach much importance to the coexistence of menstrual disorders, amenorrhœa and dysmenorrhœa, with grave nervous disorders, hysteria, epilepsy, mania; they have even created the terms oöphoralgia, oöphoro-epilepsy, oöphoro-mania. Beyond doubt, many of these affections are of reflex origin, and proceed from undeveloped or diseased ovaries. But an exact diagnosis is difficult to reach, and the surgeon should be more guarded in his opinions than many have been on the other side of the Atlantic. There are a few clearly defined cases in which the preponderating influence of the menstrual epoch is recognized beyond question, and the congested ovary is the

cause of the aura of epilepsy for instance; there are many more in which the menstrual disorders merely coincide, without being causative.

As palliative treatment for the pain, we may use potassium bromide, chloral, valerianate of ammonia, asafœtida, musk, tincture of cannabis indica, belladonna, and hyoscyamus. Antipyrine hypodermatically injected is a valuable resource; intense spasms of pain may be relieved by the careful administration of a few whiffs of ether. Oxalate of cerium has been extolled. Wylie praises electricity; he inserts the positive pole in the cervix.

Laudanum and valerian douches often afford relief when all other remedies fail. General treatment will attempt to reach the anæmic or nervous condition of the patient.

[Routh, in an excellent *résumé* of the subject, writes: "Successful treatment depends upon finding and removing the cause. As a rule it is irrational to mask the symptom of pain by giving opiates, though during a severe paroxysm it may be necessary; but even then we should add atropine, belladonna, or hyoscyamus, to relax muscular spasm, to avert constipation, and to enable us to use smaller doses of the opiate. The main objection to opium, chloral, or alcohol is that their repetition tends to their abuse. Nitroglycerin and amyl nitrite are excellent for spasmodic cases. The bromides are indicated in those cases in which the dysmenorrhœa is supposedly ovarian. Cannabis indica is valuable when menorrhagia coexists. A favorite prescription, both in congestive and spasmodic dysmenorrhœa, is:

℞ Tr. cardamomi comp.,	ʒ ss.	2.0	gm.
Spir. chloroformi,	♏ xx.	1.3	"
Liq. ammonii acetat.,	ℨ ss.	15.5	"
Tr. belladonnæ	♏ x.	0.65	"
Aq. cinnamomi, q. s. ad	ʒ i.	31.	"

M. Sig. For one dose.

I have found the tincture of pulsatilla, given for some days before the period in five-drop doses three times daily, quite efficient in the neuralgic form common in young women. In congestive dysmenorrhœa saline laxatives, hot sitz-baths, and fifteen to twenty grain doses of phenacetin every six to eight hours are effectual. For obstructive dysmenorrhœa thorough dilatation of the uterine canal gives the best results. All internal medication is uncertain.]

No general rule can be given about curative treatment, which will vary according to the cause of the dysmenorrhœa. The initial lesion, whether it be in the uterus or the appendages, is the one to be treated. Where there is doubt about the existence of this lesion, or where the trouble is functional and its origin not well determined, the therapeusis is difficult. In many cases in which the trouble is due to a delay in the perfect development of the internal genital organs, with or without cervical stenosis, it will often disappear spontaneously with age, marriage, and conception. In some cases, however, the ovaries and uterus whose functions are unequally performed do

not become restored to a normal condition; in other cases, acquired lesions (adhesions, displacements) permanently impair the functional powers of the ovary. The periodical pain becomes unbearable and the general health deteriorates. Moreover, it has been supposed that grave nervous disorders, epilepsy and mania, were of reflex origin, due to the dysmenorrhœa; it is in these cases that removal of healthy ovaries has been performed in order to stop the pain by abolishing the function which caused it. The special indication for oöphorectomy, castration, or normal ovariotomy (a term signifying that the ovary is of normal size), was first pointed out by Battey in America, then by Hegar in Germany, and Lawson Tait in England. According to Battey, whose name the operation bears, the surgeon, before performing an ovariotomy in such cases, should ask himself: 1st. Is the case a serious one? 2d. Is it curable by any other medical or surgical means? 3d. Can it be cured by the menopause?

The last question is, in truth, the all-important one. Ovarian pain in itself is not enough to prove that the ovary is the starting-point of the trouble: there is an ovarian congestion accompanying hysteria; moreover, neuralgic pains of central origin may radiate centrifugally. Sound teeth are frequently rendered sensitive by neuralgia of the trigeminal; no one would dream of extracting them. This very appropriate comparison of Olshausen has been met by the reply that, normal ovariotomy being a benign operation and the pain suffered of an excruciating nature, many patients would be willing to submit to the operation for the uncertain chance of a cure. It would at least put a stop to the exacerbation of pain at the menstrual period.

Lawson Tait has had encouraging results with ovariotomy in the cure of menstrual epilepsy. Yet G. Willers, a pupil of Hegar, has proved that there is more chance of cure if the ovary be diseased than if it be healthy. The same is true of hysteria and hystero-epilepsy with acute exacerbation at the menstrual period.

Castration has given some good results—it has also resulted in many failures. Some of the cures are quite remarkable, but they may be only temporary in their effect, and often no cure follows. We must also ask ourselves whether the cures may not oftentimes be due to the deep psychical impression produced by the operation—to a species of suggestion, in short. As a proof of this being possible, we would instance the good effect produced in a few cases by a pretended ovariotomy. As to ovariotomy for mania or psychoses apparently influenced by menstruation, I believe that it should be prohibited. In some cases of this kind the trouble has been aggravated instead of cured by the procedure. It is difficult to appreciate the point of view of those surgeons who practise ovariotomy for the purpose of producing sterility and preventing the transmission of hereditary insanity. I have as yet said nothing as to the anatomical condition of the ovaries. In spite of Hegar's praiseworthy efforts to restrict ovariotomy to cases in which lesions of the ovary can be demonstrated, and to give this operation an ana-

tomical basis, even when it is performed for nervous conditions only, it is an undoubted fact that in the great majority of cases such positive diagnosis cannot be made.

Sclero-cystic degeneration, cirrhosis, and hyperplasia of the stroma are rarely recognizable by bimanual palpation; and as for the symptoms produced by these lesions, they differ in nowise from those of purely nervous origin.

It seems to me beyond doubt that removal of even healthy ovaries has often modified the condition of the nervous system so as to cause a disappearance of the grave reflex disturbances accompanying menstruation. Consequently the operator should be less anxious to know whether the ovary to be removed presents an anatomical lesion, than to know whether it be the physiological starting-point of the trouble; rational symptoms will in this case tell him more than physical examination. But an absolute diagnosis is difficult to establish; and unless he be very positive as to the cause, a conscientious surgeon will hesitate to perform an operation which, when it does not cure the disease, constitutes a mutilation of the patient, which, from a social point of view, is more serious than the amputation of a limb.

Péan prefers vaginal hysterectomy, which he calls uterine castration, to ovariotomy; he finds it more efficacious, even in overcoming the nervous troubles, than removal of the ovary. I hold rather the same opinion. Uterine castration acts by radically removing the point from which abnormal reflexes arise. In some exceptional cases I have performed this operation and have obtained remarkable cures.

Technique of Castration.—I have already described this operation when speaking of the indirect treatment for fibroids (page 276): a few special points are worthy of notice in this connection.

The abdominal incision should be as small as possible, since only the ovary and tubes are to be withdrawn through it, and there is no great amount of groping necessary, nor is there anything to remove that offers any great difficulty; moreover, it is always an easy matter to enlarge the wound if necessary. From two and a half to three inches is large enough; the centre of the incision should be placed directly over the fundus of the uterus, which can be exactly located by bimanual palpation; the inferior end of the wound will usually be about two fingers' breadth from the pubes. Battey, at least in his first operations, removed the ovary only. Hegar, in the very beginning, realized the value of removing the tubes as well—a procedure which facilitates, rather than adds any difficulty to, the operation. Lawson Tait also considers it of paramount importance, and his opinion has had great influence in transforming oöphorectomy into salpingo-oöphorectomy.

The cicatrix left by so small an incision as that made by Lawson Tait is unimportant, especially if my advice be followed in regard to uniting the abdominal walls by three successive layers of buried catgut suture, to which may be added an intra-dermic suture of the skin.

Vaginal incision possesses no particular advantages. Yet if the patients object decidedly to an abdominal cicatrix, it may be used, especially if the ovaries are prolapsed and easily reached. The prolapse of the ovaries may be recognized by vaginal touch, in Douglas' cul-de-sac; and by the two characteristic symptoms, pain during defecation and coition.

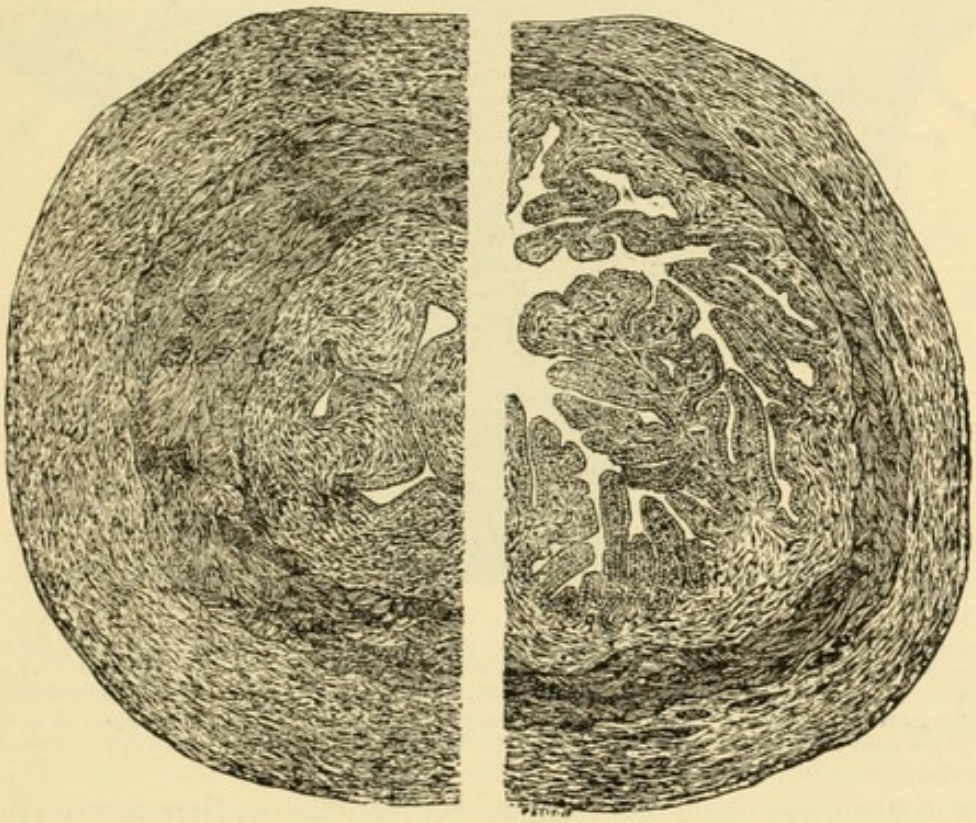
If the uterus be freely movable, the operation is of extreme simplicity. The patient is placed in the dorso-sacral position, a short Simon speculum presses down the fourchette, the cervix is brought into view by a tenaculum, and an assistant keeps down the uterus by pressing upon the hypogastrium. A transverse incision about two inches long is made in the posterior cul-de-sac as near as possible to the uterus. The index and middle fingers are introduced into the pouch of Douglas and bring down the ovary and tube, about which a ligature is carried with a blunt needle, and tied with a Tait's knot. If the nervous symptoms are very marked, it is better to remove the appendages of both sides, even if one ovary only be prolapsed; for the induced menopause has a greater therapeutic value than removal of the displaced organ. Should there be no complication and no special indication for drainage, the wound can be completely closed by catgut sutures.

CHAPTER XXIII.

INFLAMMATION OF THE UTERINE APPENDAGES.

General Considerations.

The important position taken in gynæcology by inflammation of the uterine appendages, the ovaries and tubes, has but recently been generally ad-



A B

Fig. 351.—Fallopian Tubes, Normal Condition. *A*, Transverse section of tube near the uterus. *B*, Section from the ampulla (Wyder). Layers of the Fallopian tube: 1, Upper and outermost layer, serous coat; 2, layer of loose connective tissue, richly supplied with blood-vessels; 3, muscular coat, much thicker near the uterus (uterine segment) than near the ampulla (abdominal segment). It is principally made up of circular fibres. Above and within it is reinforced by longitudinal fibres, some of which spread into the mucous layer, others (the most external) penetrate between the layers of the broad ligament; still others go to the hilum of the ovary or are prolonged to the fundus of the uterus; a few fibres penetrate to the inner layer; 4, mucous coat. The framework of this layer is embryonic connective tissue, rich in fusiform cells; it projects into the lumen of the tube in longitudinal folds which have been cut through obliquely in the section shown above. Near the uterus these folds are radiating and give a star-shaped appearance to the lumen in the section. Near the ampulla they are longer and reduplicated, which gives the lumen a jagged and toothed appearance on section. The whole surface of the mucous membrane is lined with simple columnar ciliated epithelium; the movement of the cilia is in the direction of the uterus.

mitted. Aran and his pupil Siredey clearly recognized the fact; but in spite of the appreciation of its importance by these physicians, it was for a long

time condemned to oblivion because not indorsed by the surgeons. The fame of Lawson Tait's operations has done more to popularize this truth than all the reasonings of physiology and pathological anatomy; it has thrown a great light upon the controversy waged over perimetritic inflammations.

The interminable and wearisome discussion over the question as to whether inflammation began in the cellular tissue about the uterus or in the neighboring peritoneum—of a perimetritic phlegmon or a pelvic peritonitis—a discussion which fatigued a whole generation, is now only a memory. The

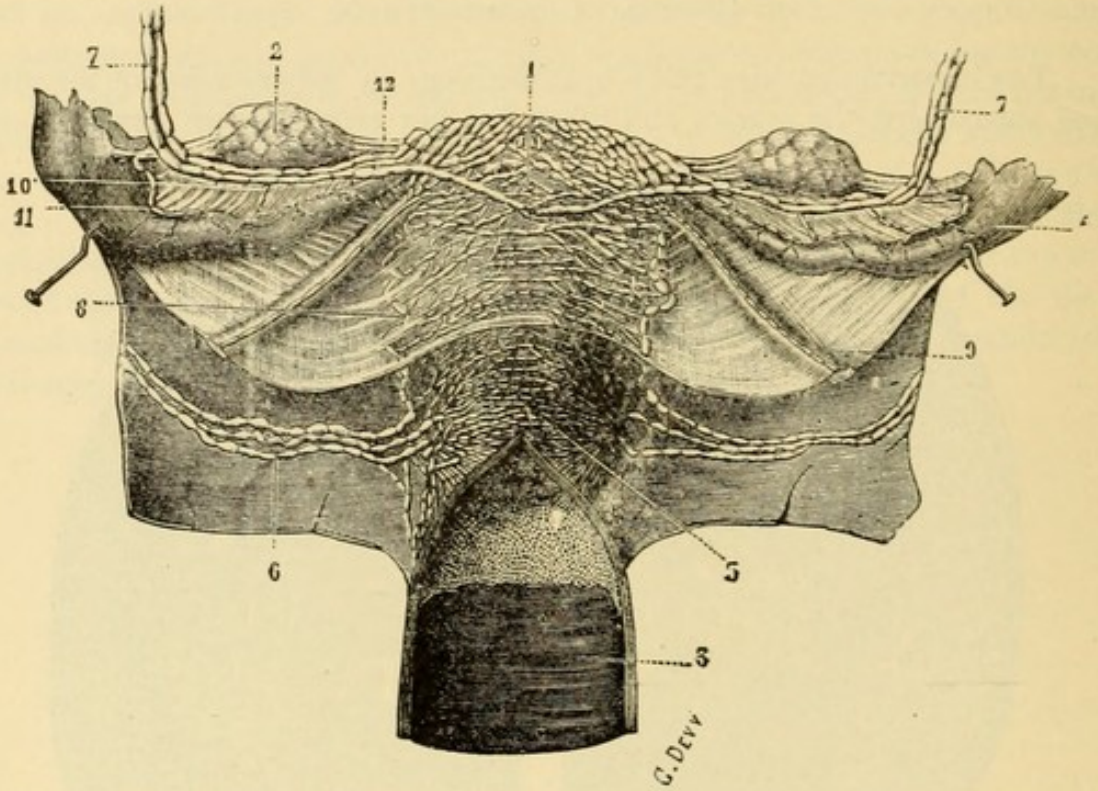


FIG. 352.—LYMPHATICS OF THE UTERUS (POIRIER). 1, Lymphatics from the body and fundus of the uterus; 2, ovary; 3, vagina; 4, Fallopian tube; 5, lymphatics from the cervix; 6, lymphatic vessels from the cervix going to the iliac ganglia; 7, lymphatic vessels from the body and fundus going to the lumbar ganglia; 8, anastomosis of cervical and uterine vessels; 9, small lymphatic vessel in the round ligament going to the inguinal glands; 10, 11, lymphatic vessels of the tubes which empty into the large lymphatic vessels from the body of the uterus; 12, ovarian ligament.

ardent controversy upon this subject between Nonat, Bernutz, Goupil, and Gallard seems as superannuated as the discussions between Gendrin and Lisfranc concerning uterine engorgement and chronic partial endometritis in explanation of the same symptoms. Even the distinction between para- and perimetritis still made by modern authorities seems unnecessary in clinical practice. It is a vestige of old theories. To understand the close connection of the uterus and the tubes, we must bear in mind the fact of their common embryonic origin. At the end of the second month of intra-uterine existence, the ducts of Müller become fused together at the lower portion to form the uterus and vagina, while above they remain separate and form the tubes, which are in reality a slender prolongation of the horns of the uterus; the various coats of both are directly continuous with each other—a fact

which explains the possibility of ascending salpingitis following endometritis, just as an ascending pyelitis may follow chronic cystitis. The ovary, which is connected with the tube by the tubo-ovarian ligament and is almost directly in contact with the ampulla, may also be easily infected by continuity.

Moreover, these organs are bound together by important vascular and lymphatic vessels. I will remind you of the anastomoses of the utero-ovarian arteries and veins with the uterine vessels. More important still are

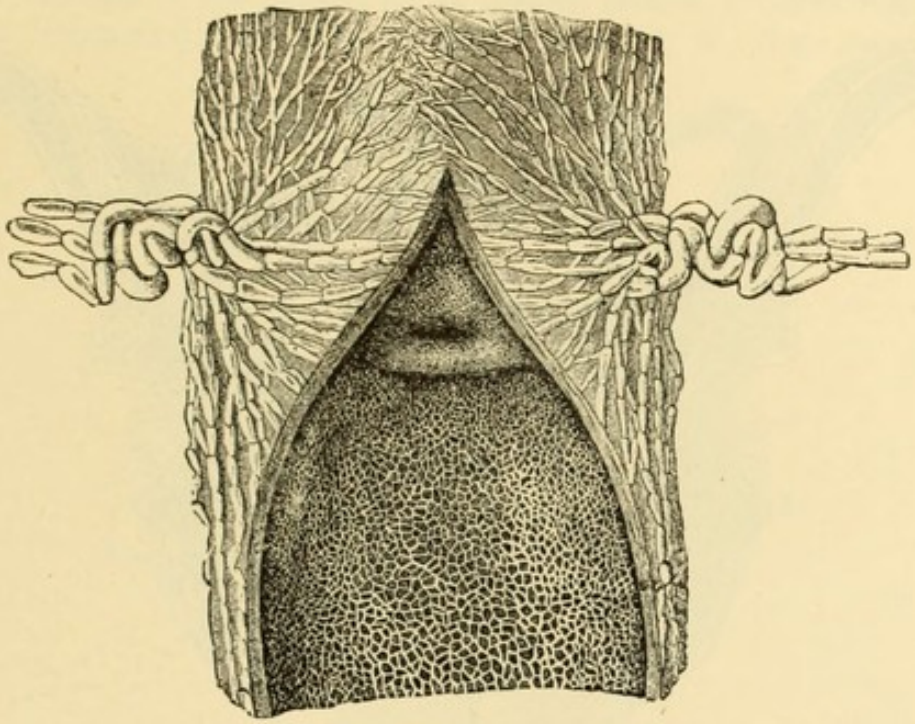


FIG. 353.—LYMPHATICS OF THE CERVIX AND UPPER THIRD OF VAGINA (POIRIER).

the lymphatic connections. To Lucas Championnière, after Cruikshank and Cruveilhier, belongs the credit of having called attention to it.

He described with especial care the superficial lymphatics, at the angles of the uterus, which are lost in the broad ligaments behind and below the tubes, between the tube and the round ligament, and especially below the ovary and tube. There are also deep lymphatics which can be demonstrated only by making a longitudinal section of the uterine angle; here a group of lymphatics is situated in the hollow between the tube and the ovarian ligament. Thus important lymphatic communications are established between the ovaries and tubes, which have such a close anatomical connection. There is scarcely ever an ovaritis uncomplicated by salpingitis, or a salpingitis unaccompanied by ovaritis.

As a rule, inflammation passes by direct contact and adhesion from the tube to the ovary. Sometimes, however, there is suppuration of the ovary without continuity of the inflammatory condition of the tube; this is explained by the lymphatic supply. The vessels from the ampulla follow the

broad ligament to the outer side of the ovary, and join the larger lymphatic network called the subovarian plexus. It is not hard to understand that an abscess of the ovary may coincide with relatively unimportant lesions of the oviduct. Adhesions, which are rich in lymphatics, as Poirier has shown, may also transmit inflammation.*

Again, the network of lymphatics which covers the surface of the ovary communicates with the lymphatics of the peritoneum. According to Waldeyer, if a lymphatic injection tube is inserted into the ovary, the whole net-

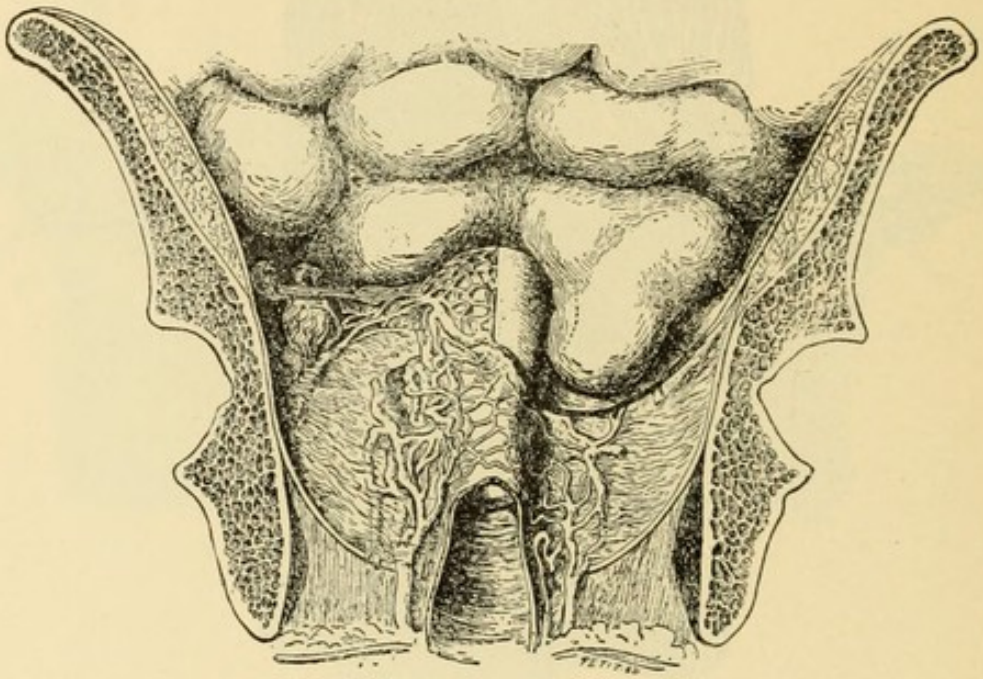


FIG. 354.—VERTICAL SECTION OF THE PELVIS, SHOWING THE SUPERIOR PELVI-RECTAL SPACE AND THE ISCHIO-RECTAL FOSSA. (On the left the section is on a level with the broad ligament; on the right it is a little in front.)

work of lymphatics in the abdominal serous membrane may be filled from it. The fact that peritonitis following inflammation of these organs usually remains circumscribed in extent is probably because the first stage of the process consists in a plastic obliteration, a sort of adhesive lymphatic thrombosis. Finally, the subperitoneal cellular tissue in the fimbriæ of the tube and in the ovary is a sort of appendage to that of the broad ligament, which is continued below on to the pelvic floor, and on the sides is continuous with the laminated tissue more or less infiltrated with fat, which lines the peritoneum, and which is especially loose in front of the bladder in the pseudo-cavity of Retzius (Fig. 354). A knowledge of these details is absolutely necessary in explanation of the deep and superficial transmission of inflammation.

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* I shall use the terms *peri-uterine*, *peri-ovaritis*, *peri-salpingitis*, which usage has sanctioned, although they are of defective composition, since they are formed by the union of a Greek and a Latin word. The correct terms would be: circum-uterine, circum-ovarian, tubo-ovaritis, or else peri-metritis, peri-oöphoritis, oöphoro-salpingitis.

Various widely differing classifications of salpingitis have been made.

Cornil and Terrillon give the following:

1. Catarrhal vegetative salpingitis.
2. Purulent salpingitis (pyo-salpinx).
3. Hemorrhagic salpingitis (hæmatoma of the tube; hæmato-salpinx).
4. Blennorrhagic salpingitis.
5. Tubercular salpingitis.

This division is incomplete, for it ignores certain forms of diffuse interstitial inflammation found in chronic disease. It is a little defective in

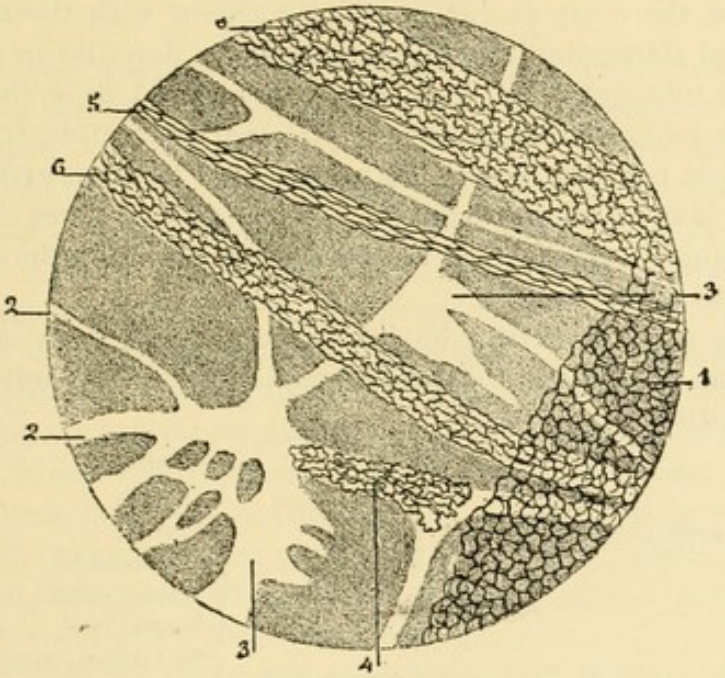


FIG. 355.—SUPERFICIAL SUBSEROUS LAYER FROM A NON-GRAVID UTERUS, SLIGHTLY ENLARGED (WALLICH). 1, Peritoneal epithelium; 2, clear bands; 3, star-like spaces; 4, dentate cells from the walls of the clear bands; 5, capillary blood-vessel with its elongated wall cells; 6, large lymph capillaries with the dentate cells of their walls. (Wallich gives the name of clear bands to the spaces which are brought into evidence by nitration, which at certain points during their course have dentated cells, and which are very probably a system of lymphatic spaces situated beyond the blood-vessels.)

that it separates purulent from tubercular and blennorhagic salpingitis, which are merely varieties of the first. Orthman makes this division:

1. Catarrhal salpingitis with its varieties: simple, diffuse, interstitial, hemorrhagic, follicular.
2. Purulent salpingitis, which may be septic, blennorrhagic, or tubercular.
3. Hæmato-salpinx.
4. Hydro-salpinx.
5. Pyo-salpinx (or purulent cystic salpingitis). From both a clinical and an anatomical standpoint, I think it of importance to classify the inflammations of the tubes according to whether they terminate or not in the formation of an encysted tumor. We should thus have:

- I. Non-cystic salpingitis.
  - *a*. Acute catarrhal.
  - *b*. Acute purulent.
  - *c*. Chronic parenchymatous (pachy-salpingitis).
    - Hypertrophic or vegetative variety.
    - Atrophic or sclerous variety.
- II. Cystic salpingitis.
  - *a*. Hydro-salpinx, or serous.
  - *b*. Hæmato-salpinx, or hæmatic.
  - *c*. Pyo-salpinx, or purulent.

I do not bring in the factor of etiology; for a blennorrhagic salpingitis, for example, may develop in one of several widely differing ways into a purulent non-cystic, or purulent cystic salpingitis or pyo-salpinx, which may be converted into hydro-salpinx or form a parenchymatous salpingitis.

Lesions of the ovary are, as a rule, coexistent with those of the tubes. From a clinical standpoint, it would be difficult to describe an *ovaritis* which was not also a tubo-ovaritis. This will explain why I have thought it best to subordinate inflammation of the ovary to that of the tube from a nosological and clinical point of view. As we shall see later, an exception may be made in the case of sclero-cystic ovaritis which sometimes exists independently of salpingitis, originating in special nutritive disorders either functional or due to diathesis.

According to Paul Petit, who has made a special study of this subject, we might, from a purely histological standpoint, make the following classification of ovaritis:

- Non-cystic ovaritis
  - Acute.
    - Cortical.
    - Diffuse.
  - Chronic.
    - Cortical.
    - Disseminated.
    - Hypertrophic.
    - Sclero-cystic.
- Cystic ovaritis
  - Serous cysts.
    - By follicular hydropsy.
    - By interstitial hydropsy.
  - Blood cysts.
    - Of follicles.
    - Of corpus luteum.
    - Of stroma.
  - Purulent cysts.
  - Cysts due to lymphatic dilatation.

CHAPTER XXIV.

OÖPHORO-SALPINGITIS WITHOUT CYSTIC TUMOR.

(Acute Catarrhal and Purulent Salpingitis, Non-cystic. Chronic Parenchymatous Salpingitis.

Pathology and Etiology.—Is there such a thing as primary ovaritis, an idiopathic lesion connected with menstrual disorders and venereal excesses, and quite independent of all infection or preceding lesion of the uterus and tubes? Dalché and Prochownick have recently upheld this view, but scarcely with convincing proofs. It seems to me very doubtful. I do not think that there are any cases of ovaritis, properly so called, that are not preceded by endometritis and salpingitis, with the exception of some rare cases of sclerocystic ovaritis, of functional and diathetic origin. As predisposing causes of such ovaritis, I am inclined to attach great importance to the rheumatic diathesis, to chilling during menstruation, to venereal excesses, and also to the dilatation of the pelvic veins known as tubo-ovarian varicocele. In the great majority of cases, however, ovaritis is due to pre-existing endometritis or salpingitis. It is true that one or the other of these conditions may have existed without leaving any permanent anatomical traces, but a study of previous symptoms will prove that they did exist.

I shall therefore use the terms tubo-ovaritis or oöphoro-salpingitis, and if for the sake of brevity I say salpingitis or ovaritis it will be understood that the word signifies a mixed lesion. Inflammatory conditions of the uterus are, without doubt, the chief cause of inflammations of the appendages. Postello long ago compared the extremity of the tube to the epididymis, and Bernutz clearly defined the analogy between tubo-ovaritis of blennorrhœal origin in the female and epididymo-orchitis in the male. In specific and other inflammations, the infection is carried from one place to another by means of the continuity of the mucous tissues. Schröder considers this the only method of infection, and in a discussion at the Surgical Society the majority of speakers held the same opinion. J. L. Championnière was almost the only one to advance the view that the lymphatics carried infection, although he himself formerly considered this the case only in the puerperal condition. He lays special stress upon the relative integrity of the uterine extremity of the tubes, even when two-thirds of the external portion are much affected. We may say in reply that the integrity is only apparent; the microscope reveals an inflamed condition of the tube when the

naked eye is unable to perceive any trace of it. Moreover, analogous interruptions in the continuity of inflammations occur in the series of lesions carried from the bladder to the ureters and kidneys. Yet the part played by the lymphatics must not be ignored. Adhesions very often bind the fundus of the uterus to the appendages. As Poirier has shown, these adhesions are almost entirely composed of lymphatics which connect the sub-endothelial uterine plexus with the lymphatics of the appendages. These adhesions are without doubt the result of the action of a previously existing endometritis upon the deep lymphatic plexus of which the sub-endothelial plexus is merely a continuation. Inflammation from the body of the uterus may be carried along this channel to the tubes and ovaries, especially if some new pathological influence comes to accelerate the process.

However this may be, if a catarrhal endometritis last any time, the tubes are always affected, but the symptoms caused are so slight that this epiphenomenon does not attract the attention of the clinician. In aggravated cases of endometritis with slight salpingitis, only the former condition is recognized and treated. On the other hand, in marked salpingitis a slight endometritis, though it may be the cause of the tubal affection, may easily be overlooked.

The frequency of endometritis quite explains that of salpingitis, the more so that a temporary endometritis is usually followed by a permanent lesion in the tubes. Winckel found, upon 575 female cadavers, 182 more or less pronounced lesions of the appendages. Arthur Lewers, in 100 autopsies at the London Hospital, found 17 times lesions of hydro-, pyo-, or hæmato-salpinx. Galabin, from the year 1883 to 1886, in Guy's Hospital, found 12 cases out of 302 autopsies, or 4 per cent. As Lawson Tait remarked, patients in this hospital come from a class more well-to-do than those of the London Hospital, and gonorrhœal and puerperal infections are consequently less frequent. Out of 20,605 gynæcological affections observed in Martin's clinic from September 15th, 1886, to December 31st, 1894, there were 1,363 cases of lesions of the adnexa; out of 2,078 cases 279 were due to gonorrhœa.

Gonorrhœal Infection is the most usual cause of inflammation of the tubes, if one is to believe Noeggerath, who took up the study of this subject after Ricord, Requin, Bernutz, Zweifel, and Rosthorn. Westermark was the first to find the gonococcus in the pus from a blennorrhagic salpingitis. Since then the researches have greatly multiplied in number, especially in Germany, where Schmidt, Carstens, Zweifel, Witte, Wertheim, Schauta, and Prochownick have reported the most conclusive observations. Martin, from his own statistics, joined to those of Wertheim, Charrier, Prochownick, and Schauta, found 76 cases of purulent salpingitis in which the gonococcus was present. In France, Hartmann and Morax found the gonococcus 13 times in 33 cases of suppurative salpingitis; Jayle 4 times out of 30 cases.

The finding of the micro-organism has been attended with more difficulty

in the various tissue layers of the tubes. Wertheim, however, found it in the mucosa and in the muscular layer. According to Reymond, it is most abundant upon the surface of the mucosa in a purulent layer composed of a larger number of leucocytes and of some desquamated epithelial cells. It is found within these cells, in the leucocytes, and sometimes between the cells.

These authors lay especial stress upon inoculation with the gonorrhœal virus, which is, so to speak, attenuated in strength, a vestige of an old gonorrhœa, which is often neglected because considered at the same time incurable and harmless (gleet). Many newly married women may be infected in this way, and the fatigues of the wedding journey thus accounted for. Slight endometritis and intense catarrhal salpingitis are often caused; abortion follows and aggravates the condition of the patient, who may long remain an invalid and sterile.

Gonorrhœal infection often leads to graver diseases, causing a sudden suppuration of the tubes, which becomes encysted or extends to the pelvis. This is the form described by Bernutz, and that I have also frequently seen at Lourcine. In one case I witnessed an overwhelming onset of gonorrhœal pyæmia, with multiple foci of suppuration scattered about in the subperitoneal cellular tissue and in the substance of the mesentery. There was intense vaginitis and pyo-salpinx. Neisser's gonococcus cannot always be identified, even when the gonorrhœal origin of the affection is undisputed. It has, however, often been found.

Puerperal infection following labor, and especially abortion under septic conditions, should be placed among the chief causes of inflammation of the appendages. In Martin's statistics, already quoted, three hundred and seventy-four cases were of puerperal origin. Lesions of the tube are especially to be feared in post-abortum endometrits with retention of placental débris, which is a strong argument in favor of energetic interference (cleansing with a blunt curette, and irrigation) instead of the expectant treatment or timid interference recommended by some authorities. The cures obtained by these last methods are only apparent. Any patient in whose uterine cavity gangrenous placental débris remains for several days is sure to develop a metro-salpingitis. The streptococcus is the infection agent in this form of salpingitis, and the cases in which it has been found are numberless. It is situated chiefly in the pus, free between the epithelial cells, more rarely within the leucocytes or the epithelial cells. It has been found in the mucosa, and in thrombosed vessels. Nearly all women suffering from salpingitis due to the streptococcus have at some time or another had some puerperal affection. Yet Kaltenbach observed a case of streptococcal ovaritis in a virgin. During the course of a puerperal infection the staphylococcus may act in the same manner as the streptococcus, but its presence in the pus of the tubes is decidedly the exception. The authorities who have met with it there have invariably found it associated with the streptococcus.

In women who are suffering from gonorrhœa at the time of parturition, a

mixed infection is produced, puerpero-gonorrhœal, which explains the frequency of metro-salpingitis in these cases. Gertheim, Wertheim, and Witte have determined the amount of influence exercised by the gonococcus upon the development of the streptococcus. In my opinion, the elevation of temperature which occurs so frequently after delivery in women suffering from gonorrhœa is due to the streptococcus, whose development has been favored by the gonococcus.

Contamination from Obstetrico-surgical Exploration and Interference.—I refer the reader to what has already been said upon this subject in the chapter on Endometritis.

The uterine sound has had many victims, and also discission of the cervix, before the days of antisepsis. Even at the present day, we must bear in mind that, in order to secure intra-uterine exploration from danger, not only must the instrument and the finger be free from germs, but the cervical canal must, by repeated washings, have been freed from the organisms which it normally contains. The presence of a constant source of infection in the cervical canal (Winter) may account for the existence of some cases of endometritis and salpingitis which have no other apparent cause than a difficulty experienced in the evacuation of the cervical secretions, from some displacement or stenosis; the normal drainage of this mucus filled with microbes that are virtually pathogenic being interfered with, auto-infection might thus be produced. It is very certain that inflammation of the uterus and adnexa is rarely absent in this condition.

Tubercular salpingitis may coexist with other affections of the genital apparatus of the same nature, and be lost, so to speak, among the graver lesions. But tubercular salpingitis has often been observed as an isolated lesion. Are these cases of tubercular salpingitis, which are of more frequent occurrence than is generally supposed, to be attributed to auto-infection or to hetero-infection (by the introduction of tubercular semen into the genital tract)? The point of entrance of Koch's bacillus seems in many cases to have been the genital tract (Cohnheim, Verneuil). But there are frequent instances of tuberculosis of the appendages in virgins which are quite unaccounted for by this explanation; it is very likely that they are in the first place due to an ordinary auto-infection caused by cervical stenosis, and that the bacilli introduced into the circulation through the pulmonary or digestive tract fix upon the inflamed tubes as the point of least resistance. This hypothesis harmonizes with the prevalent ideas of general pathology upon what is called pre-tubercular inflammations. Malformations or congenital atrophy of the tubes would also cause a morbid predisposition of these organs, as Lawson Tait has pointed out, and to which Freund has called especial attention.

I will merely mention as of passing interest the rare causative influence of eruptive fevers, especially scarlatina or variola, which Lawson Tait has demonstrated, and the very problematic influence of genital papillomata men-

tioned by Alban Doran to explain a papillomatous salpingitis whose exact nature was undetermined.

The cases of syphilitic salpingitis which have been reported will not bear investigation. Further observations upon this subject are needed. The salpingitis due to actinomycosis is a mere anatomical curiosity.

I was the first to call attention to the *intestinal origin* of certain cases of oöphoro-salpingitis. I have seen three cases in which, all other etiological factors being absent, the infection of the tubes seemed to be absolutely traceable to an old intestinal lesion (enteritis, typhoid). Propagation would seem to be carried by means of adhesions which unite the appendages to an inflamed cœcal appendix, or through the lymphatic communications between this organ and the ovary, to which Clado called attention.

In connection with these cases of purely intestinal origin, we must not fail to mention the possibility of infection of gonorrhœal or puerperal pyo-salpinx through the digestive tract. Schauta (once), Hartmann and Morax (twice), Reymond (six times), Girode (twice), and Jayle (six times) found the *bacterium coli commune* in suppurative salpingitis of distinctly gonorrhœal or puerperal origin, adhesions having been formed with various portions of the intestines.

According to Reymond, in the presence of the *bacterium coli commune* the micro-organisms previously existent in the tubes seem to acquire increased virulence. A certain number of cases of salpingitis with pneumococci have been reported, but in no case was pneumonia found in the history of the patients. Frommel and Witte found the pneumococcus in puerperal salpingitis, Zweifel and Girode in gonorrhœal salpingitis. It is an interesting circumstance that salpingitis with pneumococci is always unilateral.

Pathological Anatomy. I. *Lesions of the Tubes.*—These are in the acute variety at least more constant and more characteristic than those of the ovaries, the mucous lining being more vulnerable than the serous membrane surrounding the uterus.

The comprehensive term catarrhal salpingitis has been much abused. A glance at the records published on the subject will show that it has been applied to the most varied pathological conditions. Every non-purulent inflammation of the tubes, from a simple and slight salpingitis accompanying an endometritis and simultaneously cured with it, to a hypertrophic pachysalpingitis with abundant vegetations on the folds of the mucous membrane, and excessive thickening of the walls has been placed pellmell in this class. This confused classification makes it extremely difficult properly to estimate the therapeutic value of the various operations recently performed in France and other countries. The knowledge that a slight increase in size and a trifling congestion of the Fallopian tubes constitute a salpingitis in the eyes of some surgeons, and call for removal by operation, causes one to hesitate before indorsing the value of the brilliant series of operations, which really demonstrate only the incontestable simplicity and innocuousness of ovari-

otomy performed with aseptic precautions. To form an exact opinion it would be necessary to have each report of extirpation of the appendages accompanied by a condensed but accurate description of the lesion, instead of being labelled as vaguely as it is at present. I believe, moreover, that acute catarrhal salpingitis should be carefully distinguished from chronic parenchymatous salpingitis with acute exacerbations; they have often been confounded under the common name of catarrhal vegetative salpingitis, because a sufficiently detailed clinical history has not been secured in regard to the patients from whom the histological specimens were obtained. This confusion is made easier by the fact that many women are operated upon for a lesion of long-standing after an acute exacerbation, which puts one on the wrong track as to its exact duration.

In acute catarrhal salpingitis we find in the first place a hypertrophy of the organ, which is swollen cylindrically from about the size of the little finger to that of the thumb, this being due as much to an infiltration of the walls as to that of the subserous tissue. As the lower border of the tube is bound to the broad ligament, it is obliged to twist and bend until it presents a lumpy and moniliform appearance. The fimbriated extremity is sometimes patulous and turgescent, more often folded up like an unopened daisy. The agglutination of its fimbriæ does not go on to complete obliteration, as in the case of chronic lesions. This permeability of the fimbriated extremity I consider, to be pathognomonic of inflammations, which are simply catarrhal, or in other words superficial and curable, not calling for extirpation of the organ. False membranes, which are usually fine, soft, lamellated, or filamentous, and transparent enough to show the blood-vessels in their substance, often bind the tubes to the ovaries and adjacent structures.

The external surface of the tube is of a pinkish tint, somewhat deeper in color near the outer extremity. On section, the cavity is seen to be filled with the normal but hypertrophied folds of mucous membrane, which are pinkish or silvery gray in color, giving the appearance of vegetations; mucus sometimes is seen on the surface.

A histological examination shows that the lesions are especially marked in the mucous membrane; the folds are covered with lateral, newly formed vegetations; instead of being thin they are thick and club-shaped. Many of them anastomose at the internal extremity, which gives a reticulated appearance to the section. The framework of these vegetations is cellulo-vascular, infiltrated with the embryonic cells; they are lined in some places by a layer of columnar, ciliated epithelial cells. The fibro-muscular coat is, as a rule, but slightly affected, there being only a hyperplasia of its substance.

Acute purulent, non-cystic salpingitis is more rarely met with than the encysted form, pyo-salpinx, in which, however, it invariably terminates if it lasts long and if the pus cannot be evacuated through the uterine cavity. According to Freund, this unfavorable result is largely dependent upon incomplete development of the oviduct. He claims that two forms of Fallo-

pian tube exist normally—one almost straight and of normal calibre; the other much twisted and with diminished calibre in some spots, this being the remains of an infantile condition. In the first class of cases, tubular affections develop rapidly and tend to a spontaneous cure. In the second, from the atresia of the oviduct, suppuratve inflammations necessarily result in encysted collections of pus. This condition of things is to be looked for in persons of delicate constitution in whom dysmenorrhœa accompanies the onset of menstruation. This view of the case may be correct, but, as a rule,

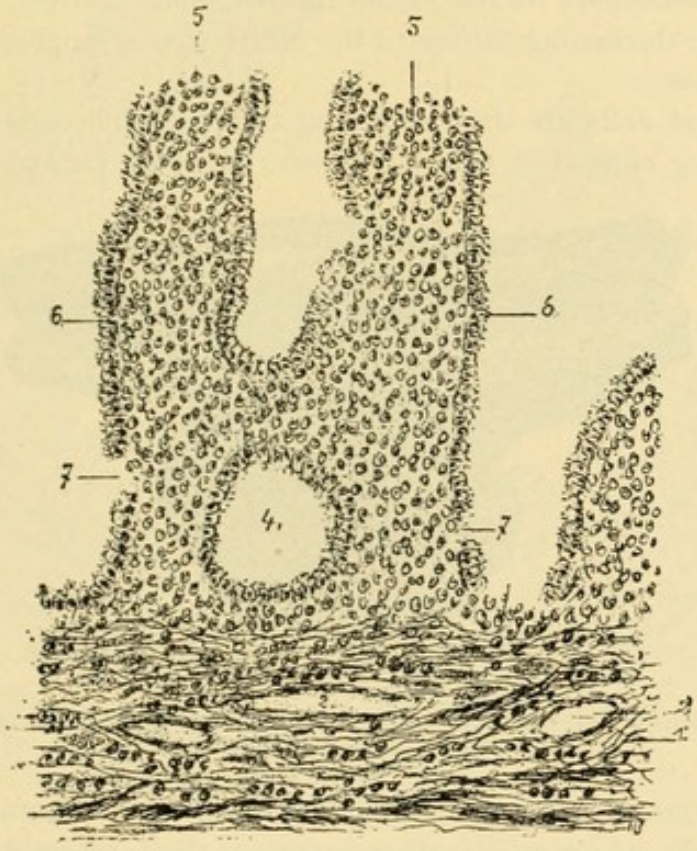


FIG. 356.—ACUTE CATARRHAL SALPINGITIS. (Transverse section of tube; enlarged 350 diameters.) 1, Fibro-muscular tissue infiltrated with some embryonal cells; 2, vascular spaces; 3, muscular bundles; 4, opening formed by union of two adjoining villosities; 5, tissue of villosities, hypertrophied and completely infiltrated with embryonal cells; 6, lining of ciliated epithelium; 7, point at which development of embryonal cells has caused desquamation of epithelium.

it is only necessary that the inflammation be very intense in its nature, to produce, in addition to the protective occlusion of the ostium abdominale, a swelling and infiltration of the walls so marked that the lumen is obliterated, or ceases to be permeable at the uterine orifice. This is what often occurs in gonorrhœal affections. However that may be, the transformation into a pyo-salpinx is always preceded by an acute purulent, profluent salpingitis, if the term be permitted, which means that the ostium uterinum is permeable and permits of free evacuation of the purulent secretion. If an operation be performed at this stage, we shall observe all the external signs of intense inflammation of the tubes; swelling, a twisted, knotty, lumpy condition of

the oviduct, with the fimbriæ so agglutinated as to close the abdominal orifice. On section the tube is found to be filled with pus, the cavity often resembling a string of beads, owing to the contractions.

The pus, which is creamy like all pus of recent formation, can easily be evacuated through the uterine cavity, as the ostium uterinum is not occluded like the ostium abdominale. The mucous membrane is downy and of a grayish tint. Under the microscope a transverse section shows very thick reduplications covered with anastomosing vegetations, forming a system of primary and secondary folds, enclosing irregular cavities that look like glands. This thickening is due to the infiltration of migratory cells in the connective tissue.

The ciliated cells are destroyed, and the epithelial cells are changed in shape, becoming cubical or flat, and preserving their normal shape only in

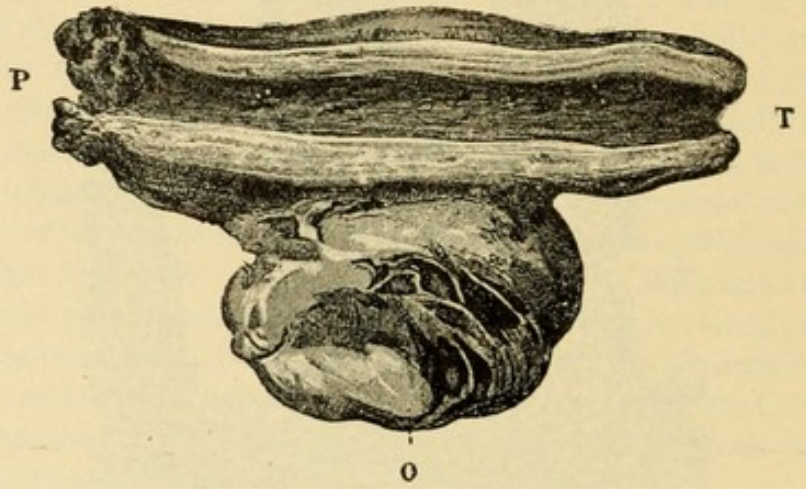


FIG. 357.—ACUTE PURULENT GONORRHŒAL SALPINGITIS. *T*, Thickened tube; *P*, fimbriæ swollen and incompletely agglutinated; *O*, cystic and adherent ovary.

the sinuses, whose pouch-like endings are lined with a basement membrane of columnar cells which still further increases their resemblance to glands (Fig. 358). The whole thickness of the wall is also infiltrated with these round migratory cells, and the blood-vessels are dilated (Cornil).

If purulent salpingitis does not go on to the formation of pyo-salpinx it may, as clinical experience has demonstrated, be spontaneously cured.

This retrogressive process is rare, however, and during its progress the patient is at any moment liable to a return of the acute phenomena. When it does occur, the cure takes place by induration, as it used to be called; that is, by the formation of embryonic connective tissue which, temporarily at least, results in a hypertrophy of the organ, a pachy-salpingitis. Fig. 359 gives an excellent representation of purulent salpingitis, which seems to be in process of development. The vegetations which were at first isolated are now united and form an embryonic tissue which at first sight seems to be homogeneous. This new layer of tissue lines the walls of the tube and diminishes its calibre by projecting into the lumen in the form of

papillomata formed of embryonic tissue. If the pus disappears and these perishable vegetations become organized, a chronic salpingitis will be established. In chronic parenchymatous salpingitis it is usual to find both tubes involved, whereas acute and unimportant lesions may be unilateral. This circumstance has given rise to Lawson Tait's rule of always removing the adnexa of both sides, as, if left, the sound side usually succumbs later. The ovary is usually implicated as well, being affected with sclerosis or peri-ova-

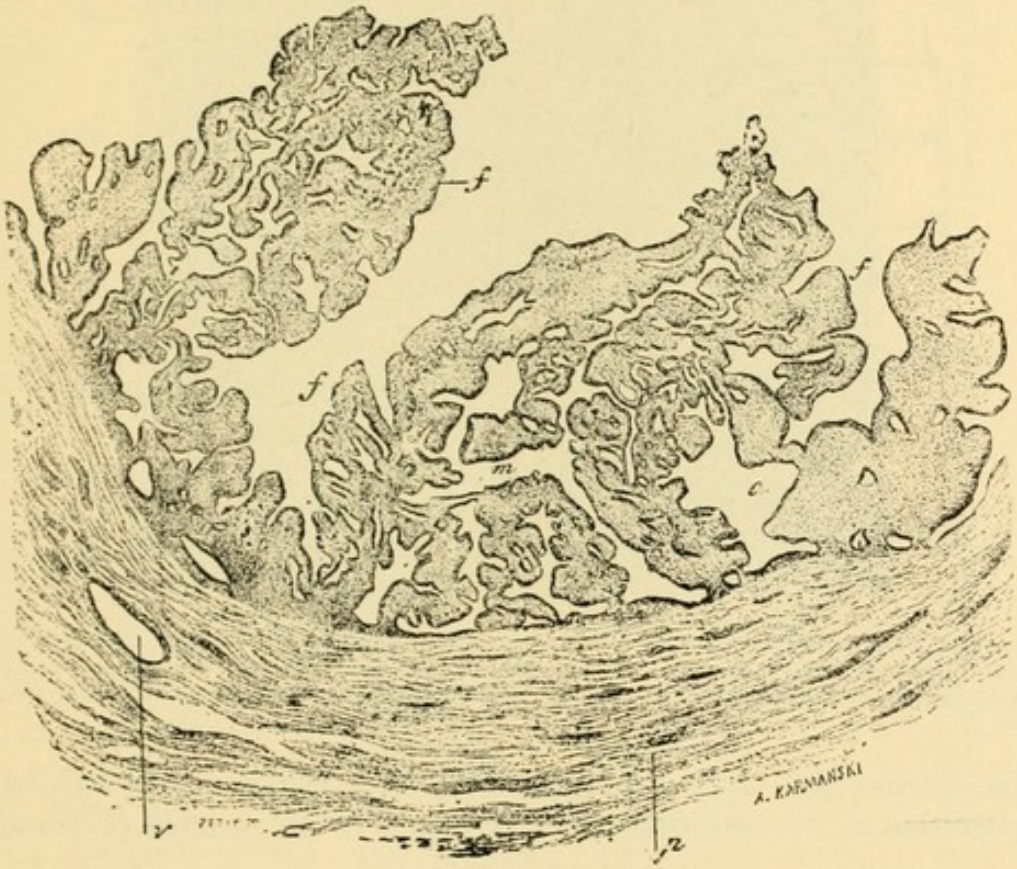


FIG. 358.—ACUTE PURULENT SALPINGITIS. Transverse section (magnified 12 diameters). *f*, *f*, Thickened vegetations, for the most part joined to each other in such a way as to form narrow openings of glandular appearance; *f*, wall of tube; *v*, blood-vessel (Cornil).

ritis. Strong adhesions, as a rule, bind the appendages to the pelvic walls or to Douglas' cul-de-sac. These adhesions may even become so tough that the ovary and tubes, which have become quite friable, cannot be detached without being torn to pieces. The thickened tube is often hard and cordlike.

The lesions, instead of being limited to the mucous membrane as in the preceding forms of salpingitis, include the whole thickness of the walls. The middle layer, the parenchyma, is even more altered than the other coats; so that chronic salpingitis, even more than chronic endometritis, may be called parenchymatous. On section we recognize the great thickness of all the walls. The mucous membrane is slate-colored. The external orifice is always obliterated and sometimes adheres to the ovary. The uterine orifice, on the contrary, is usually permeable, but the tube has often become im-

permeable in some places. The lesion has also been called pachy-salpingitis, or interstitial salpingitis because of the increase in connective tissue as shown

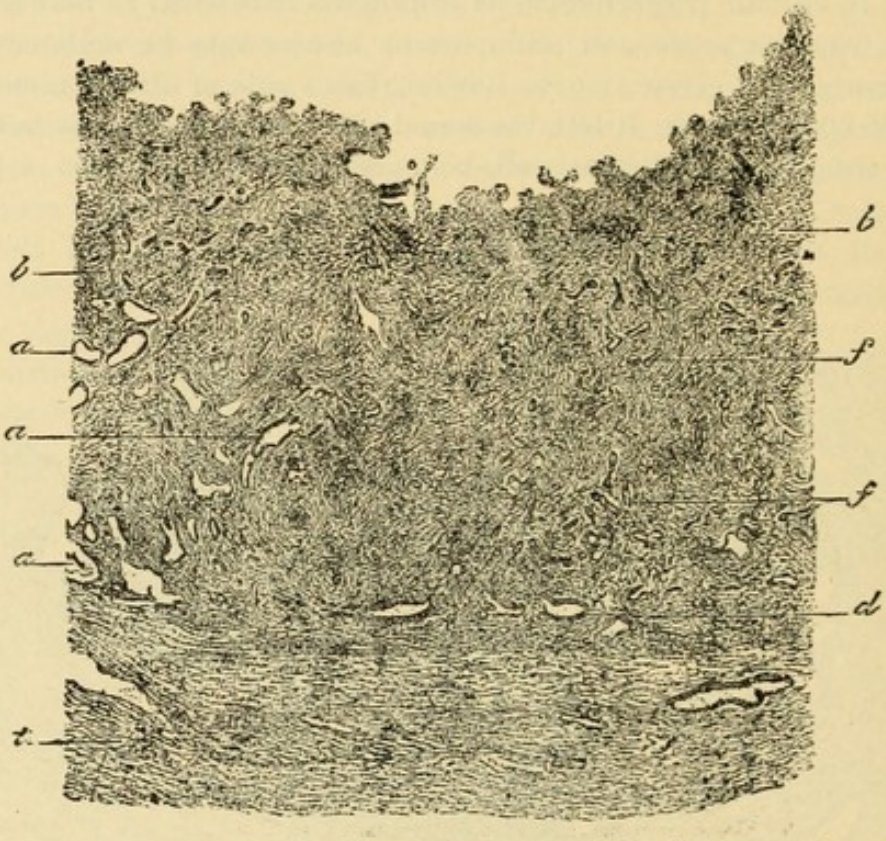


FIG. 359.—ACUTE PURULENT SALPINGITIS. Transverse section (magnified 12 diameters). *t*, Connective tissue of the walls. Above the connective tissue is a thick layer of embryonic tissue *b*, *b*, filled with cavities *a*, *a*, *a*, covered with epithelial cells and narrow crevices *f*, *f*, which also contain epithelial cells; *d*, similar cavities nearer to the walls (Cornil).

by the microscope. It is analogous to chronic epididymitis with sclerotic degeneration of the spermatic cord. Two anatomical varieties of this affec-

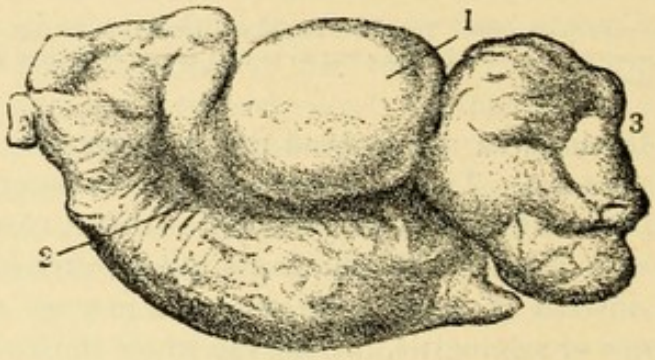


FIG. 360.—HYPERTROPHIC PACHY-SALPINGITIS AND SCLEROSED OVARY. 1, Small parovarian cyst of the broad ligament; 2, thickened tube; 3, sclerotic ovary fused with the fimbriated end of the tube. (Specimen removed by laparatomy.)

tion may be recognized, which correspond with those of parenchymatous endometritis. In the first, which was ably described by Kaltenbach, and then by Schauta and Sawinoff, and of which I have seen examples, there is a

chronic hypertrophic salpingitis. The tube, about as large as the little finger or the index, is the color of wine-dregs, purple, and of fleshy consistency. Upon cutting it, we find a thick shell of hypertrophied muscular tis-

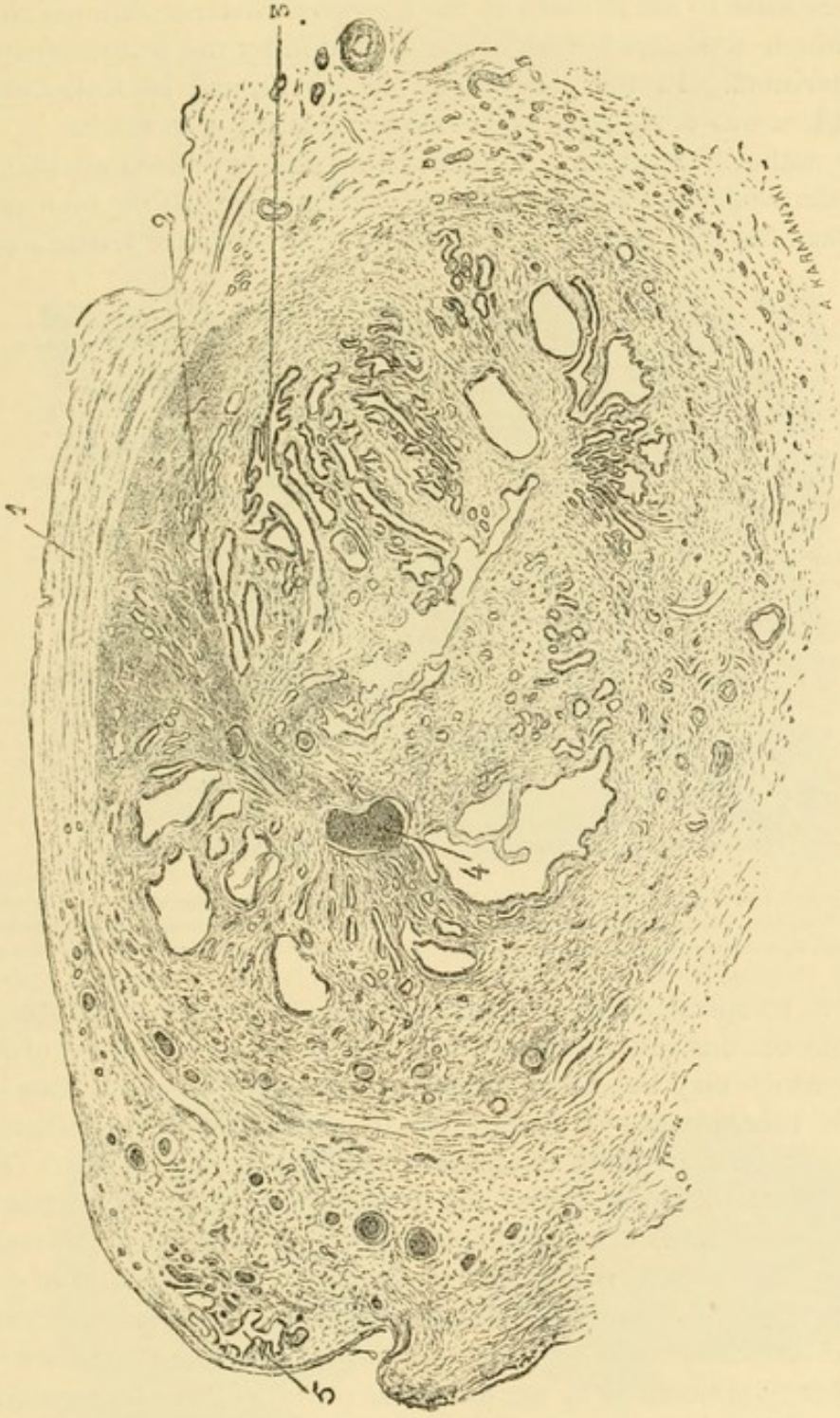


FIG. 361.—CHRONIC HYPERTROPHIC SALPINGITIS. Transverse section of the tube shown in Fig. 360. (Magnified 10 diameters.) 1, Thickened and sclerosed wall of the tube; 2, thickened and united villi; 3, pseudo-glandular structures; 4, blood-vessel; 5, accessory duct of the tube.

sue, or of newly formed connective tissue; and beneath, filling the interior of the obliterated lumen, as the marrow fills bone, is a pulpy substance of brilliant silvery appearance, formed by the mucous membrane whose epithe-

lium is greatly altered. In Kaltenbach's case the vessels were much dilated, and there were a number of hemorrhagic spots on the walls. The abdominal end of the tube was obliterated, the uterine extremity merely narrowed. These cases seem to me to point to the previous existence of a purulent salpingitis, which was saved from cystic dilatation by the permeability of the ostium uterinum. In the cases observed by me, and by Kaltenbach and Schauta, there was every proof of previously existing gonorrhœa.

These authorities attribute too much importance to the muscular hypertrophy in the production of the colicky pains of salpingitis; the same pains are noticed when the hypertrophy is confined to the connective tissue, and seem



FIG. 362.—CHRONIC HYPERTROPHIC SALPINGITIS. Tissue from the wall of the tube shown in Fig. 360 (× 250 diameters). 1, Fibro-muscular tissue in longitudinal bundles; 2, the same cut transversely; 3, infiltration of embryonal cells; 4, large mass of the same elements; 5, lymphatic; 6, hypertrophied blood-vessel with thickened walls.

to be due to compression of the nerve filaments, to a perineuritis which Sawinoff has conclusively demonstrated. There is another variety of chronic salpingitis which may be called atrophic. The cellular infiltration of the walls of the tube, instead of giving rise to a permanent product, is reabsorbed, and by a formation of cicatricial tissue causes contraction. This is probably a more advanced state of the hypertrophic pachy-salpingitis which has gone on to cirrhosis of the Fallopian tubes. The muscular tissue disappears before the fibrous tissue, the whole organ contracts, and in extreme cases is changed to a hard and impermeable cord. Boldt has carefully studied and described these lesions. He has often seen the lumen of the tube completely obliterated by agglutination of the walls. He compares the destruction of the epithelium which occurs under those circumstances to cirrhosis of the liver and kidneys. Orthmann describes, under the name of follicular salpingitis, an anatomical lesion which scarcely merits a special classification. It is distinguished by cystic cavities in the walls, giving it

an areolar appearance, but this pseudo-glandular character is common to all the varieties of tubal inflammation (Figs. 358 and 359). There are also small nodular bodies, resembling myomata, which have been observed in the

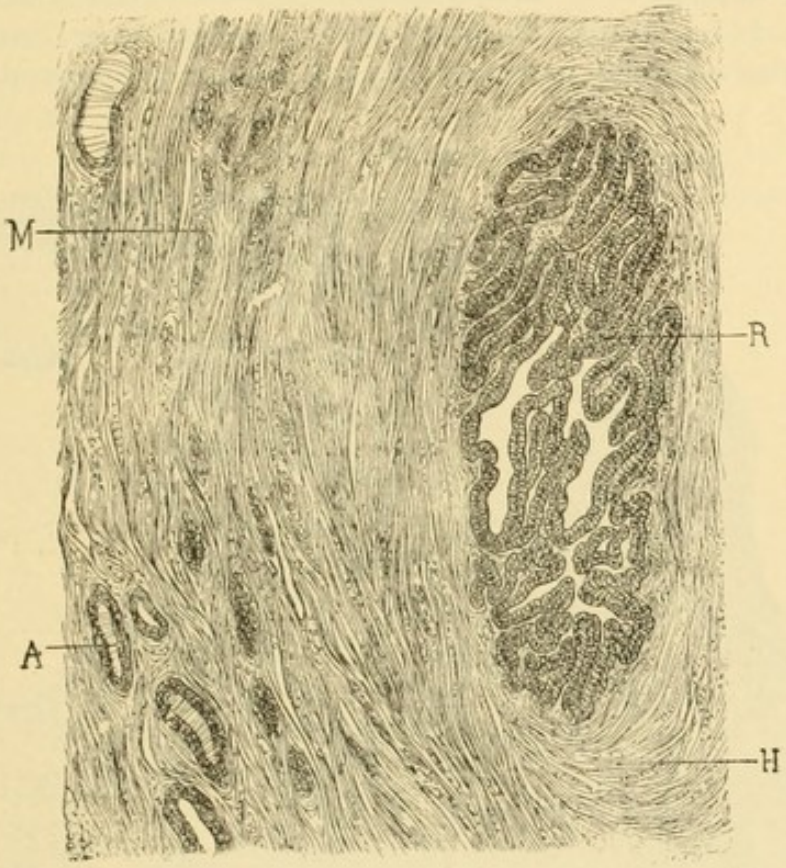


FIG. 363.—ATROPHIC FORM OF CHRONIC SALPINGITIS (BOLDT). Slight enlargement. Remains of mucous folds and obliterated lumen. *H*, Hypertrophy of submucous connective tissue and of the middle coat; *M*, scattered muscular fibres cut transversely; *A*, arterioles near the peritoneal surface.

walls of an inflamed or cystic tube, but their presence does not justify the classification of a special form of nodular salpingitis.

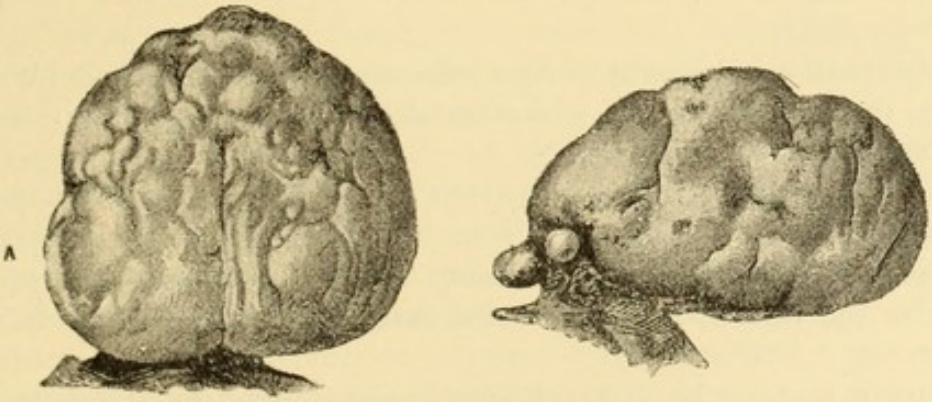


FIG. 364.—CHRONIC SCLEROTIC OVARITIS WITHOUT LESION OF THE TUBE.

In all the varieties that I have described, the tube may continue to form a canal open at both ends, and the permeability of the ostium uterinum al-

lows of an evacuation of the mucus as soon as it is formed. This of course prevents ampullar or cystic dilatation.

II. *Lesions of the Ovary.*—The ovary, which often preserves its integrity in catarrhal salpingitis, is usually affected in acute purulent and in chronic salpingitis. It is generally displaced, fixed by adhesions in Douglas' cul-de-sac or to the sides of the pelvis. It may suppurate independently of the

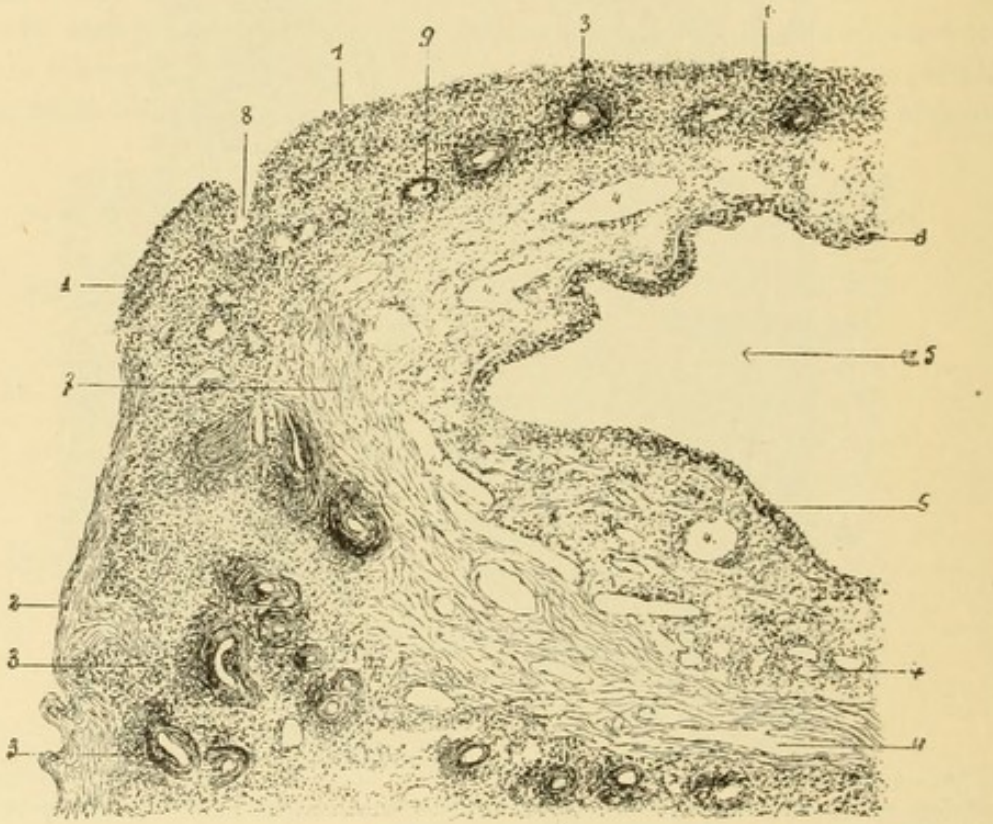


FIG. 365.—CHRONIC SCLEROTIC OVARITIS. Section perpendicular to surface of shrivelled ovary (Fig. 364, A) showing convolutions similar to those of the brain. Entire surface composed of dense tissue, more or less sclerotic. 1, Cortical layer rich in compressed cellular elements; 2, superficial sclerotic zone; 3, vessels with sclerotic walls; 4, lymphatics; 5, subcortical micro-cyst; 6, layer of compressed peripheral cells; 7, zone of loose œdematous connective tissue, infiltrated with fibrinous granular matter; 8, convolutions of surface; 9, follicle which has persisted.

tube, but quite exceptionally. As a rule, ovarian lesions follow, rather than precede, those of the tubes; when they do exist alone, it is under the form of chronic sclero-cystic ovaritis.

In the majority of cases ovaritis is caused by a localized peritonitis, a peri-oöphoritis, which progresses from the periphery to the centre. This peri-oöphoritis may, however, be absent, and the starting-point of the process be in the interstitial tissue of the ovary itself, near the vessels and the ovisacs.

However that may be, little is known in regard to the initial lesions of acute ovaritis. Paul Petit describes the following forms based upon thoroughly accurate data.

a. Cortical Ovaritis.—This is secondary to peri-oöphoritis. According to

Cornil and Terrillon, in many cases this form, which is analogous to vaginalitis in the male (Bernutz), can exist alone, the ovarian parenchyma remaining intact, and the lesions being limited to more or less resistant false membranes. Lawson Tait does not agree with this opinion, and believes that when the serous covering of the ovary is affected, some lesion will invariably be found at a certain distance from the capsule, the whole organ being greatly increased in size.

b. Diffuse Ovaritis.—In this variety the enlarged ovary is increased in size, infiltrated with fluid, and studded with follicular cysts containing serum

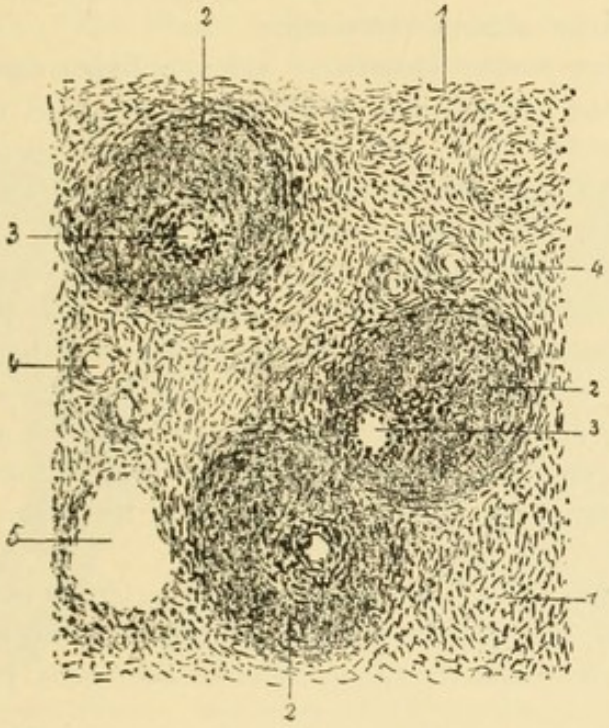


FIG. 366.—CHRONIC SCLEROTIC OVARITIS. Sclerotic vessels showing extremely contracted lumina. 1, Connective tissue of cortical layer, very rich in cells; 2, very thick-walled vessels; 3, remains of lumen of vessel; 4, smaller vessels; 5, lymph space.

or blood. The stroma is the seat of an embryonal infiltration scattered in every direction, but more pronounced around the follicles and the vessels which are undergoing plastic obliteration.

c. Suppurative Ovaritis follows the two preceding varieties unless they undergo sclerosis. It begins in the form of miliary gatherings within the follicles.

CHRONIC OVARITIS.—From a purely histological standpoint, we may, with Paul Petit, distinguish several subdivisions under this head. Unfortunately they do not correspond to any well-marked clinical types, notwithstanding which it will be of value to enumerate them.

(*a*) *Cortical Sclerosis.*—The ovary is surrounded by false membranes, among which are occasionally found blood foci analogous to those of pachymeningitis. The sclerosis either invades the organ to a great extent, or else

in distinct and uniform fashion remains within a few millimetres of its surface. The subjacent tissues are none the less destined to destruction; the obstruction to expulsion of the ovum and to the venous circulation of the hilum determines a follicular hydropsy and hemorrhagic infarct around which are grouped the secondary foci of sclerosis.

(*b*) *Chronic Disseminated Ovaritis.*—This is characterized by plaques of sclerotic tissue which have originated around the vessels and follicles; the result is the same, for the ovisac is the most richly vascularized part of the ovary. The process is probably slow and chronic from the outset. It is usually observed with or without vascular dilatation in the ovaries of patients who have large uterine fibromata.

(*c*) *Chronic Hypertrophic Ovaritis.*—Sclerous hypertrophy of the ovary is characterized by the hypergenesis of fibrous tissue, with destruction of the follicles. As Lawson Tait well observes, it is merely a second stage of sclerosis preceding that of retraction. "I have had the opportunity," he says, "of observing one of these cases for several years. At present it appears to have reached the stage of sclerosis." The hypertrophy is either complete or limited to the periphery. In either case the surface of the ovary, from the exaggeration of its furrows, resembles the cerebrum with its convolutions.

Independently of sclerous hypertrophy, Lawson Tait and Slavjansky admit of a true hypertrophy caused by hypergenesis of the normal gland elements and capable of increasing the weight of the organ to more than two ounces.

(*d*) *Fatty Degeneration.*—In suppurating or sclerotic ovaries we often find small foci of fat. In certain exceptional cases the fat may invade the organ to such an extent that its tissue becomes analogous to that of a fibrolipoma.

Micro-cystic Degeneration.—This name, or that of chronic follicular oöphoritis, has been given to a lesion characterized by the presence of a great number of small cavities, varying in size from that of a millet seed to a pea, which are scattered over the surface of the ovary, and which have often been found when castration was performed merely to relieve pain (Battey's operation). These cavities contain a clear, serous fluid and occasionally clots.

Some authorities consider that this constitutes a pathological condition, but the majority believe there is nothing morbid about it. It is certainly reasonable to suppose that these small follicular dropsies are in themselves non-inflammatory, and they are often met with when no symptoms pointed to their existence. Nevertheless they may by their number impair the integrity of the organ; interstitial sclerosis, as a matter of fact, is often met with in ovaries thus affected. In some cases it would seem as though we had to do not with follicular dropsy, but with hydrops of the ovules. When this is the case, according to Toupet we can clearly distinguish the following layers from the periphery to the centre of the cyst: first the layer of cubical

cells of the wall, then a narrow granular zone formed probably of the detritus of cells, a second epithelial peri-ovular layer, a more or less distinct hyaline membrane corresponding to the vitelline membrane, a granular mass representing the vitellus which has become dropsical, and showing in its centre a nucleus with nucleolus.

The term sclero-cystic degeneration has certainly been misapplied in order to justify the removal of organs which should have been left undisturbed. It should be exclusively reserved for those cases in which follicular cysts exist in large number throughout the whole extent of the organ, transforming it into a veritable areolar tissue.

Total Sclerosis.—The whole organ may be invaded by the interstitial inflammation which produces the hypertrophy of the connective tissue.

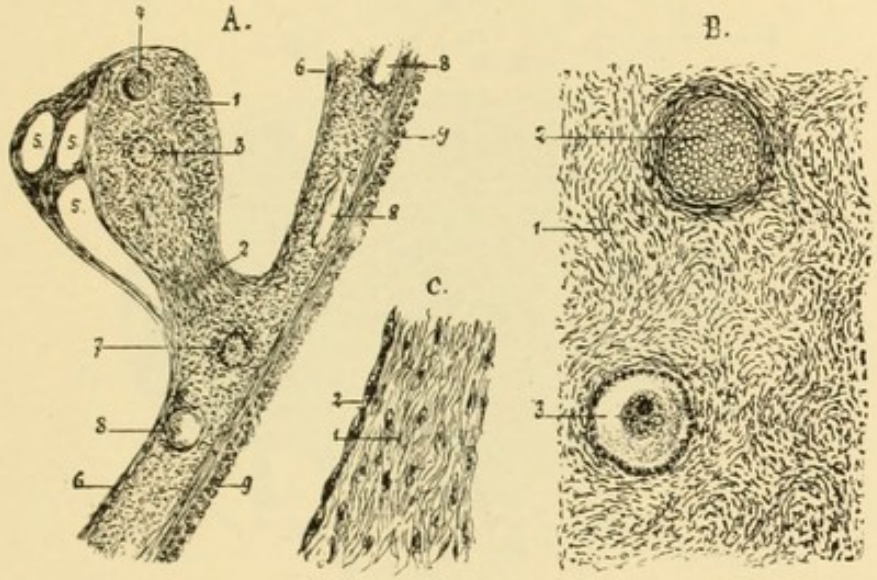


FIG. 367.—CHRONIC SCLEROTIC OVARITIS. Small nodules at base of ovary (Fig. 364, *B*). *A*, Section perpendicular to surface of ovary and passing through pedicle of growth (50 diameters), diagrammatic. 1, Body of tumor; 2, fibrous pedicle; 3, Graafian follicle; 4, vessel; 5, lymph spaces; 6, surface of ovary; 7, Graafian follicle in cortical layer; 8, vessels; 9, lining epithelium of small subjacent cyst. *B*, Region 3-4 of Fig. *A* (300 diameters). 1, Connective-tissue bundles running in all directions, with elongated slightly flexous nuclei; 2, vessel; 3, follicle and ovum. *C*. Section perpendicular to surface of one of the small tumors (500 diameters). 1, Fibrous tissue with long nuclei; 2, endothelial cells.

In the early stages it is compatible with ovulation, but, if it be at all advanced, the follicles are compressed and choked. The compression of the nerve filaments, which is due to the same cause, has been considered the chief reason of the nervous symptoms for which Battey's operation is performed. In the majority of cases the immediate cause of the cirrhosis seems to be a localized peritonitis, a peri-oöphoritis which progresses from the periphery to the centre. This peri-oöphoritis may, however, be absent and the starting-point of the process be in the interstitial tissue of the ovary itself. In these cases the hypertrophied ovary may attain the size of a hen's egg, and show the mammillated, mulberry-like surface of a cirrhotic ovary (Fig. 360). Usually, however, the ovary is shrivelled and diminished in volume from retraction of the newly formed fibrous tissue.

Jones found a most interesting lesion in such an ovary, which was of the size of an egg, granular on the surface, which was prolapsed and had been removed by operation. The lesion (to which I have already referred under the head of chronic endometritis) consisted in a dilatation of the lymphatics. The lacunæ were filled with a nearly homogeneous lymph containing a few lymph corpuscles; an elastic coat and a thick endothelial lining could be clearly seen.

Cirrhosis of the ovary usually accompanies micro-cystic degeneration, thus forming a mixed lesion, sclero-cystic ovaritis, which is more frequent in occurrence than either lesion alone. This lesion is sometimes accompanied

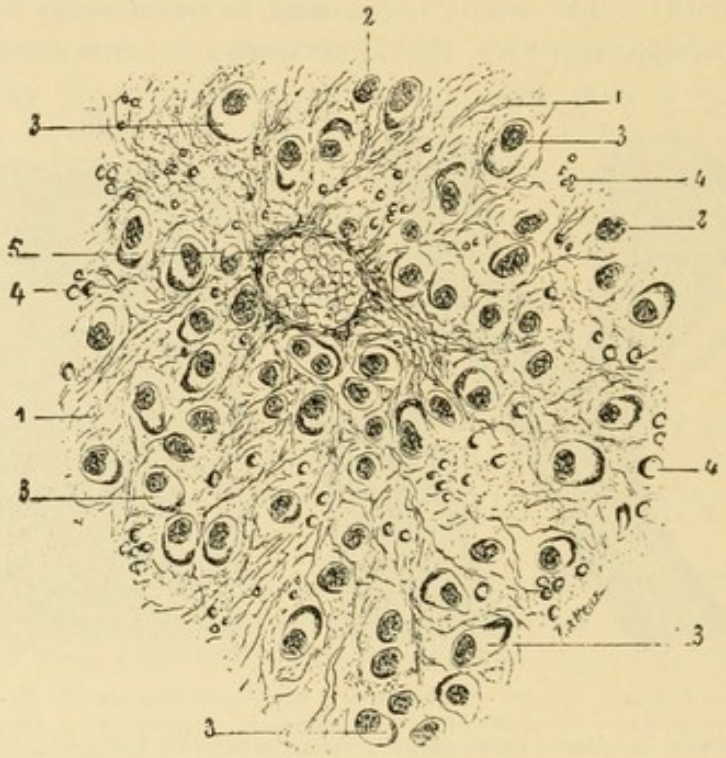


FIG. 368.—CHRONIC SCLEROTIC OVARITIS. Central portion of ovary in state of fatty degeneration (500 diameters). 1, Œdematous fibrous connective tissue; 2, large granular cells with thin protoplasmic limiting layer · 3, same changing to fat drops; 4, free fat droplets; 5, capillary blood-vessel filled with red and white corpuscles.

by œdema of the ovary, to which I shall refer later (*chronic œdematous ovaritis*). I will add a new form to the preceding ones. Chronic ovarian and peri-ovarian inflammation frequently is reduced by the normal development of the follicles which become transformed into cysts varying in size from a pea to a walnut. This form, which macroscopically has a distinct type, may be classified as *cystic* ovaritis from abnormal ovulation.

Paul Petit states that the stroma, which is normally composed of connective-tissue cells with multiple prolongations pressed closely against each other, which gives them a fusiform appearance, are gradually converted into fibrous tissue with dense wavy bundles, poor in cells and containing few blood-vessels, many of the arteries and veins having been obliterated by the plastic process. The connective-tissue bundles are thickest where they surround

the blood-vessels, follicles, and corpora lutea, the latter being for the most part increased in amount but reduced to a débris, and are recognized alone by their folds and hyaline appearance. This increase of corpora lutea is evidently the result of a species of morbid maturation of the follicles during the course of acute attacks of the disease. In the newly formed tissue, when the sclerotic process is far advanced, we see long ovular or star-shaped fissures, vestiges of the blood and lymphatic vessels of the ovisacs. They are, however, diminished in number and often altogether absent, according to the stage of the disease; some undergo modifications which result in the formation of serous or bloody microcysts.

Follicular Cysts from Abnormal Ovulation and Cystic Disease of the Ovary.—Dropsy of the Graafian follicle has long been considered the only or

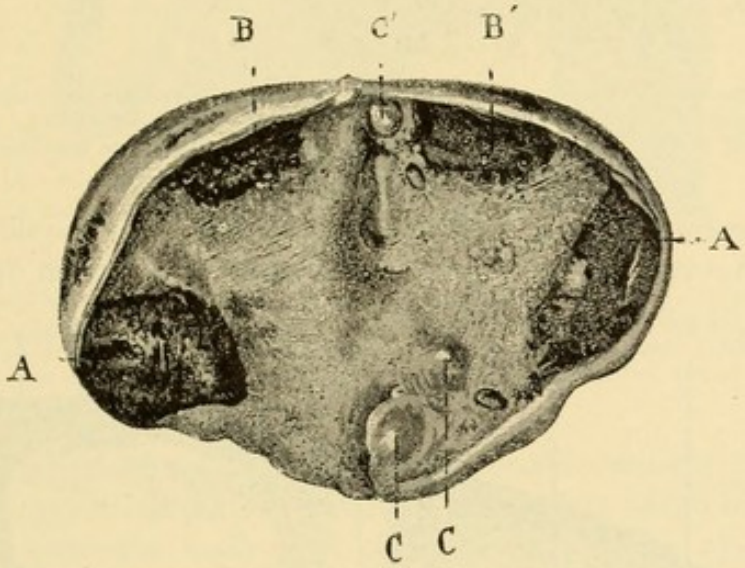


Fig. 369.—Chronic Micro-cystic Ovaritis with Apoplectic Areas. *A*, *A*, Cystic corpus luteum; *B*, *B*, apoplectic areas; *C*, *C*, small follicular cysts.

the chief cause of the development of large ovarian cysts. Some English authors still cling to this theory, which should, however, be abandoned. Cysts due to this origin are always small, and if they provoke morbid symptoms, that is rather because of the chronic inflammation of the adnexa than to the ovarian cysts themselves. We might almost say, by a juggling of terms, that the operations they call for are castrations rather than ovariotomies. I must therefore place them here among the cases of ovaritis.

Rokitansky's observations have established the fact of the existence of cystic dilatation of the follicle, and some writers describe this anatomical form by his name.

Follicular cyst (Fig. 369), or *follicular dropsy*, forms a small unilocular pouch, as small as a hempseed or as large as a walnut; this is the *miniature cyst* of Cruveilhier. The agglomeration of several of these pockets may exceptionally increase the size of the ovary to that of a fist or of a fœtal head. The wall is smooth, and lined with only one layer of epithelium;

the fluid is not thick. The ovule can often be seen, even in the larger cavities. In the new-born infant we sometimes find well-developed follicles towards the centre of the ovary: they seem to be due to special

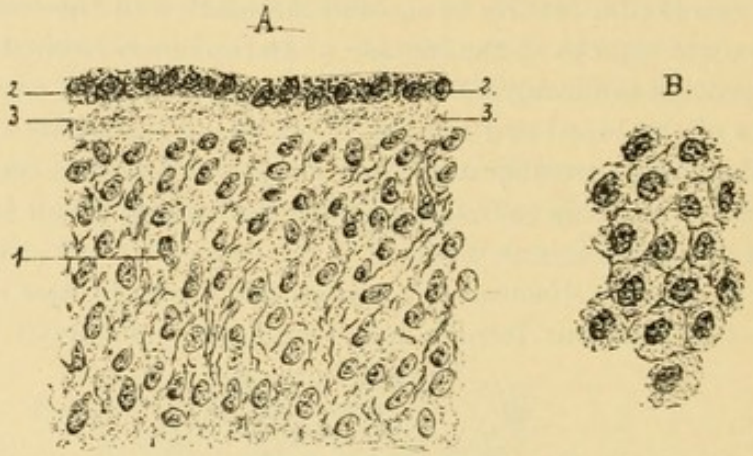


FIG. 370.—CHRONIC MICRO-CYSTIC OVARITIS. Section perpendicular to the surface of a dilated follicle. *A* Cyst wall. 1, Dense connective tissue containing many large granular cells with brilliant nuclei; 2, epithelial layer composed of a single layer of cells; 3, homogeneous intermediate layer. *B*, A flake of the same epithelium detached and seen on the flat.

local developmental activity at the moment of birth. It would be incorrect to call them cysts. The *large conglomerated cysts* which transform the

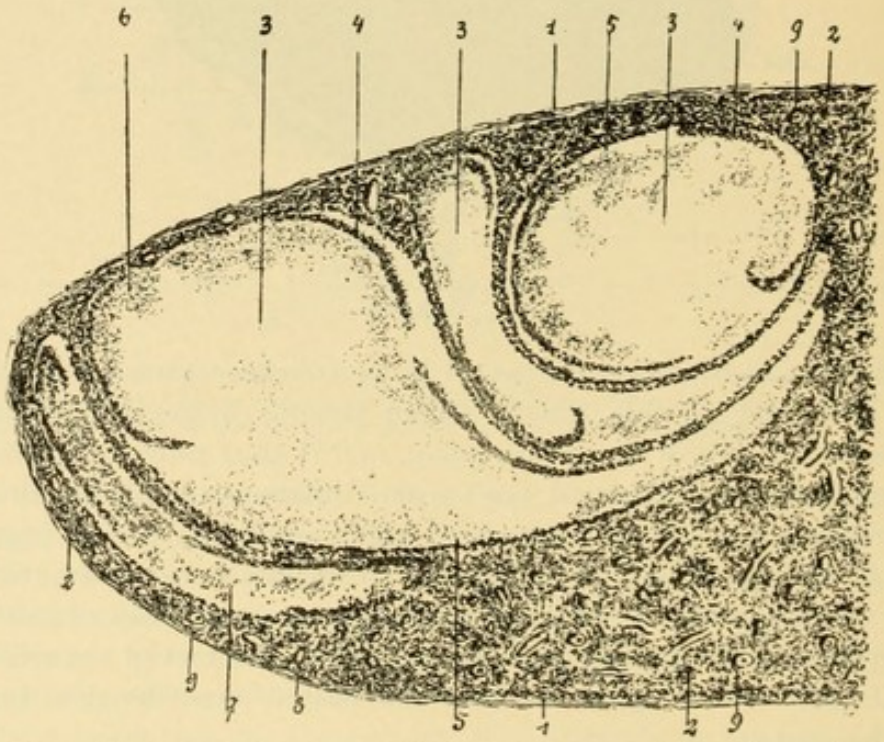


FIG. 371.—CHRONIC MICRO-CYSTIC OVARITIS. Section from an ovary containing a large number of small cysts, slightly enlarged. 1, Fibrous layer; 2, cortical layer; 3, 3, 3, cystic cavities deformed by mutual pressure; 4, layer of epithelium from one of the many superimposed cell walls; 5, point deprived of epithelium; 6, granular mucoid material; 7, small cyst filled with blood; 8, blood-vessel; 9, follicles in process of evolution.

whole ovary into a multilocular mass from a definite anatomical type which corresponds to an equally well-marked clinical variety. I think we might

well distinguish them from other small cysts, under the name of *cystic disease* of the ovary (Figs. 371, 372). These conglomerated cysts, which are rarely larger than a head, are usually the size of a man's fist, but are not,

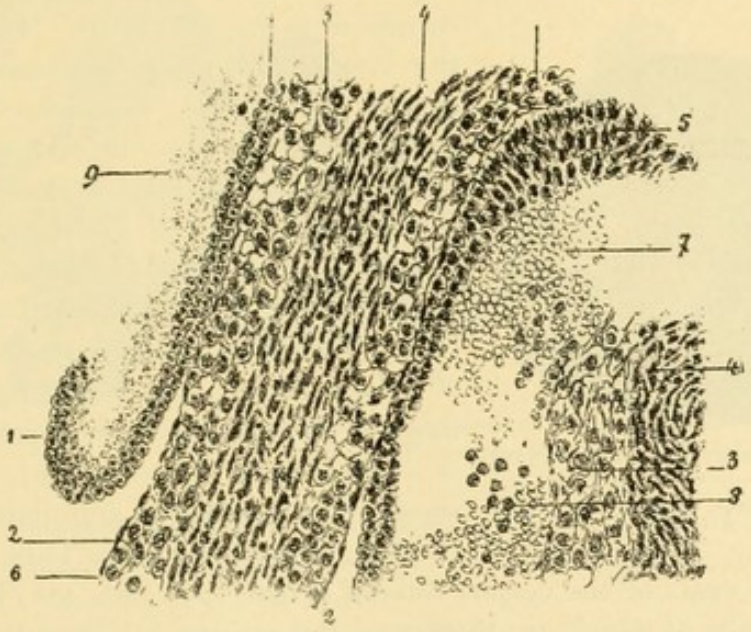


FIG. 372.—CHRONIC MICRO-CYSTIC OVARITIS. A point, showing the wall separating two cavities, from Fig. 371, highly magnified. 1, Epithelial layer consisting of one or two tiers of small rounded cells, corresponding to granular layer of follicle; 2, small flat cells (basement membrane); 3, reticulated lymphatic layer; 4, fibrous layer; 5, proliferated epithelium, deeper layer cylindrical; 6, point where desquamation of epithelium has occurred; 7, effusion of blood corpuscles; 8, detached epithelial cells; 9, thick contents of cyst.

as used to be supposed, the first stage of a more voluminous tumor. They retain for an indefinite period their small size, a fact which from a surgical point of view separates them from glandular proligerous cysts, which are moreover histologically different.

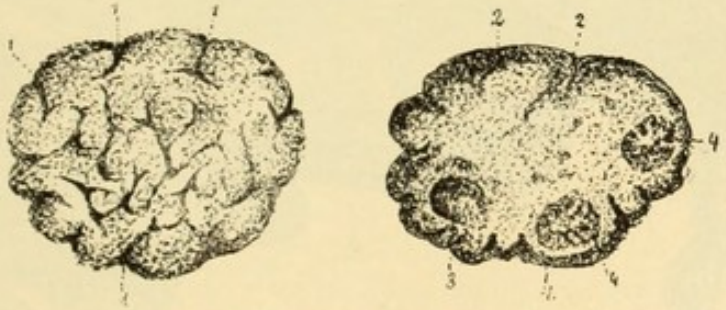


FIG. 373.—TOTAL CHRONIC SCLEROTIC OVARITIS.—*A*. Ovary (natural size) shrivelled and showing grooves and projections of its surface, resembling cerebral convolutions. 1, Grooves penetrating more or less deeply. *B*. Section of the same. 1, Sharply defined cortical layer; 2, place where this is more or less sclerotic; 3, micro-cyst; 4, corpora lutea.

In cystic disease of the ovaries, the liquid contents are serous or bloody. Yet I once extirpated a polycystic ovary in which a certain number of the sacs, varying in size from a pin's head to a walnut, were filled with a serous fluid, the rest containing a caseous or lardaceous substance in which a microscopic examination by Toupet, in Professor Cornil's laboratory, revealed

myxomatous tissue. The lesion was unilateral, the other ovary being sclero-cystic. This species of secondary degeneration of the follicular cysts has not, I believe, been described before.

Cysts of the Corpus Luteum.—To Rokitansky, again, we owe the first description of this affection. He believed that the *corpus luteum of pregnancy* alone was capable of cystic degeneration, but this opinion was too absolute; Gottschalk found them in a nulliparous woman. As a rule, these cysts are not larger than a walnut, but the two described by Gottschalk were of the size of an orange and a small apple respectively. Schröder saw one which was the size of a pigeon's egg, and Nagel reports them as large as an apple, or even of an adult's head. A microscopic examination of the walls shows the papillary granulations peculiar to the corpus luteum. This will prevent confusion of cysts of the corpus luteum (Figs. 379, 380, 381) with follicular cysts, the walls of which are thickened and stained by deposits of blood, or



FIG. 374.—SCLERO-CYSTIC OVARITIS WITH A LARGE FOLLICULAR CYST. *O*, Ovary surmounted by a large transparent follicular cyst.

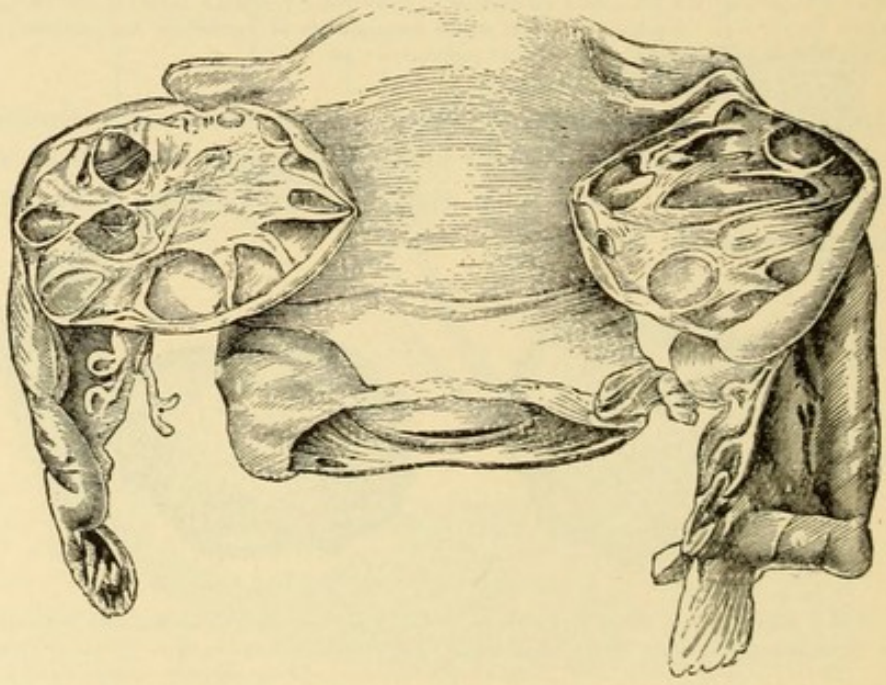


FIG. 375.—CYSTIC DISEASE OF THE OVARIES. Multiple serous follicular cysts. The tumors are seen opened (Barnes).

with suppurative ovaritis with inspissated pus when the cysts are inflamed under the influence of a coexisting salpingitis.

To a right understanding of the genesis of cysts at the expense of what is usually considered a cicatricial process, we must bear in mind that the

theory of a retraction of tissue for the formation of the corpus luteum is quite erroneous. It should be replaced by the view that there is prolif-

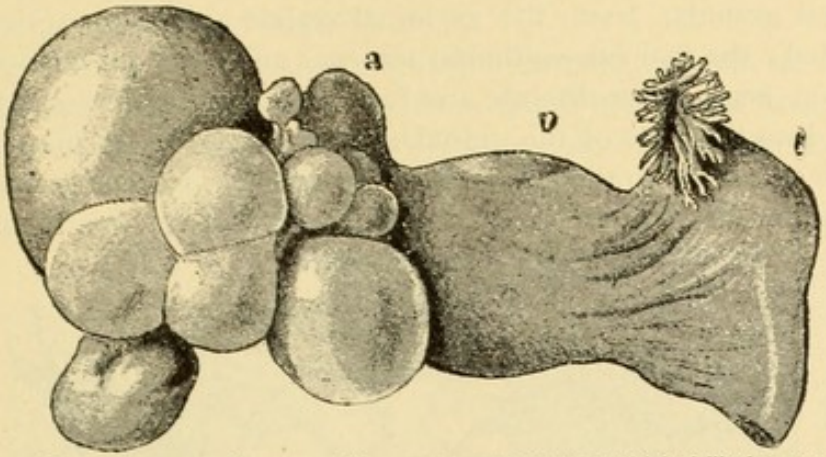


FIG. 376.—CYSTIC DISEASE OF THE OVARIES. (Serous and myxomatous multiple follicular cysts.) *t*, Tube; *o*, ovary; *a*, *b*, follicular myxomatous cysts.

eration and neo-formation of the ovarian tissue. Toupet's recently advanced theory attributes the formation of the corpus luteum to the granu-

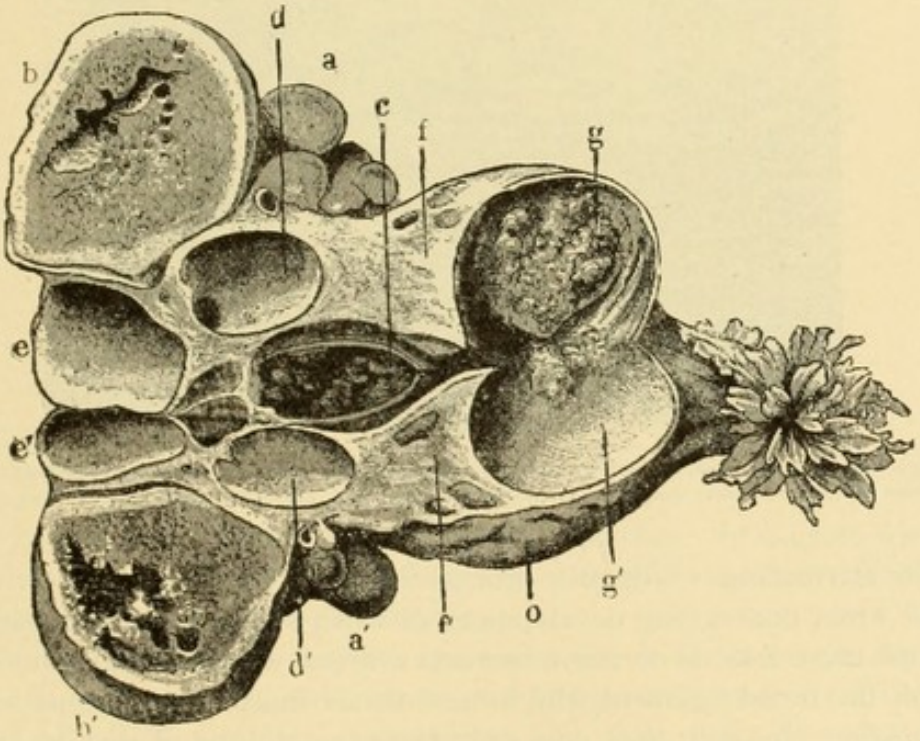


FIG. 377.—CYSTIC DISEASE OF THE OVARIES. (Serous and myxomatous multiple follicular cysts.) (Section of tumor shown in preceding cut natural size.) *a*, *a'*, Small myxomatous cysts; *b*, *b'*, large myxomatous cysts; *e*, *e'*, follicular cysts with fluid contents; *c*, *g*, *g'*, follicular cysts with caseous contents; *o*, *f*, *f'*, ovarian tissue containing small follicular cysts.

lar membrane, as does Waldeyer, from whom he differs in believing that the vitelline membrane is of the nature of connective tissue, or at least in holding that it is lined by a fibrous layer which serves as a support to the cells of the

ovular granular layer. This fact once admitted, the formation of the corpus luteum is explained as follows: when the ovisac is ruptured, the ovular granular layer and the subjacent connective-tissue layer remain in place as does the parietal granular layer, the germinal vesicle and the vitellus alone being expelled; the two sub-epithelial internal and external connective-tissue layers then begin to proliferate and form the papillary prolongations which penetrate into the cells of the granular layer, some being directed towards the centre and some to the periphery. By this theory, the formation of the corpus luteum would come under the general law of the development of tissues, by attributing to them a process identical to that observed upon the mucosa when undergoing development or when subject to inflammation.

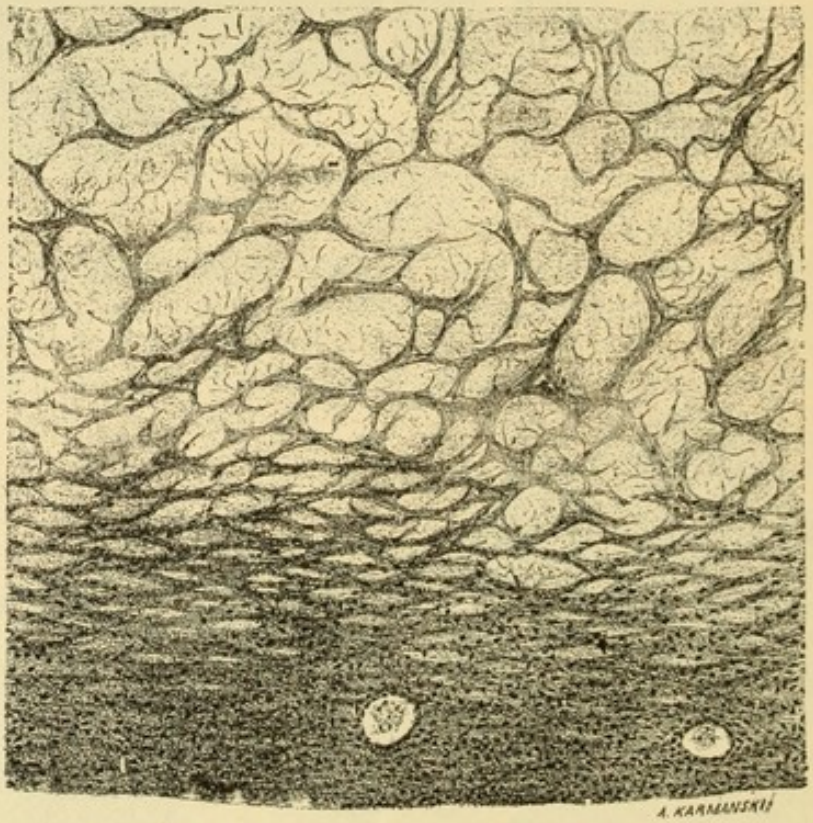


FIG. 378.—FOLLICULAR CYST OF THE OVARY, WITH MYXOMATOUS DEGENERATION. (Magnified 50 diameters.) *A*, *A*, Loose myxomatous tissue toward the interior of the cyst; *B*, *B*, dense myxomatous tissue toward the external surface.

With these lesions of the tubes and ovaries, we often find lesions of the folds of the broad ligament which must be attributed to the same inflammatory origin. In fact, they are only exceptionally found due to any other cause.

Residual Wolffian and Müllerian Cysts.—In the case of uterine fibroids or of beginning tumor of the ovaries especially, we frequently find in the broad ligament or the tube small transparent vesicles which possess no surgical interest, but whose anatomical significance deserves mention. They occur in three varieties.

(1) *Hydatid cyst of Morgagni*, attached to the fimbriated extremity of the tube, varying in size from a pea to a cherry, transparent, and lined with only one layer of endothelium. We know that the hydatid of Morgagni is the remains of the extremity of Müller's duct.

(2) *Supra-tubal cyst* of the same size, structure, and general appearance as the foregoing. It would seem to be a micro-cyst of the broad ligament which has pushed its way under the serous membrane and slipped into this

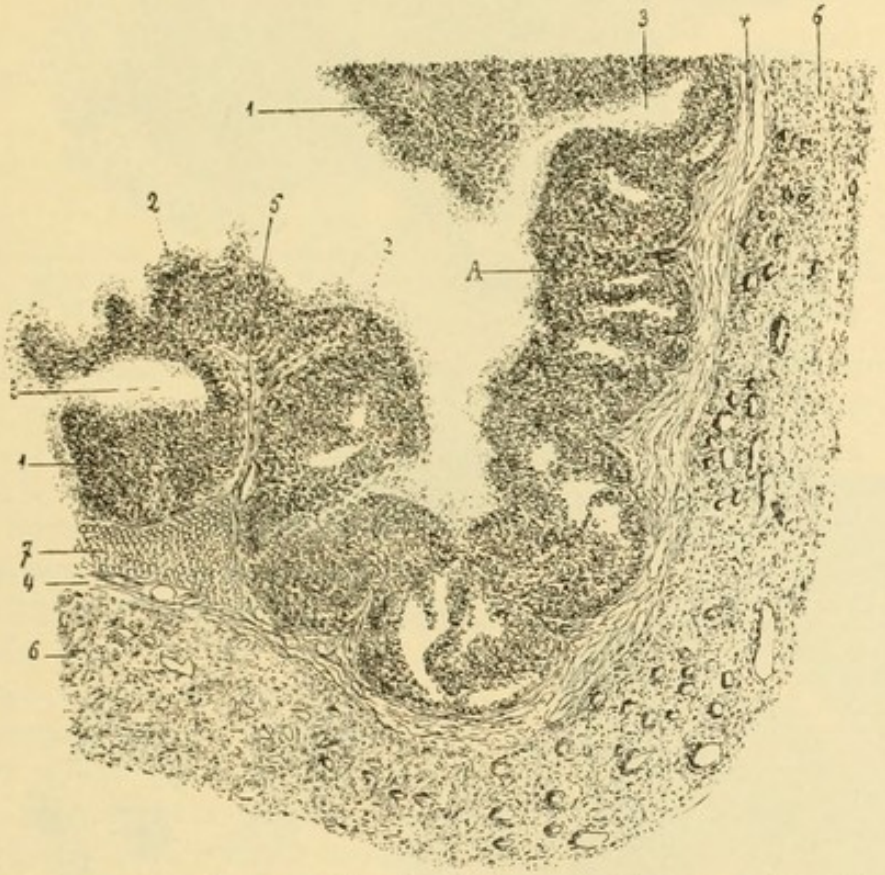


FIG. 379.—NORMAL CORPUS LUTEUM. Section through its centre (30 diameters). 1, Corpus luteum (substance formed of closely united cells); 2, mucus on surface; 3, grooves between the lobules; 4, connective-tissue layer; 5, prolongations into interior of lobules; 6, ovary, cortical portion riddled with vascular spaces; 7, extravasation of blood.

unusual position. Paul Petit is of opinion that these little cysts are due to the inclusion of peritoneal endothelium near the folds of the tube, from an adhesive and circumscribed peritonitis.

(3) *Micro-Cysts of the Broad Ligament.*—Some of these are dependent from Rosenmüller's body, and others are independent and of undetermined origin. According to Doran, only those which take origin from the vertical tubes of the parovarium contain ciliated epithelium, and become papillary from later development; the other cysts, those which originate outside of the parovarium, or even the cyst in the horizontal tube, which may be attached to the broad ligament by a slender pedicle, are lined with ordinary endothelium. We cannot positively affirm that the micro-cysts of this third variety have so distinctly limited a form of development as those of the

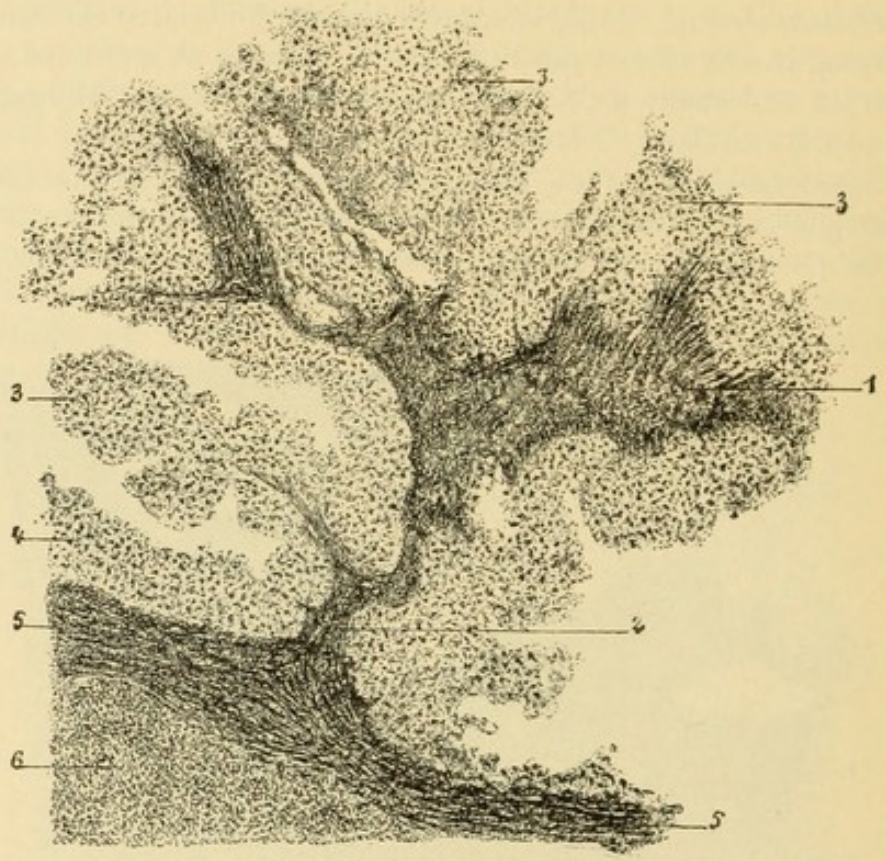


FIG. 380.—CYST OF CORPUS LUTEUM, FROM A PHOTOGRAPH (SLIGHTLY MAGNIFIED). 1, Large vegetating mass projecting into the cyst; 2, distorted pedicle; 3, tissue of hypertrophied corpus luteum; 4, layer of corpus luteum lining cavity of cyst; 5, fibrous wall of cyst; 6, peripheral extravasation of blood.

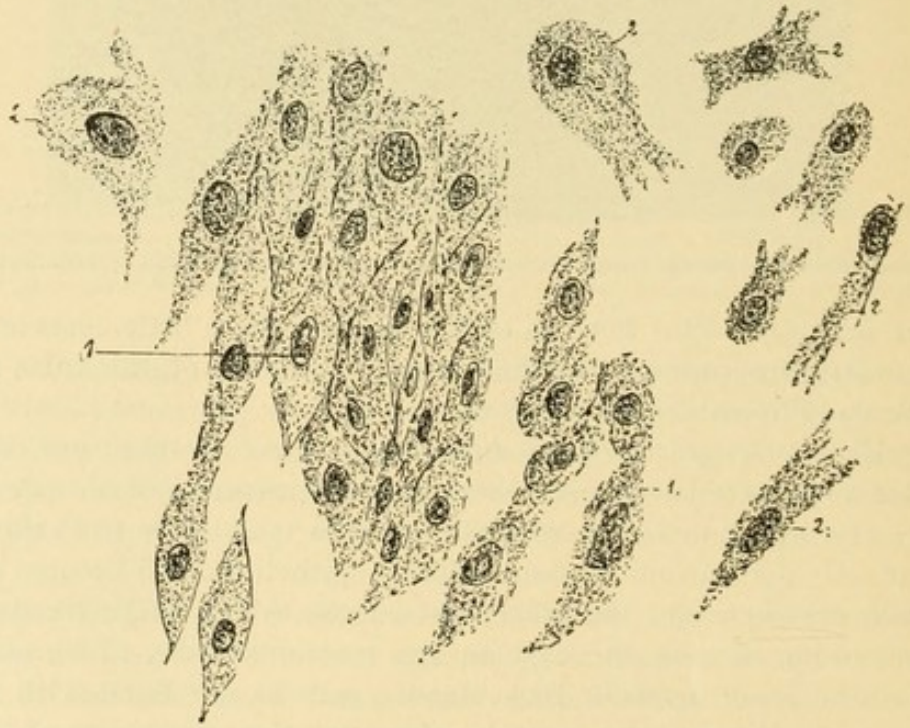


FIG. 381.—CYST OF CORPUS LUTEUM. Cells separated by alcohol (1,000 diameters). 1, Fragment from preceding figure showing grouping of cells; 2, isolated cells of various forms.

first. It even seems probable that although some of them may be of no importance at any time, others, under the influence of some unknown irritative process, may form the starting-point of large cysts of the broad ligament with purely liquid or else papillary contents.

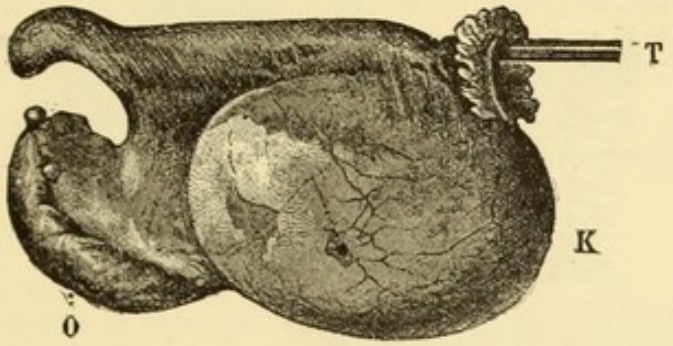


FIG. 382.—MICRO-CYST OF THE BROAD LIGAMENT DEVELOPED BETWEEN THE TUBE AND OVARY (POZZI). *K*, Cyst with transparent walls and contents; *O*, ovary; *T*, sclerotic tube showing small fibrous nodules and containing sound to demonstrate its permeability.

In this connection, it is interesting to read the data of the comparative anatomy of lesions of the uterus and ovaries in animals, given by Bland Sutton. These lesions are much more frequent in domestic than in wild animals. Cysts originating from the vestiges of the Wolffian bodies are fairly frequent among batrachians. Sutton found ten cases in two hundred and fifty frogs and toads. In birds and in batrachians we know that only the left canal of Müller persists, to form the oviduct. The right one disappears, and opens like a little cœcum in the cloaca. This small rudiment of a canal is a frequent starting-point for cystic formations. The following is a curious fact: when a female bird in the poultry yard possesses plumage or characteristics which resemble the male bird, its ovaries are usually found to be altered. In old mares, cysts of the tubes and ovaries frequently occur. Two-thirds of them are thus affected. They have been found in cats, goats, etc.



FIG. 383.—SUB-TUBAL MICRO-CYST OF THE BROAD LIGAMENT (POZZI). *GK*, Cyst, size of a mandarin, with transparent walls and contents; *PK*, accessory cyst, size of a nut, with transparent walls and contents; *T*, tube affected with parenchymatous salpingitis superimposed upon the ovary and adherent to it.

Suppuration of the ovary, as a rule, coexists with that of the Fallopian tube; the two are, so to speak, amalgamated, and sometimes form the wall of the same purulent pouch, so that pyo-salpinx is in reality a pyo-oöphoro-salpingitis.

Symptoms.—It is rare to find an acute salpingitis without coincident inflammation of the uterus, so that it is difficult to decide with precision to which lesion the symptoms are due. The uterine symptoms (uterine syn-

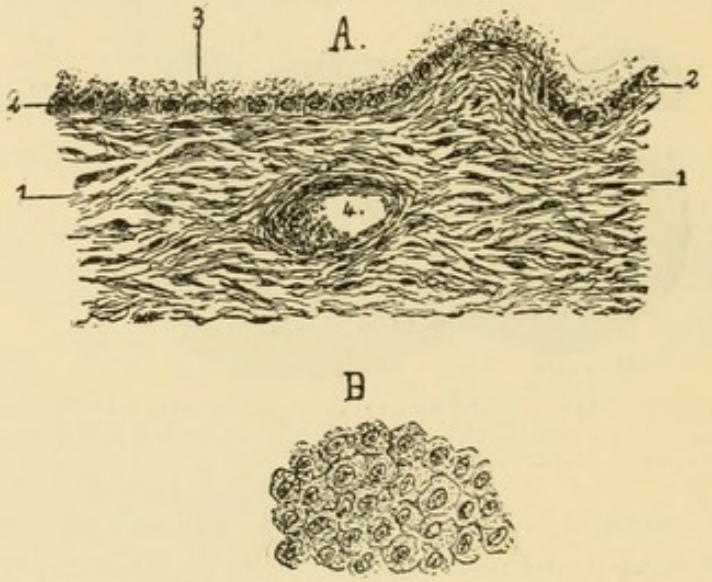


FIG. 384.—SUB-TUBAL MICRO-CYST. Section perpendicular to inner surface. *A*. Loosely arranged and interlacing bundles of connective-tissue fibres with elongated cells; 2, single layer of epithelial cells; 3, coagulated granular matter; 4, vessels. *B*. Fragment of epithelium seen on the flat.

droma) which I have fully described are usually most marked, yet there are a few special signs by which we may know that the tubes and ovaries have become inflamed.

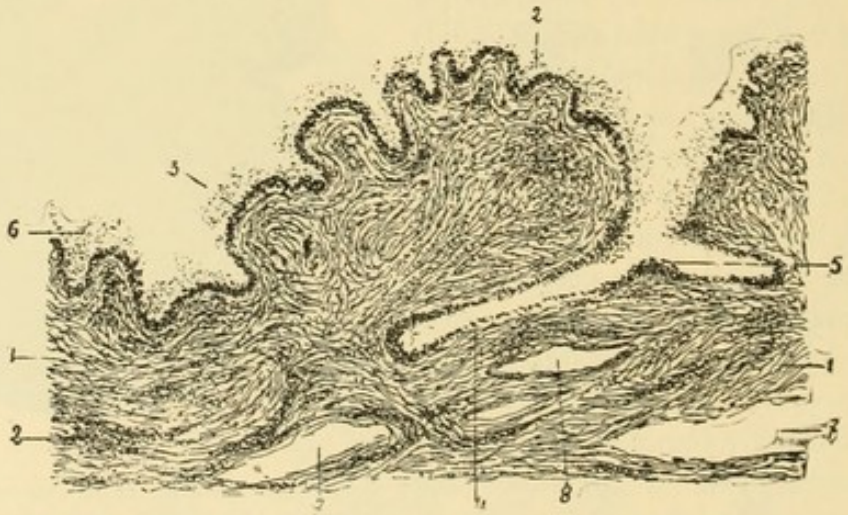


FIG. 385.—SUB-TUBAL MICRO-CYST. Section perpendicular to the wall (slightly magnified). 1, Fibrous tissue of dense, parallel, wavy fibres; 2, mass of small embryonal cells; 3, layer of cylindrical ciliated epithelium; 4, denuded portion of cyst wall; 5, portion where epithelium has become squamous; 6, mucus on internal surface of cyst; 7, lymph spaces; 8, vessels.

Pain is characterized by pseudo-neuralgic crises situated in the neighborhood of the appendages or in the lumbar region; it radiates upward to the epigastrium and downward to the thighs. Sometimes, but not always,

the pain is of a colicky nature, called salpingeal, and its cessation is characterized by the evacuation of muco-pus, which comes not so much from the tubes as from the cavity of the uterus which has been reflexly stimulated to contract.

Pressure, whether it be abdominal or vaginal, near the appendages causes pain. If the inflamed ovary be pressed between the two hands, the pain is exquisite, especially on the left side, for the left ovary is the one most often affected, just as in the male the left testicle is the one most liable to disease (varicocele, epididymitis, etc.). This may be due to the greater frequency of laceration of the cervix on the left side with direct propagation of inflammation either by an ascending endometritis or through the lymphatics.

The pain in the sides and in the lumbar region is often accompanied by gastralgia and vomiting; it is most marked at the menstrual period. Quite exceptionally we may see a case in which there is relief from pain during the menstrual period, and crises in the intervals (inter-menstrual dysmenorrhœa). Menorrhagia is an almost constant symptom, but there may also be long periods of amenorrhœa; thus we may have great irregularity in menstruation.

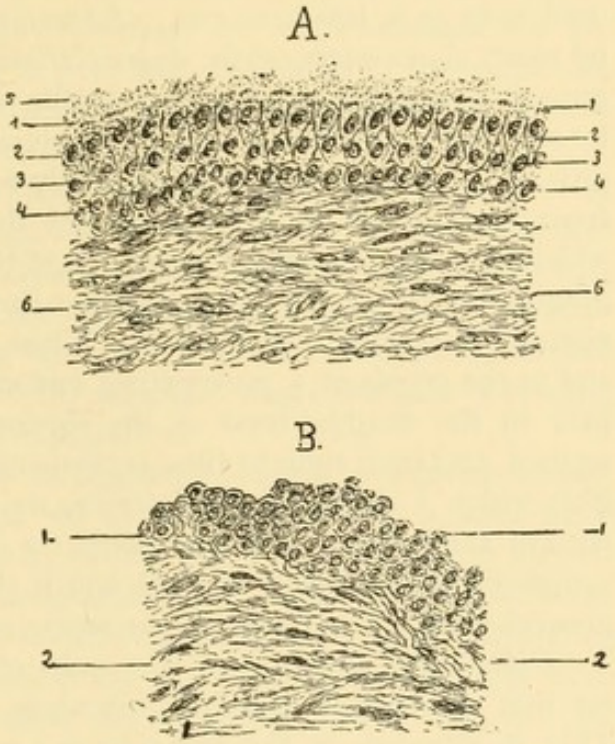


FIG. 386.—SUB-TUBAL MICRO-CYST. *A*. Section at point 3 in Fig. 385 (500 diameters). 1, Layer of vibrating ciliæ; 2, columnar epithelial cells with large nuclei; 3, long ovoid cells; 4, rounded cells of deep layer; 5, mucus; 6, rather dense connective tissue with fusiform cells. *B*. Section at point 5 of Fig. 385 (500 diameters). 1, Polyhedral squamous cells; 2, layer of connective tissue.

An examination of the inflamed organs is difficult in acute tubo-ovaritis, because of the pain which it causes. If there be any doubt as to the diagnosis, and a decision be imperative, the patient should be anæsthetized. I hardly know how to protest with sufficient energy against the systematic neglect of this valuable auxiliary to investigation, and against the substitution for it of an inquiry into the anatomical condition of the parts by one means of diagnosis only, namely, localized pain. This neglect is an excellent method of multiplying exploratory laparatomies.

Palpation of the appendage may be done according to the excellent rules laid down by Schultze. To examine the right side, the index and middle fingers of the right hand are introduced into the vagina, and the left hand is placed on the abdomen; for an examination of the left ovary, exactly the re-

verse is done. The patient is upon her back, the knees elevated and the thighs rotated outward, to put the psoas muscles on the stretch. The inner border of these muscles is to be followed as far as the superior strait, after which the exploring fingers are directed more inward toward the horns of the uterus. A small ovoid body, about the size of an almond, is met with and grasped bimanually. An exploration thus conducted can scarcely fail, under anæsthesia, to reveal any existing lesion of the appendages. Noeggerath has suggested that examination of the tubes be made by vesico-rectal touch, and he has by this means appreciated conditions which could not otherwise have been recognized; but as this method is open to some objections, it should be used only as a last resource. Although Hegar claims to have appreciated by touch alone micro-cystic degeneration of the ovary and catarrhal salpingitis, it is very certain that such tactile sensibility will never be possessed by any larger number of clinical physicians. Nevertheless, in acute salpingitis, some lesions may be more easily recognized than would seem possible from their limited nature, because of the existence of peripheric œdema which doubles or triples the volume of the inflamed tubes. In chronic salpingitis the tube feels like a resistant cord which is immobilized by adhesions to the sides of the pelvis. When, in addition to these physical signs and to the proofs of a pre-existing endometritis, we find constant localized pain in the neighborhood of the appendages, of the character already described, and from time to time accompanied by acute attacks of peri-salpingitis which I shall describe later on, we may with certainty affirm the presence of salpingitis. We may suspect a purulent condition if the rational symptoms are extremely marked, and if there has been recent gonorrhœa, or gonorrhœa called into activity by septic post-abortum infection.

Differential Diagnosis.—The pain of salpingitis must not be mistaken for that of ovarian neuralgia, ovaralgia, or painful ovary due to hysteria. This is situated on the left side as a rule, but may be bilateral. Charcot has shown that it is often accompanied by anæsthesia of the same side and by hystero-epileptiform attacks. This pain is manifested during serious and slight hysterical attacks; pressure brings it back; and as it is frequently associated with dysmenorrhœa of nervous origin, one may be tempted to attribute this symptom to inflammation of the ovary. According to Charcot, the pain really is situated in the ovary. In a pregnant woman who was a hystero-epileptic and suffered from hyperæsthetic ovary, he was able to follow the ascension of the painful zone as the ovary was drawn higher and higher in the abdomen by the enlarged uterus. The characters of the pain are such that it cannot be mistaken for anything else. Graduated pressure causes the appearance of a more or less marked hysterical attack, beginning with constriction in the epigastrium, nausea, cardiac palpitation, accelerated pulse, and globus hystericus; then follow ringing in the ears, sharp pain in the temples, and obscuration of sight, all more marked upon the same side as the affected ovary; finally there may be partial or complete loss of conscious-

ness. On the other hand, firm pressure upon the ovarian region may abort or delay the attack; but it must be firm enough to overcome the contractions of the abdominal muscles, which may require the exertion of all one's strength for several minutes. With such a group of symptoms as we have here described, it would be difficult to mistake the purely neuralgic nature of the attack; the presence of other neuralgic pains, paralyses, contractures, and hystero-epileptic seizures will re-enforce the diagnosis. Moreover, hysterical stigmata may be found—hysterogenic zones (sub-mammillary, dorsal), anæsthetic regions, narrowing of the field of vision, etc. The way in which the patient tries to avoid the pain caused by pressure is in itself characteristic of hysteria; when the appendages are really inflamed, the patient groans and instinctively tries to push away the hands of the examining physician; in the case of hyperæsthetic ovary, the movements lack co-ordination, and are of an irregularly convulsive type.

Lumbo-abdominal neuralgia, which may exist alone, and which so often accompanies endometritis, is recognized by its location in the abdominal walls, and by the fact that it is awakened by superficial pressure, especially upon the points of emergence of the cutaneous nerve filaments. Pressure over the appendages may give pain, because at the same time the abdominal walls are pressed upon; we can readily ascertain where the pain is actually situated by trying both methods of exploration.

Inflammation of the uterus is recognized by special symptoms already described; it is seldom, indeed, that we do not find at least a trace of it where there is marked inflammation of the tubes. I have in fact already stated that the two affections are rarely separated. Even when the endometritis is the more serious trouble, it is often accompanied by slight ascending salpingitis, too trivial perhaps to cause any appreciable physical signs to be included in the diagnosis, or to modify the treatment in any way, and yet quite sufficient to cause sensitiveness of the appendages.

Is it possible to determine from physical examination alone, without the rational signs, the exact part played by the tube or the ovary in an oöphoro-salpingitis? In the majority of cases this distinction cannot be made, nor is it usually necessary as regards the indications for operation.

Sclero-cystic degeneration of the ovary may exist without any marked tubal lesion; yet, as a rule, lesions of the two organs are rarely dissociated. The ovary is, as a general thing, so closely bound to the tube by adhesions that the tumor met with is tubo-ovarian. Still in a few cases we may, by means of bimanual palpation, distinguish the thickened cord-like Fallopian tube from the oblong ovarian tumor, which is by far the more movable of the two, and more detached from the edge of the uterus. It is not easy to find, and it may often be necessary to introduce both the middle and fourth fingers into the posterior and lateral culs-de-sac of the vagina; in some cases bimanual palpation with rectal touch will be better. Besides the changes in shape and mobility, an inflamed ovary is so sensitive that the

lightest touch will cause the patient to cry out with pain and draw herself away. Finally, it is when ovaritis is pronounced, and especially when it is bilateral, that dysmenorrhœa is the most intense, and that one may perceive a sensible increase in the size of the tumor at the menstrual period, either because of congestion or because there is an extravasation of blood into the micro-cystic cavities.

Cystic salpingitis and peri-salpingitis will be recognized by the great volume and the character and connections of the tumor which they cause. Yet it is well to know that we may meet successively, at intervals of a few days, either the elongated and cord-like tumor of acute or chronic salpingitis or the rounded and more or less diffused tumefaction produced by an acute peri-salpingitis of short duration.

Course and Prognosis.—Inflammation of the mucous membrane of the tubes is less amenable to treatment than that of the uterus. Let septic infection find a foothold in one of the many folds of the external third of the organ, and it will be inaccessible to direct therapeutic measures; if the patient recover, the cure will be spontaneous, the microbes having been destroyed. It is well known that such a result may occur in other localities; it is therefore reasonable to believe that it may occur here, especially if careful treatment be given to the uterine mucous membrane (anatomically and physiologically so closely connected with that of the tubes), placing a barrier about the tubal inflammation, and constantly re-enforcing the anatomical tissue elements in their struggle against the microbes. Is it possible for the cure to be complete with *restitutio ad integrum?* Most assuredly, and yet it is of rare occurrence. As a usual thing the Fallopian tube is more or less permanently impaired as a result of acute inflammation. There may be atrophy of the parts involved, as Boldt has shown; on the other hand, clinical experience demonstrates, by the persistence of the morbid symptoms when once the appendages have been subject to inflammation, how little amenable to treatment is this affection, and how serious are the after-results. The chief danger in either acute or chronic salpingitis comes from the perpetual liability to sudden attacks of peri-salpingitis (pelvic peritonitis).

The least over-exertion or change of regimen may cause an increase in severity of all the symptoms, and a decided change for the worse in the condition of the patient. Lawson Tait believes that this is caused by the entrance of a few drops of muco-pus into the peritoneum. Whether this theory be true or not, we find a peripheric puffiness due to infiltration or acute œdema of the subperitoneal cellular tissue. As a rule, rest and care bring about resolution, but relapses are frequent, may occur at intervals of months or years, and be characterized by the rapid appearance and no less rapid disappearance of circumscribed inflammatory nodules in the culs-de-sac. The feeling imparted to the hand by the senodules has caused certain authorities, who did not sufficiently examine into the anatomical conditions pres-

ent, to consider them inflamed ganglia, and the names peri-uterine adenitis and lymph-adenitis have incorrectly been given to this affection. There are no ganglia in this situation, consequently no adenitis; yet the œdema is doubtless found around lymphatic vessels and constitutes a peri-lymphangitis. It is found just above the vaginal cul-de-sac, upon the sides of the cervix, in the exact spot where Poirier has found and described a sort of network of lymphatic vessels which go from the cervix to the iliac ganglia.

Sterility is not an invariable consequence of salpingitis, which may resolve without obliteration of the ampulla; but when an old salpingitis has closed both tubes, fecundation is impossible. This, no doubt, accounts in great measure for the sterility of prostitutes.

Treatment.—Whatever may have been said to the contrary, a laparatomy or even an exploratory incision is not justified for the mere relief of persistent pain in the vicinity of the appendages. After an era of surgical excesses, especially in foreign countries, where, according to Emmet, "removal of the uterine appendages has been lightly undertaken by both competent and incompetent persons," we have at last reached a point where the fruitfulness of patients is not so readily sacrificed, and where we attempt to cure rather than to extirpate.

The treatment of catarrhal tubo-ovaritis is identical with that of endometritis, as that of ascending pyelo-nephritis is similar to that of the cystitis which causes it. Absolute rest, mild aperients, careful antisepsis of the vagina, prolonged and hot vaginal irrigations are the first things to be prescribed. When necessary, bleeding, if not contra-indicated, may be produced by scarifying the cervix or by leeches applied to the iliac fossa, and will greatly relieve the pain. Small blisters followed by the application of one-sixth of a grain of the chlorhydrate of morphine to the denuded surface, cauterization of the iliac region, prolonged tepid baths, injections of laudanum, valerian, chloral, may all be used for the relief of pain. As I said above, we may hope to cure salpingitis along with the endometritis providing that the lesions do not have time to become permanent. Curetting the uterus and then injecting tincture of iodine, as described at length in the chapter on Endometritis, has often done me good service in curing an incipient salpingitis. Trélat has obtained excellent results by following curetting with injections of creosote and glycerin. The cures reported by Walton, Gottschalk, and Doléris are doubtless due more to the antiseptic treatment of endometritis than to any problematical mechanical action, and the very indirect dilatation of the ostium uterinum.

Should curetting be done when salpingitis is accompanied by acute peri-salpingitis characterized by the painful nodules in the vaginal cul-de-sac? I think not, and that it is better to wait until rest and antiphlogistic treatment have caused a disappearance of these nodules, which occurs very rapidly when they are not encysted tumors of the Fallopian tubes. A little delay

will often help in settling the question of diagnosis. To extol forced dilatation and curetting as a cure for perimetritic exudations, as Walton of Brussels and Poullet of Lyons have done, is to formulate a dangerous precept, since it presupposes that there can be no error of diagnosis. Undoubtedly curetting for endometritis may in many cases relieve or cure a serous perisalpingitis as well as the salpingitis; but in other cases it may result fatally by causing the rupture of a cyst where a pyo-salpinx exists but has not been suspected. In view of this danger, and of the fact that an exact diagnosis is often impossible, would it not be better to delay curetting until the acute manifestations have subsided and we can assure ourselves that they did not mask a collection of pus?

It is under the head of indirect treatment that we must consider the question of the value of *electricity* in some cases of salpingitis.

I think the extent of its applicability has been overestimated. Encysted matter in the tubes can only be reached by puncture, which would be as dangerous with the negative pole as with a trocar. In hydro- or hæmato-salpinx suppuration may be induced; in pyo-salpinx this incomplete opening may entail, not only a fistula, but septic accidents. Galvano-puncture through the vagina, if it does not penetrate into collections of pus, is very apt to produce adhesions which cause pain and complicate further operative procedures. Apart from the cases just mentioned, I see no reason why the application of the intra-uterine galvano-cautery may not cure catarrhal salpingitis by its good effects upon the endometritis. But I consider curetting with intra-uterine injections preferable on account of its greater simplicity and the greater certainty of its good results. In very nervous patients, continuous faradic currents carried into the uterus by means of the bipolar excitor may give relief. But we must proceed with great caution, and bear in mind the possible presence of pus; electrization of the uterine cavity has been known to cause the rupture of a pyo-salpinx.

Massage has in the past few years been greatly praised as a method of treatment for inflammation of the uterus and appendages, and like all new measures has aroused more enthusiasm than it deserves. This method is by no means free from disadvantages. I think it should be used exclusively in cases of chronic salpingitis in which there is no suspicion of the existence of encysted collections of pus, for the cysts might easily be ruptured accidentally into the peritoneal cavity instead of being emptied through the ostium uterinum as the masseur desires. In acute inflammatory processes, massage does more harm than good. By friction of tissues which are friable and filled with blood, it may cause rupture and dangerous hemorrhages. Yet I would advise the use of this method of treatment in the case of residues of inflammations long passed, adhesions and cicatricial contractions, which all cause pain, for the relief of which many a laparatomy has been too hastily undertaken.

Antiphlogistic massage should follow, in gynæcology, the same laws

which general surgery have created for it, as, for example, in the treatment of arthritis.

If all therapeutic measures fail, after a sufficient delay we are justified in having recourse to the radical operation of oöphoro-salpingotomy.

We must not hesitate to perform it without delay when the severity of the symptoms leads us to suspect a purulent salpingitis which might rapidly threaten life. And although we should be a little more conservative in the case of chronic non-purulent tubo-ovaritis, yet the operation is not to be proscribed. These lesions, while not endangering life, render it unbearable by the almost incessant pain they cause, and the deterioration of the general health. At least six months' careful and patient treatment by the methods which I have already indicated should precede an ovariotomy for non-purulent salpingitis.

Removal of the appendages by abdominal incision, except in very exceptional cases, is a safe operation. It really includes two distinct procedures: (1st) rupture of peripheric adhesions and replacing the uterus, which is usually retroverted or retroflexed; (2d) removal of the tube and ovary as close as possible to the uterus.

Their removal by vaginal incision has been praised by Byford in America, by Gottschalk in Germany, and by Picque in France. This operation has recently been restored to favor by Dührssen under the name of vaginal cœliotomy, and by Martin as anterior colpotomy. Martin practised it one hundred and seventy-nine times without one fatal result, fifty-four of the cases being lesions of the adnexa. No doubt this operation is of use in certain cases, but it seems to me that here it possesses no special advantages, and may be of serious disadvantage should the slightest operatory complication arise. The ovary must always be removed with the tube, even if it seem to be unaffected. Can we, in certain cases, limit ourselves to the first part of the operation, breaking down of the adhesions, liberation and replacement of the uterus and appendages? Hadra was the first to observe that the morbid symptoms, especially sharp abdominal pains, for the relief of which healthy ovaries have often been removed, may be relieved by merely destroying the adhesions, often filamentous, which bind together the various abdominal viscera. He therefore suggests that whenever a laparatomy is performed under these conditions, we should carefully examine the abdominal organs for adhesions, slipping the hand carefully between the loops of intestine, under the omentum, and above it. If the appendages are in a healthy condition, he contents himself with this performance; if they are diseased, he removes them.

Polk goes farther than this. Having removed only one tube after going through the procedure just described, although the oviduct which was left in place showed evident signs of inflammation, he proposed the plan of simply expressing the muco-pus contained in the diseased tube, washing the

peritoneum, and closing the abdomen, after having, if necessary, performed a hysteropexy to prevent a return of the retroflexion.

Mundé theoretically approves of this treatment, and in addition to expressing the contents of the tubes proposes that a catheter be introduced into them and that they be washed from the abdominal end with a hot bichloride solution 1 : 5,000. F. Howitz has also in some cases substituted the breaking down of adhesions for an ovariotomy. He reports a remarkable case in which all the symptoms of chronic salpingitis were cured without a salpingotomy, although the right tube seemed to be inflamed and swollen. He lays much stress upon the pathological influence exercised by adhesions extending from the epiploön to the pubis. Many other authorities are beginning to show the same conservative tendency. J. L. Championnière recently expressed himself in favor of these views at the surgical society. Terrillon has performed the exploratory method once; Martin did not stop with breaking down the adhesions, but opened the obliterated extremity of the tube and reconstructed the ampulla. Out of thirty-one cases of laparatomy for lesions of the appendages, Polk in twenty-four of them simply destroyed the adhesions.

It is impossible as yet to give a definite opinion as to the value of these procedures. There is perhaps a danger of going from one extreme to the other, and, after having been too ready to operate, we may be in too great haste to try procedures of great ingenuity but of doubtful value. Yet the good results following simple hysteropexy after breaking down adhesions, in cases in which salpingitis and peri-salpingitis undoubtedly existed, plainly show that many tubes and ovaries have been needlessly sacrificed. The replacing of the uterus into position, the liberation of the appendages, and the antiseptic cleansing of the pelvis, which necessarily attends this operation, will certainly tend to diminish the number of oöphoro-salpingotomies. We may probably reserve extirpation of the appendages for three classes of cases:

1. Ovaritis and salpingitis where there is every reason to suspect the presence of pus, and to fear the consequences.

2. Painful sclero-cystic ovaritis.

3. Chronic parenchymatous salpingitis and cystic (serous or hæmic) salpingitis, where, in spite of the lesions being apparently slight, menorrhagia, dysmenorrhœa, or nervous reflex phenomena call for an operation. Removal of inflamed appendages, which contain a small quantity only of mucus or muco-pus without the formation of a pouch or pyo-salpinx, is not a severe operation. Conservatism is enjoined, less because of the gravity of the operation than because of the sterility which follows it.

CHAPTER XXV.

CYSTIC OÖPHORO-SALPINGITIS.

(Pyo-salpinx, Hydro-salpinx, Hæmato-salpinx.)

Among the cystic dilatations of the Fallopian tubes, that due to accumulations of pus should have the first place. Pyo-salpinx often becomes transformed into serous or bloody cysts. When (probably from spontaneous destruction of the germs) the phlegmonous process comes to an end, an abscess in the tube may, like a cold abscess, become changed to a collection of serous matter by a clarification of the pus, the solid constituents of which are deposited upon the walls while the serum increases in amount. This seems to be the origin of the majority of cases of hydro-salpinx. The rupture of newly formed blood-vessels in the walls of the cavity of a chronic pyo-salpinx often fills it with blood.

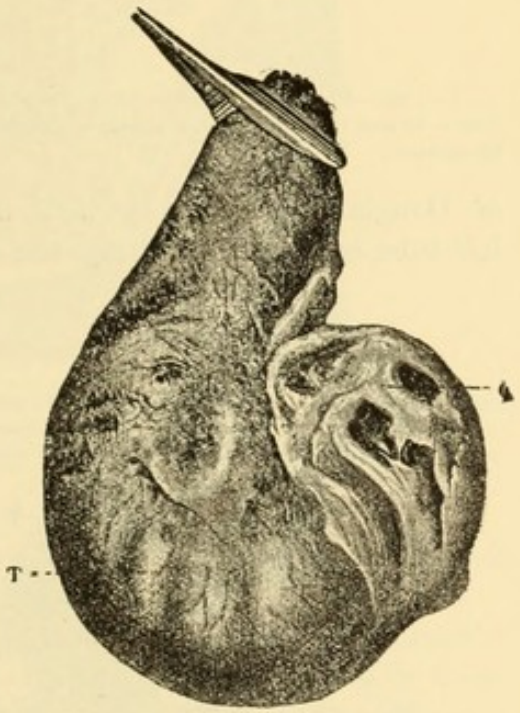


Fig. 387.—Pyo-salpinx Adherent to a Sclero-cystic Ovary. *T*, Dilated tube; *O*, ovary.

Pathological Anatomy.—Pyo-salpinx, or purulent cyst of the Fallopian tube, is a sequel of purulent salpingitis, especially that caused by gonorrhœa or by septicæmia—the latter usually occurring post abortum.

As I have already remarked, Lawson Tait and Freund attach much importance to an incomplete development of the oviduct, which predisposes it to obliteration and cystic degeneration. The tube, whose external extremity is closed by an agglutination and a species of intussusception of the fimbriæ, is dilated for about two-thirds of its extent externally; more rarely the whole length is dilated. As a usual thing the portion nearest the uterus remains of normal size for about half an inch or an inch, but is at the same time much hardened. In this situation we may observe a torsion of the uterine pedicle of the tube. The ampulla often adheres to the ovary, which is more or less fused in with the cyst; very rarely we may find the ampulla intact and free and projecting beyond the collection of pus, which is limited by the

obliteration of the tube nearer to the uterus. Adventitious membranes adhere to the tube and ovary, which they usually bind down to the cul-de-sac

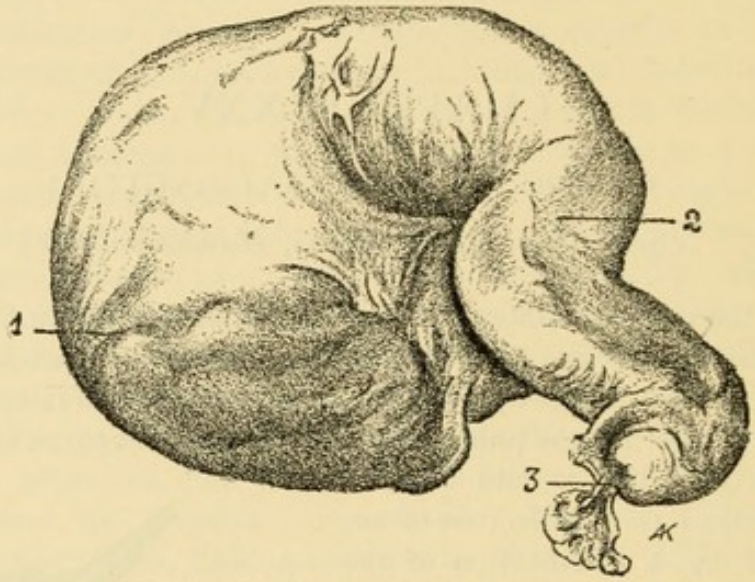


FIG. 388.—PYO-SALPINX. 1, Dilated portion of the tube formed by the obliterated distal end; no trace of the fimbriæ to be seen; 2, middle portion of tube thickened and bent; 3, proximal end of tube; below is seen the remains of an adhesion.

of Douglas. The uterus itself is consequently frequently displaced. The left tube is, as a usual thing, the larger.

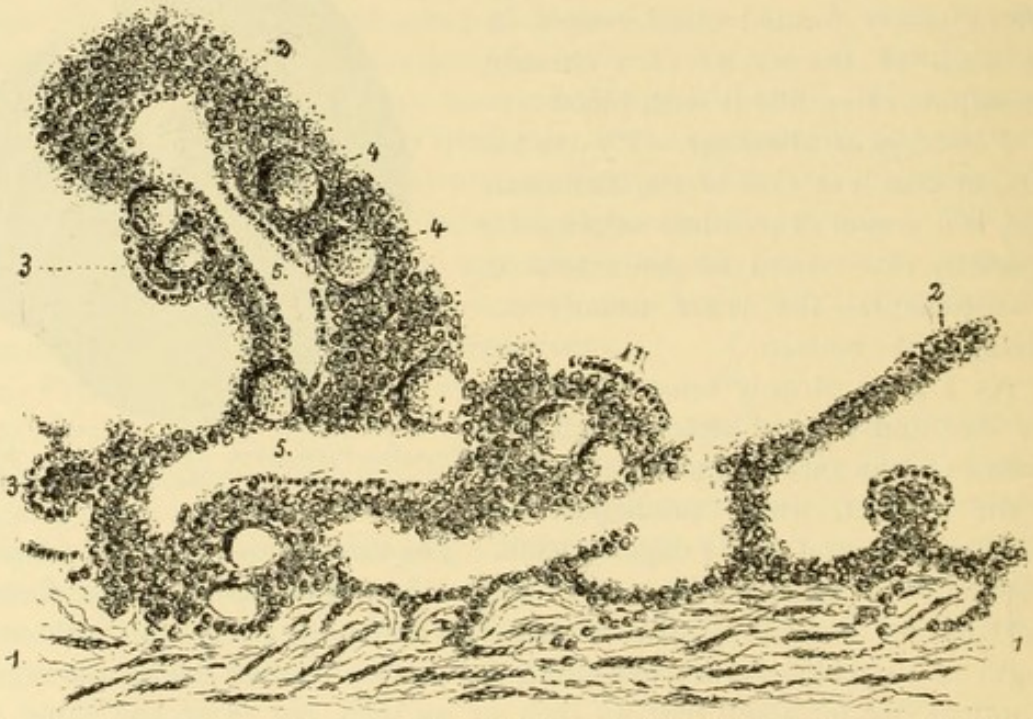


FIG. 389.—PYO-SALPINX. 1, Fibro-muscular tissue of tube; 2, villosities infiltrated with embryonal cells and denuded of epithelium; 3, points where epithelium still remains; 4, dilated vessels full of blood; 5, lacunæ formed by consolidation of adjoining villosities.

Cysts vary much in size; some have been reported to be as large as a fœtal head or a cocoanut.

As a rule, however, they are about the size and shape of a small pear; often they are slightly curved upon themselves, like a hunter's horn (Fig. 388), and are yellowish-white in color. The wall of the cavity varies in thickness; usually there is a weak spot corresponding to the posterior adhesions; it is difficult to avoid bursting the sac in this place when detaching it. The internal surface is velvety to the touch, the pus creamy and yellowish; it has a fetid odor when the sac is intimately connected to the rectum. Sometimes a cyst of the broad ligament, or of the ovary situated just

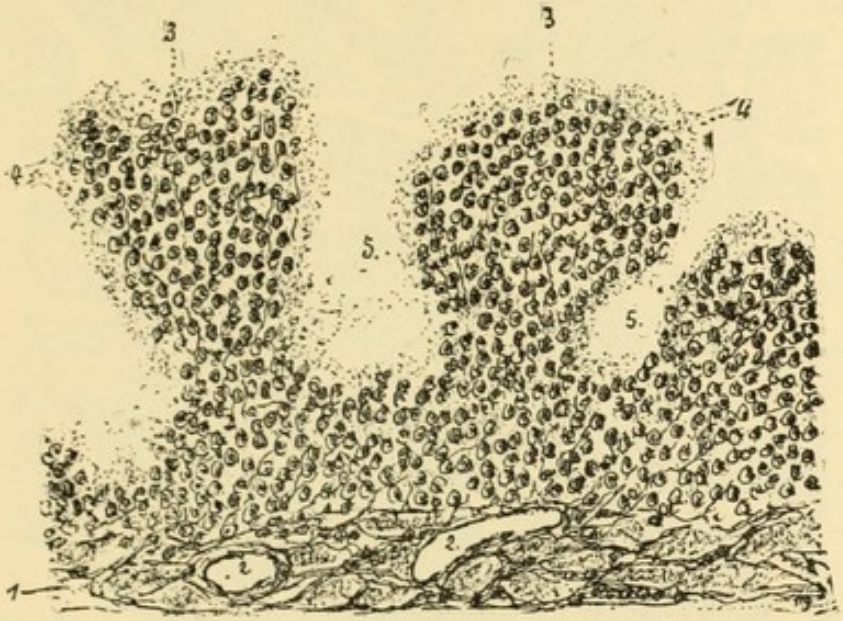


FIG. 390.—PYO-SALPINX. Section perpendicular to inner surface of tube (350 diameters). 1, Fibro-muscular tissue; 2, vessels; 3, villosities composed of loose connective tissue infiltrated with innumerable cells and showing no epithelial cells upon their surface; 4, granular mass of coagulated fibrin containing blood corpuscles; 5, spaces between villosities.

below the inflamed tube, may also suppurate, and even open into it. I have myself seen an example of the first-named variety.

Under the microscope, we find the internal surface covered with branching vegetations like those of acute catarrhal salpingitis, but two or three times as thick, because of the more abundant infiltration with embryonic cells. They are covered with a single layer of columnar cells, which is also found in the bottom of the sulci which separate them.

The deep layers of the mucosa are rich in fusiform cells. Nearer to the surface is a zone of such abundant cellular infiltration that it looks like granulation tissue. The walls of the undilated portion of the tube, which to the naked eye look perfectly normal, are also infiltrated with embryonic cells. The blood-vessels are everywhere seen to be dilated.

In pyo-salpinx the uterine end of the tube may be still slightly permeable. It is said that the walls are thickened in this variety, when there is free evacuation. In all probability they seem so, because they are not excessively distended. It has also been asserted that the hypertrophy of the

muscular fibres would then cause an evacuation of the cavity; but this is improbable; evacuation is probably caused by an overflow.

The tube being more or less affected and showing signs of a chronic interstitial inflammation, it may happen that the ovary alone is transformed into a purulent cavity, or that circumscribed abscesses occur within it. In such cases the source of the inflammatory process has usually been the tube,

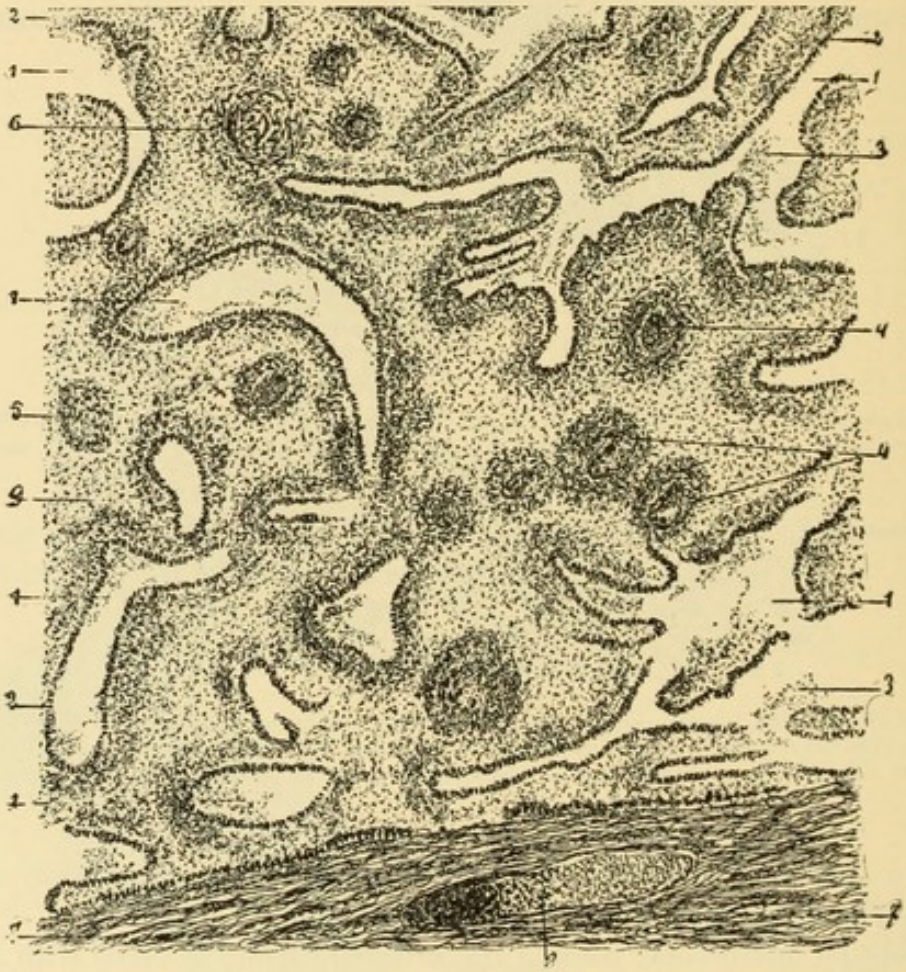


FIG. 391.—TUBERCULAR SALPINGITIS. Section perpendicular to wall of tube (diagrammatic). 1, Villosities of tube more or less united, leaving between them irregular cavities of varying size; 2, cylindrical ciliated epithelium; 3, mucus; 4, tubercle with giant cells; 5, tubercle without giant cell; 6, obliterated vessel; 7, wall of tube; 8, large vessel filled with coagulated blood; 9, tissue of villosities infiltrated with numerous embryonal cells especially near tubercles.

which after evacuating its contents into the uterus has gone on to the stage of chronic inflammation, while the suppurative process still continued in the ovary.

In other cases in which the two organs have remained widely separated, the infection of the ovary must have been indirect and by means of the lymphatics. However that may be, it is probable that the formation of abscesses within the ovary, from contagion derived from the tube, is usually favored by a small pre-existent cyst, either follicular or of the corpus luteum, or else by micro-cystic degeneration.

Pyo-salpinx may coexist with uterine tumors, fibroid or cancerous.

Cold abscess of the tube, or tubercular pyo-salpinx, is recognized with difficulty when there is no similar lesion of the ovary or uterus. We may, however, find characteristic tubercular granulations upon the neighboring peritoneum; as to the caseous masses found in the tube, they might be caused simply by inspissation of pus, and we know now that these apparent tubercles, to which so much importance was attached of old, are of small importance. The microscope alone can decide whether they are really tubercular, by showing the characteristic cellular features of a tuberculous follicle, with its zone of nucleated cells surrounding the giant cells, and showing,

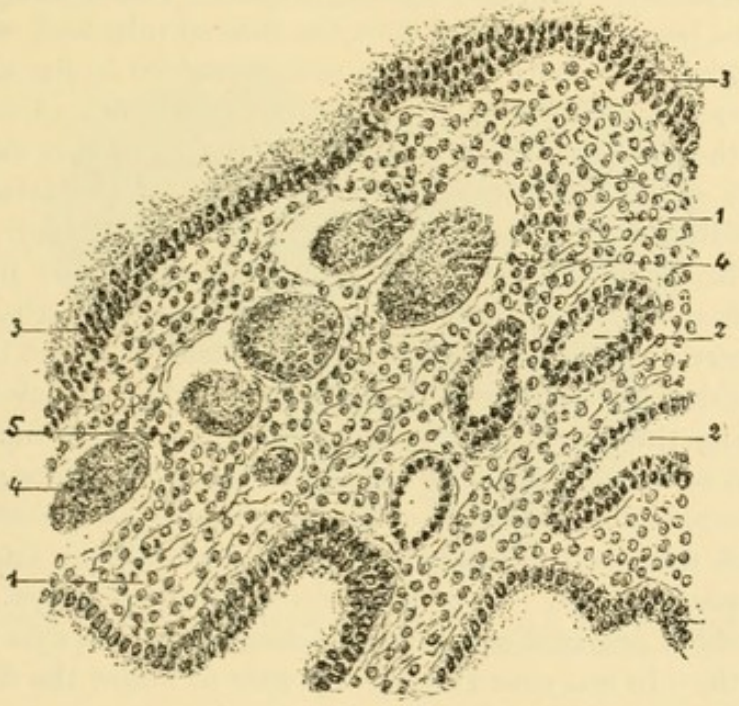


FIG. 392.—TUBERCULAR SALPINGITIS. Portion of Fig. 391 highly magnified. 1, Tissue of villosities with numerous round embryonal cells; 2, villosities cut transversely; 3, epithelium arranged in several layers, the deeper being cylindrical; 4, giant cells; 5, proliferated cells.

above all, the Koch bacillus. Hegar and Orthmann have met with the latter, but, like Neisser's gonococcus in gonorrhœa, it may be absent (because it has disappeared) without invalidating a diagnosis of specific lesion.

Hydro-salpinx, or tubal dropsy, is, from an anatomical point of view, the oldest known of the tubal affections. But, beyond doubt, many a case of tubo-ovarian cyst when the tube was not dilated but only lengthened, hypertrophied, and adherent to an ovarian cyst which opened into it, has been mistaken for hydro-salpinx. This may account for the colossal dimensions attributed to it by ancient and even modern authors. It is very doubtful if these tumors ever attain a greater size than that of a fœtal head. As a usual thing they are only as large as a small pear. They are smooth and bluish-white in color; the walls are transparent in places and papyraceous. In a few cases the tube is not equally distended throughout, and the

hydro-salpinx presents sigmoid curvatures (Fig. 393). There are few peripheric adventitious membranes, or, if they exist, they are thin and distended—for dropsy of the tubes always indicates an inflammation which has subsided.

Froriep, who studied this lesion profoundly, divided hydrops tubæ into two varieties: aperta and occlusa, according to whether the uterine end were open or occluded. The fluid is yellowish, and sometimes contains blood or a little purulent matter.

Tubo-ovarian Cysts.—In this connection I will give a few details in regard to a variety of cyst which by a structural peculiarity due to its acquired connection with the tube, deserves a special classification. In these cases the cystic ovary is engrafted upon the dilated tube with which it communicates, so that the cavity (which is usually curved in the shape of a retort) in this case consists partly of a tubal and partly of an ovarian portion. Richard was the first to give an accurate description of this variety. As a rule it consists of small tumors of the ovary (cysts of the Graafian follicle joined to the dilated tube, their volume being inconsiderable). But Hildebrandt and Olshausen have seen tubo-ovarian cysts formed by proliferous cysts, and consequently of enormous size; the latter authority reports two cases which were apparently in relation with cysts of the broad ligament. It is therefore evident that this variety may be superadded to any kind of cyst. As a usual thing the tube remains permeable, which allows the fluid to flow into the uterus so soon as the pressure within the sac becomes great enough. In this way we have the formation of a *profluent ovarian hydrops*, similar to what has been described in connection with hydro-salpinx, under the name of *profluent tubal hydrops*. This open communication plays the part of a safety-valve, which prevents exaggerated distention of the cyst and tends to limit its growth. In one case Hennig was able to follow the diminution in size which occurred in bilateral tumors after their evacuation. In regard to the origin of these compound cysts, the question occurs as to whether the adhesion of the tube to the ovary precedes or follows the cyst formation, whether in the beginning there is not an inflammation of the appendages leading to their adhesion, or else a precedent co-existence of hydro-salpinx and ovarian cyst which by resorption of the wall become fused into one. For my part, I am inclined to believe that this is usually the case, so that the lesion might equally well be described in the chapter of ovarian diseases as in this one upon the pathology of the tube. Out of three hundred ovariotomies Olshausen found three cases of tubo-ovarian cyst, one of which was bilateral.

Hæmato-salpinx must be distinguished from the small hemorrhages or hæmatomata of the tube which distend its inflamed walls; these effusions of blood, which tend to reabsorption, are mere accidents rather than disease. Hæmatocele of the tube, or true hæmato-salpinx, implies a profound alteration in its walls which have assumed a definitely cystic formation, and a mod-

ification of the blood analogous to that undergone by it in hæmatocele. In one word, there is a permanent lesion, instead of the transitory pathological incident which is the real significance of an extravasation of blood into an inflamed organ. This distinction, however, not having been made by most authorities, I shall be obliged to conform to the general usage.

Leaving aside the cases of retention of the menstrual blood by atresia of the genital tract, which will be treated of in the chapter on Malformations, there remain two chief varieties of hæmato-salpinx.

1st. The first and more frequent, of which I have just been speaking, is an apoplexy of the tube, which may occur incidentally in the course of a catarrhal inflammation, or even during an irregular menstruation affected by

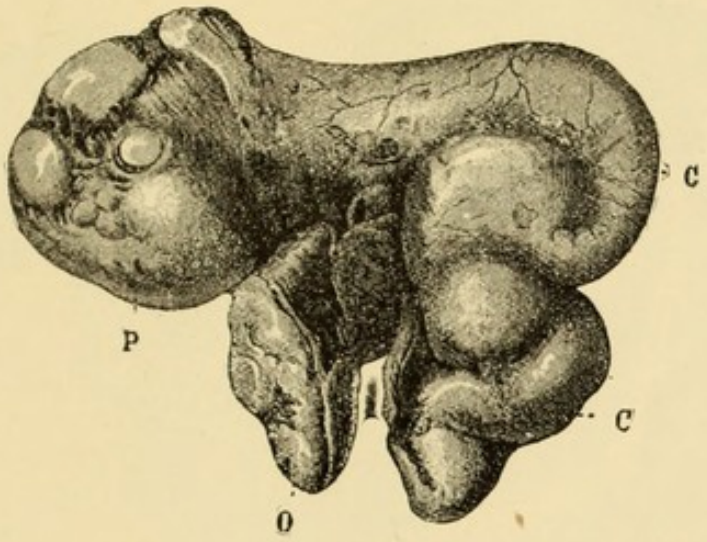


Fig. 393.—Hydro-salpinx with Sigmoid Flexures of the Tube. *C*, *C*, Flexures of the dilated tube; *O*, ovary; *P*, fimbriated extremity obliterated and distended.

change of *régime*, by great fatigue, or by the effect of cold in neuropathic or plethoric patients. It is not impossible that the symptoms attributed by some to a congestion of the uterus or to pelvic congestion have this origin only. The lesion is usually only temporary, the clot is reabsorbed, and the symptoms may gradually subside, unless, as is often the case, they have been grafted upon the symptoms of a chronic parenchymatous salpingitis.

(There is no doubt that the mucosa of the tubes is the seat of an exudation of blood during menstruation. There is then a physiological hemorrhage into the tubal cavity as into the uterine cavity. After an ovariotomy, when the stump of the tube is fixed to the abdominal walls, either by means of a clamp or by extra-peritoneal ligature, it is not unusual to see an oozing of blood from the cut surface at the menstrual period. This physiological hemorrhage, if not constant, is certainly frequent, and is probably easily induced by anything which increases the active or passive congestion of the genital apparatus. If the hemorrhage occurs when the extremities of the tube are free, the blood will probably pass into the uterus without causing

any disturbance—the physiological condition. If very abundant, it may give rise to clots in the tube, with consequent indefinite morbid phenomena, until they are reabsorbed: if still more excessive, retro-uterine hæmatocele may result.)

2d. The second variety of hæmato-salpinx, the only one which possesses a real anatomical individuality, is especially characterized by the presence of a sac like that of pyo-salpinx. For the formation of the sac I think we must presuppose a tubal pregnancy arrested in its development by the death of the fœtus, which is reabsorbed, or a previous pyo-salpinx which has ob-

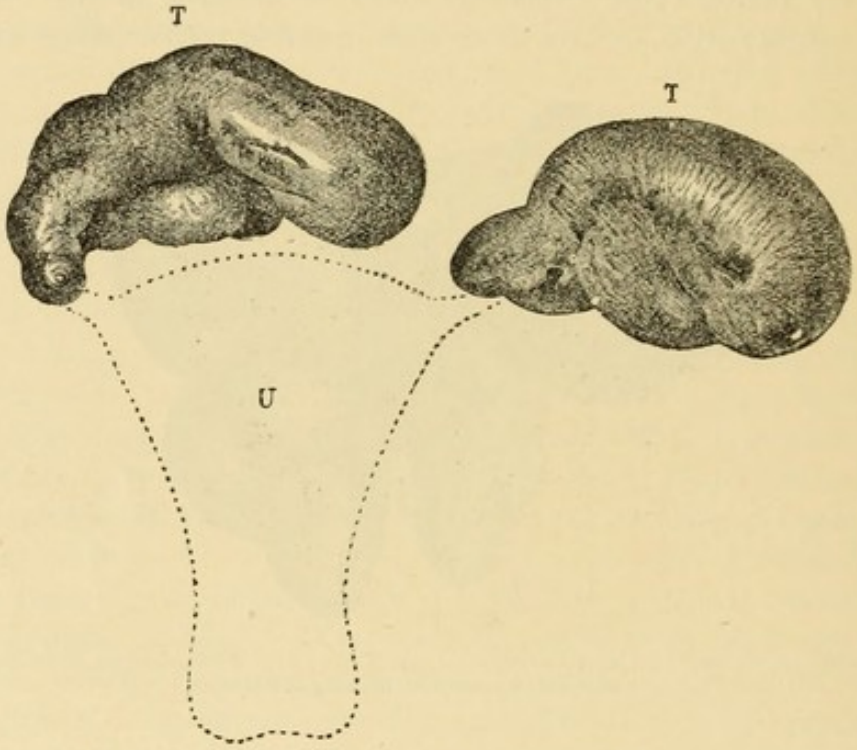


FIG. 394.—DOUBLE HYDRO-SALPINX. Showing tossing backward of the right appendages.

literated the uterine opening and thickened the walls at the same time that they became dilated. Sometimes there is a direct transformation from the pyo- to the hæmato-salpinx; again, there seems to be an intermediate condition of hydro-salpinx; it is in these latter cases that the fluid is the clearest and the walls the thinnest.

Inversely, it may happen that a secondary suppuration of the hæmato-salpinx occurs; the infection is in this case probably carried by the lymphatics rather than through the uterine cavity, with which, indeed, all direct connection is cut off. The size of these sacs rarely exceeds that of a pear; yet Lawson Tait reports a case in which one reached above the umbilicus and contained several litres. It seems to me that there must have been a co-existing encysted intra-peritoneal hæmatocele which was bound to the hæmato-salpinx.

Hæmato-salpinx is often associated with fibromata; it is not to be attrib-

uted to the pressure of these tumors upon the ostium uterinum, but rather to the hemorrhagic metro-salpingitis which accompanies the development of myomata.

The sac of hæmato-salpinx is thin in some places and thick in others. Hypertrophy of the muscular fibres is met with, as in pyo-salpinx. The communication with the uterus may persist. As to the contents there may be a syrupy, chocolate-colored blood (in cases in which the lesion is due to a retention of the menstrual flow from genital malformation) or, more often, a

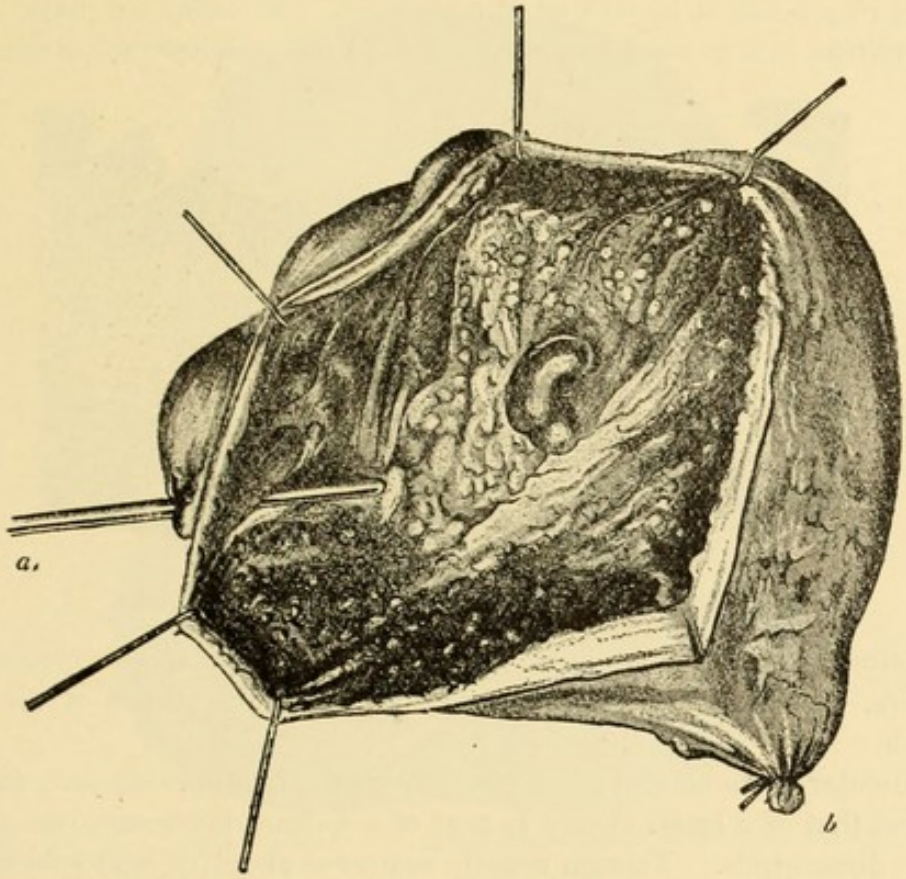


FIG. 395.—SUPPURATING HÆMATO-SALPINX. The pouch is opened; the mammillated inner surface is seen, and a small kidney-shaped body (clot or embryo?). A canula *a* is inserted in an opening which existed between the pouch and the rectum; *b*, ligature around the uterine extremity.

clearer liquid formed of a watery fluid and blood or of pus and blood. Clots may form in layers on the walls, or in little fibrous masses which are free (Fig. 395). A microscopical examination of the sac shows an irritative process less severe than in pyo-salpinx. But there is an unusual abundance of the fusiform cells in the mucous membrane, which in some of the folds seem to rise perpendicularly from the deeper layer. The top of these folds has usually lost its epithelial coating; the intervals between them may contain a dense network of capillaries filled with blood, that can be traced almost to the surface of the mucous membrane. In places small parenchymatous hemorrhages hide the structure of the tissues (Fig. 396).

Cystic Ovaritis.—Microcysts, or *slightly developed cysts of the ovary*, are

described in their proper place in the study of the inflammatory processes by which they are caused.

A. *Serous Cysts.*—Upon the surface of a normal ovary it is usual to find a certain number of follicles filled and swollen by fluid; this is probably a purely physiological condition, a simultaneous development of several ovules, in order to secure the expulsion of an ovum. Moreover the most competent authorities assert that even in cases in which the peripheric tissues are distinctly altered, the existing follicles do not differ histologically from normal follicles in process of growth or of regression. In order to judge whether the condition is a morbid one, we must base our conclusions upon concomi-

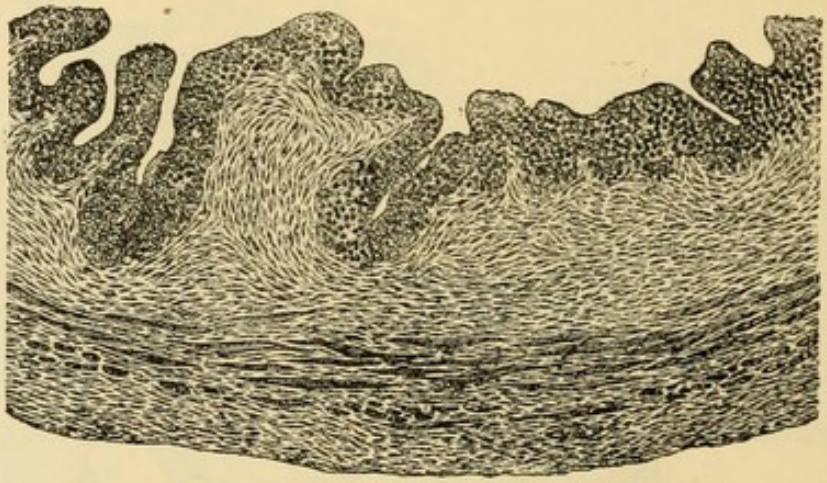


FIG. 396.—HÆMATO-SALPINX. Section slightly magnified (Wyder).

tant lesions, upon the number of these follicles, and more especially upon their size, which normally should not exceed from four-fifths of an inch to one inch.

Follicular cysts occur in the form of spherical, unilocular sacs, varying in size from that of a small cherry to that of a walnut, but sometimes attaining greater dimensions. Though usually scattered about or agglomerated upon the surface of the ovary, they may also be found within its tissues. Upon section they show a smooth wall with double outlines, and limpid, colorless contents. According to Ritchie and Webb the ovule is not to be found in cysts which are larger than a cherry; upon the proliferation of the granular cells which surround them they seem to disappear. The parietal epithelium first proliferates and then undergoes colloid or granular degeneration. As to the so-called lymphoid layer it gradually becomes lost in the cellulo-vascular layer, both undergoing the sclerotic process. In some cases, according to Toupet, there would appear to be hydropsy of the ovule itself, and not of the follicle.

I removed a polycystic ovary in which a certain number of the sacs, ranging in size from a pin's head to a walnut, were filled with a serous fluid, while the rest contained cheesy or lardaceous matter which was examined microscopically by Toupet in Professor Cornil's laboratory, and found to

consist of myxomatous tissue. The process was probably analogous to that of cicatrization in normal follicles.

From a clinical standpoint, I believe that it is advisable to distinguish between microcystic degeneration accompanied by sclerosis, and the large conglomerated follicular cysts which transform the whole ovary into a multilocular mass reaching the size of a fist or even of the head. This type of lesion I call *cystic disease of the ovary*.

Chronic œdematous ovaritis, to which I have already referred, is found more especially in cases of tubo-ovarian varicocele. The first succinct de-

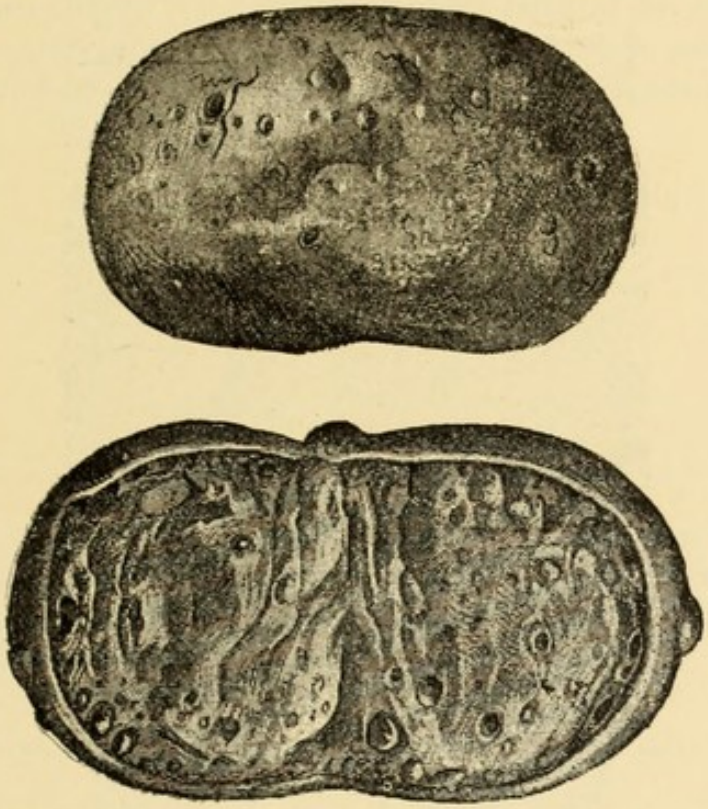


FIG. 397.—CHRONIC ŒDEMATOUS OVARITIS WITHOUT LESION OF THE TUBE (POZZI).

scription of them was given by me in the theses of two of my pupils. Since then, histological researches have completed our knowledge of the subject.

The appearance of an œdematous ovary is characteristic; it is twice or three times its usual size, its surface is smooth and lustrous, its consistence soft and elastic. Upon section its stroma is found to be infiltrated, gelatinous, and dotted with small serous cysts which project from the softened tissue like transparent stones (Fig. 397). The microscope reveals a profound sclerosis of both arterial and venous vessels around the hilum (Fig. 398); an active inflammatory process affecting the blood and lymph capillaries (with dilatation of the lymphatic spaces), a dilatation of the ovarian stroma from œdema (Figs. 399 and 400), and transformation of the follicles into interstitial cavities by the granulation of their connective-tissue walls and destruction of their epithelium. There is therefore in œdema of the

ovary, either diffuse, acute, or subacute ovaritis. This process may advance sufficiently to the formation of the pseudo-cysts recently described by Paul Petit from a specimen furnished in my practice. These pseudo-cysts, analogous to physiological bullæ of œdema, might at first be confounded with follicular cysts, but are distinguished from them by the absence of a wall and by their disappearance as soon as opened.

B. *Blood-Cysts.*—Blood cysts of the follicles occur under varying aspects, according to their causation. When multiple and of small size, and riddled often throughout the whole extent of the organ, they result from infectious ovaritis of internal origin. Larger cysts, varying from the size of an almond to that of the fist, contain a sero-sanguineous fluid, and appear to be due to hemorrhages into the dropsical follicles, or to be formed of blood



FIG. 398.—CHRONIC ŒDEMATOUS OVARITIS. Sclerosis of the hilum (75 diameters) (P. Petit).

which is almost pure. The latter are an especial accompaniment of cortical sclerosis, and it has been stated that they were capable of growth to the point of rupture by a species of intra-cystic process of expulsion of the ovum in the neighboring follicles (*menorrhagic cysts* of Boeckel). These cysts have a fibrous wall, which is sometimes extremely thin; their investing layer of epithelium is degenerated or destroyed.

Blood cysts within the corpora lutea result from an exaggeration of the physiological hemorrhage after the expulsion of the ovum, or from a hemorrhagic *raptus* within cicatrized corpora lutea. Cysts of the first-named variety have a nearly uniform enveloping membrane within which is found the more or less altered elements characteristic of corpora lutea, vitreous masses of degenerated epithelium supported upon papillæ. The other must be considered simply as a variety of interstitial hemorrhage. Sometimes they are disseminated, sometimes diffused throughout the whole stroma of the ovary, which they transform into a pulpy mass like the splenic pulp. Between in-

tra-vesicular hemorrhage and apoplexy of the stroma there would seem to be a mixed variety (Besnier), consisting of a veritable *intra-ovarian hæmatocele*, from abnormal ovulation.

C. *Purulent Cysts.*—Suppuration of the ovaries at the outset occurs in the form of small, multiple abscesses, strictly limited, and for the most part

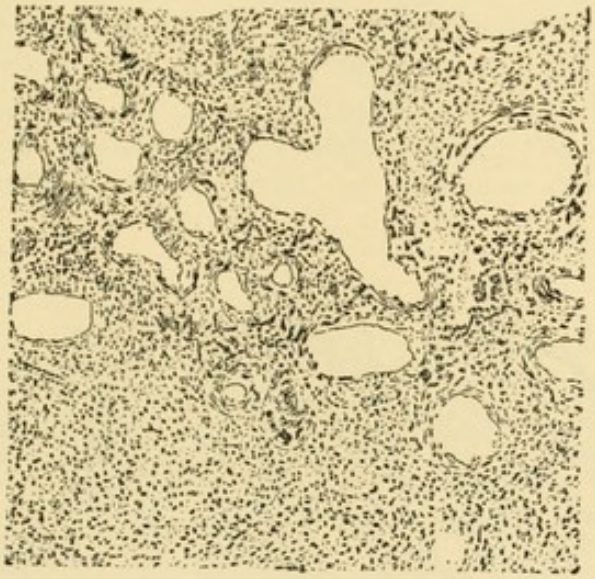


FIG. 399.—CHRONIC ŒDEMATOUS OVARITIS. First degree of œdema in medullary portion (150 diameters) (P. Petit).

situated in the ovisacs, if we are to judge by their form and the débris of epithelial cells found upon their walls. Little by little these cavities become fused by the purulent melting away of the interposed cellular tissue,

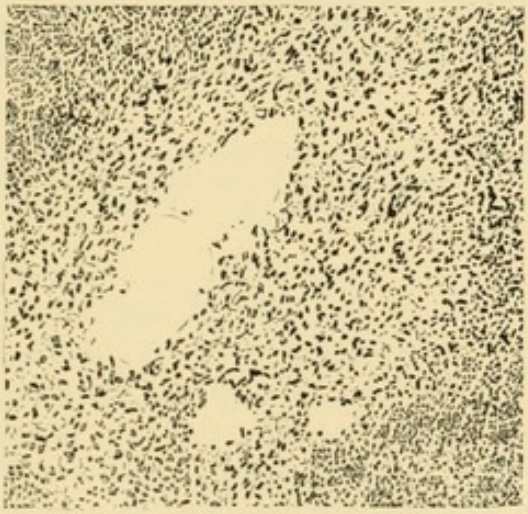


FIG. 400.—CHRONIC ŒDEMATOUS OVARITIS. Third degree of œdema. Vacuolation of stroma (90 diameters) (P. Petit).

and finally form several large sacs, or one sac only. The wall of this large abscess is formed from within outward of a layer of embryonal tissue, a dense fibrous layer, and finally a vascular layer within which are found the

more or less altered elements of the organ. To purulent cysts probably belong the cysts from circumscribed softening, described by Rindfleisch and Mayweg.

Abscess of the ovary is nearly always unilateral (twenty-eight out of twenty-nine cases). As infection of the ovary (when the tube is normal, or when it is diseased, but not adherent to it) always occurs through the lymphatic or blood channels, the pus of suppurating ovaritis should contain only streptococci; in one case Etheridge reports having found pneumococci; Zweifel found the gonococcus.

D. *Lymphatic Cysts.*—These pseudo-cysts which are probably always dependent upon ovarian varicocele may attain to the dimensions of small fol-

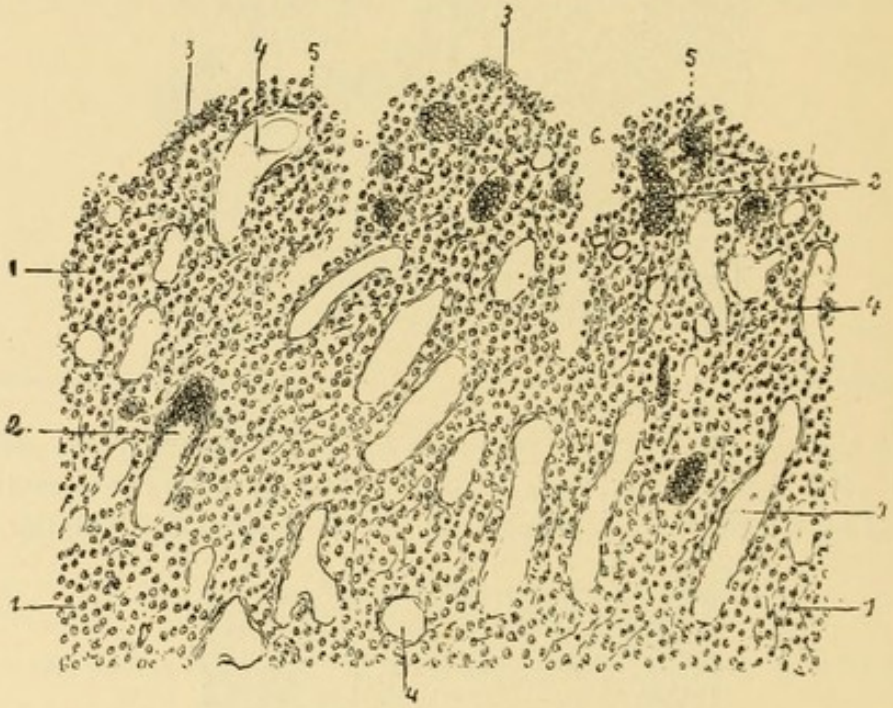


FIG. 401.—SUPPURATIVE OVARITIS. Ovary size of hen's egg, containing purulent collection. Section perpendicular to surface of sac (diagrammatic). 1, Very loose connective tissue infiltrated with large number of cellular elements; 2, vessels dilated and filled with blood; 3, extravasation of blood on surface; 4, large lymphatics; 5, papillæ on inner surface of sac; 6, spaces separating papillæ.

licular cysts. They occur in the form of starry masses, covered with flat cells and enclosing a small number of white corpuscles.

All these microcysts, which are so varied in character, with serous, bloody, and purulent contents, and which are for the most part associated, possess a common property in that they are usually the result of an inflammatory or irritative process, and that they are restricted in development. It seems to be absolutely established that they cannot be transformed into proliferous cysts. At a given time they empty either into the abdominal cavity (blood cysts) or the neighboring viscera (purulent cysts), or else become atrophied after reabsorption of their contents.

Symptoms.—It may seem singular, *a priori*, to attempt to give at the

same time the clinical picture of collections of pus and of collections of serum and blood of the tubes and ovaries. If one had not verified the fact by actual observation, it would be difficult to believe that a patient might be carrying about in her abdomen two sacs filled with pus without exhibiting any serious phenomena or even seeming to suffer from their presence. Between the initial period of formation and the final period of inflammation of surrounding parts, and efforts at spontaneous evacuation, pyo-salpinx passes through a torpid and latent phase, so to speak, during which the economy which is perfectly protected by the encysting of the septic fluid seems to acquire tolerance for its presence; the rational symptoms then seem to be ex-

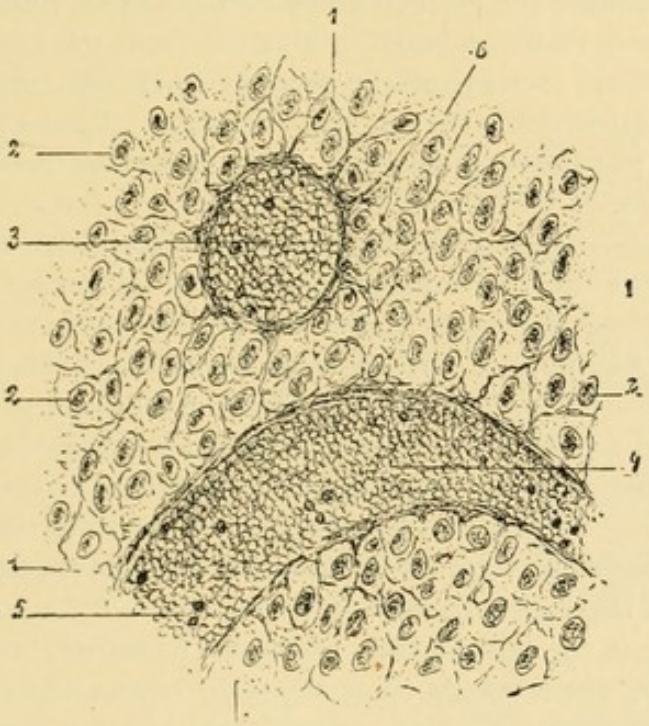


FIG. 402.—SUPPURATIVE OVARITIS. Portion of preceding figure (500 diameters). 1, Fine network of connective-tissue fibres; 2, round cells with large nuclei surrounded by thin protoplasmic layer; 3, transverse sections of vessel filled with blood corpuscles; 4, longitudinal section, same; 5, white blood corpuscles; 6, fine molecular granulations of exuded fibrin.

actly similar to those of chronic salpingitis, and the physical signs are in nowise different from those of hydro- or hæmato-salpinx. We are thus justified in treating of the symptoms under one head, only adding a few special ones which characterize the acute stage of tubal abscess.

This clinical picture does not materially differ from the one which I drew for non-cystic salpingitis. There are the same pains and the same menstrual disorders (amenorrhœa, dysmenorrhœa, menorrhagia); the latter, however, may not occur, and menstruation be perfectly normal. In hæmato-salpinx, Puech has sometimes noticed a constant dribbling of small quantities of blood instead of real menses; this is what some call *amenorrhœa distilane;* it is not pathognomonic, and is met with in endometritis as well.

I must not fail to mention another accessory symptom, to which alto-

gether too much importance has been attributed; I mean the sudden flow of a certain amount of serous, bloody, or purulent fluid following an attack of colicky pain; this may occur at irregular intervals of a month or six months. Has it anything to do with the permeability of the uterine orifice, now and then forced open by the overflowing of the overfilled cyst? Or is there merely an expulsion of the contents of the uterus, which is itself inflamed, caused by reflex contraction of its walls? We shall be tempted to accept the latter explanation if we remember how frequently the cystic tubes are obliterated at the uterine extremity. However that may be, the fact has long been noticed; it constitutes the hydrops tubæ profluens of Froriep. Klob, having examined and studied many aged patients, thinks that this may account for certain cases claimed to be a return of the menstrual function after the menopause. Sometimes by pressing upon the tumor from above, its contents are expelled into the vagina. This flow of pus caused by abdominal pressure, or pyo-metrorrhagia, has often been considered a sure symptom of pyo-salpinx.

Two groups of symptoms only are really characteristic: the pains which direct attention to the uterine appendages; and a local examination which results in the finding of a tumor at the side of the uterus.

The physical examination will be made by means of bimanual palpation and rectal touch. It is to be undertaken with great precaution; serious and even fatal accidents have been caused by rupture of a pyo-salpinx from too rough an examination. Cystic tumor of the tubes varies greatly in its character, according to whether it is free and to a certain extent movable by the side of the uterus, or whether it has fallen into the cul-de-sac of Douglas and become fixed there by adhesions.

The first case is the typical one; with both hands we can grasp a small pear-shaped body, which hangs upon the side of the uterus, to which it is connected by a slender pedicle which we can scarcely reach. When the tumor is bilateral, it seems as if a wallet had been thrown over the uterus, saddle-bag fashion. Fluctuation is rarely felt, but pain is always caused by the examination if the patient be not anæsthetized. In some cases we find the cyst upon one side, while the cul-de-sac of the other side and Douglas' pouch are filled by an elastic or fluctuating globular mass which seems incorporated with the posterior surface of the uterus. This is one of the tubes, dilated to the shape of a retort, which has fallen into the cul-de-sac, uplifts the uterus, and presses down the rectum. It is usually purulent and nonmovable; at first it is free, but gradually becomes so adherent to surrounding parts that it becomes transformed into a veritable pelvic abscess which cannot be enucleated.

Diagnosis.—Can we always distinguish pyo-salpinx from serous or hæmatic tubal cysts? I have already spoken of the extreme caution to be observed in this diagnosis, and of the tolerance acquired by the system for the presence of a sharply limited collection of pus.

Pyo-salpinx is to be suspected if the dilatation of the oviduct follow gonorrhœal or puerpero-gonorrhœal infection, and if the tumor be very closely adherent. If temporary or permanent purulent fistulæ are found, there is no room for doubt. There only remains the question of exact location to decide, and the possibility of a transformation into a pelvic abscess. In doubtful cases only abdominal section can give the answer.

Hydro-salpinx and pyo-salpinx are usually double, while hæmato-salpinx is unilateral. It would be pertinent to inquire whether this be not due to the fact that it is caused by an arrested tubal pregnancy.

There may be a purulent mass upon one side and a fluid mass upon the other. If the tubal mass be of large size and there be no extensive adhesions, we probably have to do with a hydro-salpinx; pressure is less painful than in the case of a purulent cyst.

While the tumor is still movable, we may mistake it for a small ovarian cyst, and especially for an intra-ligamentous cyst. The latter, however, is more decidedly lateral, and is not usually separated from the uterus by the space corresponding to the pedicle of the tubal cyst.

The differential diagnosis from tubal pregnancy in the first four months is almost impossible to make with certainty. In the majority of cases in which these fœtal cysts have been extirpated, the operation had been undertaken for a supposed salpingitis. Hypertrophy of the uterus and expulsion of a decidual membrane are the only diagnostic symptoms. Menstruation may continue to be normal.

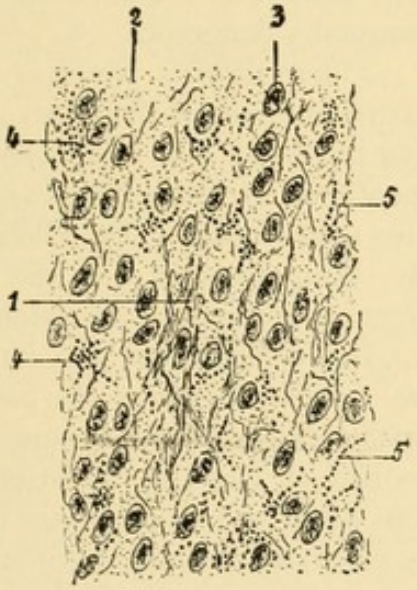


FIG. 403.—SUPPURATIVE OVARITIS. Section stained by Weigert's method (800 diameters). 1, Fine connective-tissue network; 2, molecular granular exudate; 3, round cells with large nuclei; 4, small masses of micrococci; 5, same in chains.

An inexperienced examiner is very apt to mistake large serous or bloody cysts for uterine fibromata, and it is indeed often very difficult at first to distinguish the one from the other. But the uterine sound, carefully used, will show a great increase in the uterine cavity when there is a fibroid, and a normal cavity in the case of the tubal affection. Moreover, we may always perceive fluctuation in hydro- and hæmato-salpinx if they be of any size, or if the patient be anæsthetized: it is surprising how different the sensation imparted is from that felt before the anæsthetic was administered. Pyo-salpinx with adhesions projecting into the cul-de-sac of Douglas often give the sensation of a pasteboard vagina.

Is it permissible to make an exploratory puncture for the sake of clearing up a diagnosis? It seems to me a dangerous procedure, however far the tumor may be from the point of puncture; whether it be abdominal or vaginal.

There is danger of wounding the intestines; especial danger of an effusion of septic fluid in the peritoneum, either primarily if in spite of aspiration the evacuation has not been thoroughly accomplished, or, secondarily, if the cyst is again filled and forces open the lips of the small wound. This exploration, which seems so trifling to the patient and her friends, is in reality much more serious than an incision under antiseptic conditions. Certainly the latter is not to be lightly undertaken; still, we should not forget that it constitutes one of the most valuable of surgical resources.

The differential diagnosis between a large cyst of the tube and fibro-cystic tumor of the uterus is in some cases almost impossible; yet the increased size of the uterine cavity, as demonstrated by the use of the sound, will determine the question. In this case exploratory puncture would be especially dangerous.

Pelvic adenitis, which is of rare occurrence and of obscure origin, may occasion errors of diagnosis. The rational symptoms to which it gives rise, and the tumor which it forms, resemble pyo-salpinx with adhesions. Tenier mentions an interesting case of this kind. L. Championnière and I have also seen similar ones. Pregnancy complicated with a bilateral pyo-salpinx has been observed, and the peculiar condition caused was understood only after an exploratory laparatomy.

Doléris mentions two interesting cases of adherent enterocele in Douglas' cul-de-sac, where the pain and the physical signs pointed to an inflammatory tumor of the appendages. The mass felt behind the uterus was formed of loops of intestines agglutinated together by false membranes. The tubes and ovaries were in an almost normal condition. These seem to be examples of pelvic peritonitis of intestinal origin, very seldom met with, and only possible to diagnose by laparatomy. Removal of the appendages gave no relief.

I observed a case which was similar, except that the symptoms appeared to be subacute and to be due to a peri-salpingitis, although the tubes were but slightly affected. Laparatomy followed by rupture of the adhesions, irrigation of the peritoneum, and drainage resulted in a rapid recovery.

Course, Duration, Termination, Prognosis.—We may assert that these cysts of the tube constitute a definite disease, which is incurable except by extirpation. The patients become chronic invalids, in whom the least over-exertion brings on acute attacks of peri-salpingitis; so that the course of the disease is marked by contant relapses, just as in peri-uterine phlegmon and pelvic peritonitis. In fact, until recently tubal lesions were indiscriminately classified with the inflammatory processes of which they are the cause. The acute attacks in the case of non-purulent tumors are characterized by an exacerbation of the pain and the nervous symptoms and by a remittent type of fever. Tait attributes these repeated attacks to the exit of a few drops of irritating fluid through small openings in the tube. However that may be, it is certain that there are constantly recurring attacks of peri-salpingitis,

which may finally result in rupture. If this occur to a serous or a blood cyst, the result may be comparatively harmless (as in the case of rupture of the ovary).

But if a pyo-salpinx opens and discharges into the peritoneal cavity, the most formidable results follow, of which the cause is often not recognized. The medico-legal adviser should be informed of the possibility of these sudden deaths which may carry off patients in apparently good health; in their unexpected severity these cases are comparable to the rupture of extra-uterine pregnancy. When the evacuation of pus is prevented by the obliteration of the uterine opening, and its formation still continues, the pus distends the cavity so enormously that it comes into contact with neighboring cavities, rectal or vaginal, and adheres to them; perforation follows, with evacuation of the pus. The opening tends to become permanent, and fistulæ are thus formed which usually communicate with the rectum, as the pyo-salpinx usually prolapses into the cul-de-sac of Douglas; but it may also be observed in the intestines higher up than the rectum, so that the evacuation of an abscess by the anus does not mean the opening of an abscess into the rectum. More rarely the pus finds its way into the vagina or bladder or ureter. Shooting pains, tenesmus, and glairy diarrhœa (Nonat) precede the opening into the rectum; signs of cystitis announce the opening into the bladder. Recto-vesical communication may be established by a double perforation.

These fistulæ are usually intermittent. After a febrile stage and premonitory pains, the pus is suddenly evacuated. Instantaneous relief follows; the patient, who often seemed at the last gasp, comes to life again, and seems almost to be cured, until the advent of another sharp attack exhausts her again. These alternations of pain and relief may last for a long time without greatly impairing the general health. In some cases the attacks assume a septicæmic character, the temperature rises to 106° F., violent chills, delirium, a pronounced alteration of the facies indicate the intensity of the infection. After a few of these attacks the patient is much enfeebled, and subject to an exhausting though slight hectic fever. Unconquerable anorexia is one of the most striking features of this morbid state; some patients cannot take the slightest nourishment; everything is rejected, and they finally die of inanition.

Another clinical type exists, in which the fistula, whether permanent or intermittent, causes scarcely any reaction, but brings about a gradual deterioration of the system.

The suppurating Fallopian tube may open laterally into the iliac fossa, giving rise to abscess in this region, or, in front, into the prevesical cellular tissue, causing a special form of suppuration in the cavity of Retzius. These lesions, which will be carefully considered in the following chapter, belong more to the category of pelvic abscesses than of circumscribed inflammations.

When a partial cure is spontaneously effected, the plastic residues which bind down and displace the uterus and its appendages are a constant source of pain, and continually menace a return of acute inflammation. Moreover, the tubes, even after the evacuation of their contents, are subject to an interstitial salpingitis, at first hypertrophic and finally atrophic, which causes persistence of the pain.

Treatment.—"Many diseases which are the despair of medical practice are easily cured by the help of surgery," wrote Louis more than a century ago. These words were never more strikingly illustrated than in tubal affections. Only a few years ago women thus diseased were treated upon the expectant plan, and condemned to a perpetual state of invalidism or to a lingering and painful death. Now surgery affords an almost certain means of cure.

Can we in these cases employ the indirect treatment which I recommended in the case of non-cystic salpingitis? Many good authorities thought it well to expel the fluid in the tubal cavity by reopening the uterine orifice by curetting and dilating the uterus. If we remember the pathological anatomy of these lesions, the complete and permanent obliteration of the calibre of the tubes in the majority of cases, we shall see how illusory are the hopes of success in this direction. The relief and cure obtained after this treatment must certainly belong to serous peri-salpingitis, which has been mistaken for pyo-salpinx. It is scarcely worth while even to mention the plan of evacuating the tubes by means of a catheter. There is danger in penetrating into a healthy tube, and in the case of a diseased organ it would certainly be dangerous.

As soon as the diagnosis of a cyst of the tube is established, we must remove the diseased parts, choosing the best moment for the operation. If possible we should not operate during an acute attack. Yet if it be of so serious a character as to threaten general peritonitis, or if there be danger of rupture of the pyo-salpinx, the abdomen must be opened without delay, as it is the only way to save the patient. Two methods of surgical treatment share the approval of operators: these are laparatomy and vaginal hysterectomy.

The operation of oöphoro-salpingotomy for cystic lesions is far more difficult than when done for simple catarrhal salpingitis. The great number of adhesions and the danger of perforating a cavity full of fluid that may infect the peritoneal cavity call for the utmost precautions. The incision is usually larger than is ordinarily the case for ovariotomies. We often find the omentum adhering to the pubis and covered with bullæ (acute œdema) which completely change its appearance. This is to be detached by the fingers covered with gauze compresses, and if it be much altered, resected, in small sections after a careful application of catgut ligatures. With the fingers we then find the fundus of the uterus, and follow its upper surface outward to the tubes and ovaries. As soon as we have found which tube is

the more diseased, we try to pass our fingers around the tumor, detaching it if it be adherent, and insinuating the finger between it and the adjacent organs. If the sac be very large and its walls thin, we must avert all danger of rupturing it by aspirating its contents with Potain's or Dieulafoy's apparatus, closing the small opening made by the needle with one or two forci-pressure forceps. If the tumor be small, firm, and resistant, we would better carefully detach it without emptying it; this gives a better grasp to the fingers. When the tumor is freed, and is no longer fastened to the broad ligament except by the alæ of the tube and ovary, we transfix this mem-

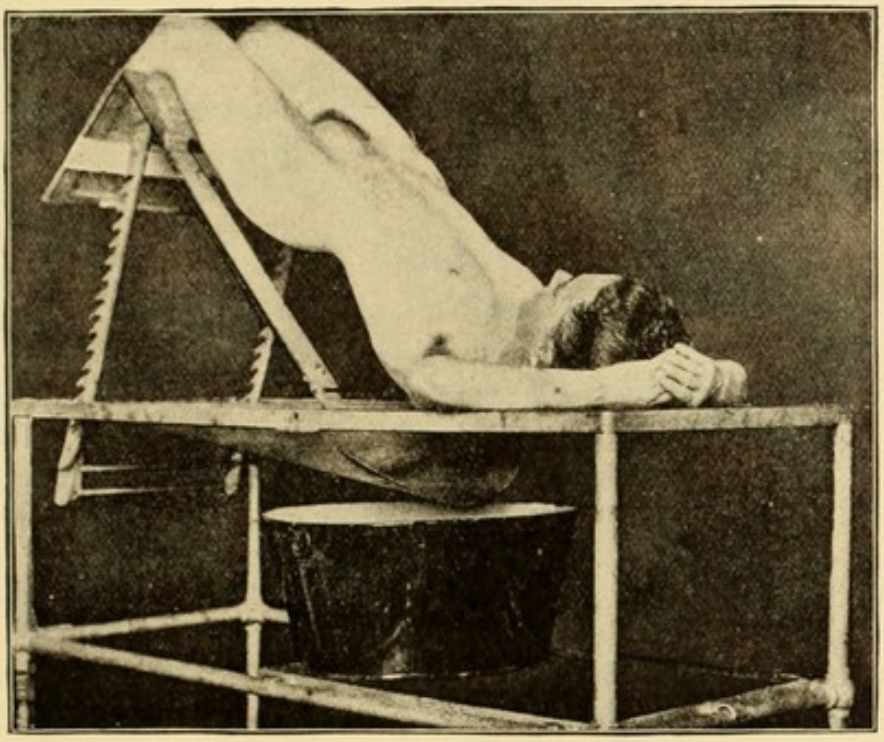


Fig. 404.—Patient in Trendelenburg's Position on Table.

branous pedicle by means of a blunt needle threaded with silk, and we tie it with a Lawson Tait knot, or, if the pedicle be too large for this, with two crossed threads, or a series of linked ligatures. If adhesions interfere with the first loosening of a cystic tube fixed to the cul-de-sac of Douglas, we may facilitate matters by cutting the tube between two ligatures at about half an inch from the uterus, which is a situation where the tube is usually but slightly affected and not at all dilated, and forms a real pedicle. We then detach the adhesions from within outward instead of from without inward. I must call attention to the fact that there may be an adhesion of the tumor to the vermiform appendix. If the latter be mistaken for the pedicle, it might be a dangerous error.

The surface of the cut section of the tube should be cauterized with the thermo-cautery as an antiseptic precaution, for there is always a small hernia of diseased mucosa in the centre of the stump.

When much difficulty is experienced in isolating the adherent tube, there is a natural desire to enlarge the wound in order to be able to see as well as to feel. Lawson Tait, who has an unparalleled experience in operations, strongly condemns this procedure. He advises an absolute reliance upon the sense of touch, and decries a further complicating of the operation by the necessity of replacing the intestine and drawing together the often resistant lips of a lax abdominal wound. If, when we come to ligate the pedicle, we find that it is large, stretched, and inelastic, and is in danger of being torn by the traction necessary to bring it within reach of the instruments, or of being cut by the constricting threads, Lawson Tait recommends the following procedure to relax it somewhat: he slips his fingers along the broad ligament as far as its attachment to the pelvis, then by scratching with his nails he produces some small wounds of the serous fibres of the ligament. These scratches do not affect the blood-vessels, which escape because of their elasticity and mobility. The broad ligament is thus given more freedom of motion, and the pedicle can be more readily drawn to the wound, and tied without tearing or cutting it.

In exceptional cases, where digital examination does not give sufficient information, or where it is deemed unsafe to trust to this alone, it may be necessary to bring the parts into view either by putting the patient in the *Trendelenburg position*, or by *evisceration*, or temporary extraction of one or several loops of intestine, to be covered with warm aseptic compresses. In this way I have been enabled easily to separate appendages that were very adherent to the sigmoid flexure in a case of pyo-salpinx, by means of scissors and the thermo-cautery.

The best method of arresting hemorrhages during these operations is by compression. I accomplish it exclusively by means of the gauze compresses. The operation is suspended for a moment, and with both hands we press firmly down upon the mass of compresses which fills in the wound. Hemorrhage caused by detaching a tumor fixed in the cul-de-sac of Douglas can readily be stopped by this means. That due to a tear of the edges of the uterus may persist; but a row of catgut stitches will control it. Irrigation with hot water, or the application of the thermo-cautery, may be tried when necessary. Only in case of absolute necessity should we have recourse to hæmostatic tamponade of the peritoneal cavity with iodoform gauze, or even to permanent forcipressure, which is the *ultima ratio*. In the later case, capillary drainage should be employed by covering the forceps with pieces of iodoform gauze. Some surgeons have even had to resort to hysterectomy to obtain hæmostasis in cases in which the hemorrhage was caused by uterine adhesions.

If there has been an effusion of pus or of irritating fluid into the abdomen, the cavity should be washed out, and if the manœuvres have been very painful, and there is any reason to fear much oozing from extensive lacerations, drainage or antiseptic tamponade of the peritoneal cavity should be

resorted to. I make it a rule to observe this last precaution whenever there is a fistula; the latter usually closes soon after the operation, without infecting the peritoneum. If there should be delay in the closure, the tamponade will sufficiently protect the serous cavity.

Shall we, as a matter of routine, remove both tubes, even when only one is diseased, because of predisposition to disease on the part of the other? This seems to be a needless sacrifice of the possible fruitfulness of the patient, and it would be better to let her run the chance of a second operation. Few surgeons are as radical upon this point as Tait. Surgery of the tubes, having passed through a period of absolute temerity, would seem to be entering upon one of conservatism. I have already noted the practice of some operators who content themselves with breaking down the adhesions, and treating the pelvic cavity antiseptically in cases in which a laparatomy has shown only a small amount of disease of the appendages. Martin has at times simply opened the ampulla by pushing apart the agglutinated fimbriæ or has made an artificial opening by partial resection of the tube. He performed resection of the tube sixty-five times without one fatal result. In two women in whom after ablation of the appendages of one side he had partially resected the other tubes, he later noted pregnancy. In some cases of hydro-salpinx he went farther, and resected a portion of the sac, and sutured the internal to the external wall in such a way as to make a permanent opening, an artificial ampulla which made fecundation possible. Skutsch reports an operation of this nature, to which he proposes giving the name of salpingostomy. Instead of extirpating the tube, which is transformed into a serous cyst, he ascertains the nature of the contents by aspiratory puncture, opens the abdominal extremity, excises an oval piece about half an inch wide, and by means of silk sutures unites the mucous and serous membranes around the opening. The permeability of the tube is ascertained by passing a sound through it. Skutsch wonders whether in such cases it would not be better to suture the new ampulla to the ovary. It seems to me to be preferable. In a recent case Gersuny did this in a woman whose appendages of the left side he had removed. The right ovary was normal, but there was a hydro-salpinx. Gersuny performed salpingostomy, and attached the ovary to the new tubal ampulla. Seven months later the patient, whose health was completely restored, became pregnant. I have, however, but little confidence in the value of this so-called conservative operation; I believe that whenever we find upon the tube signs of an old inflammatory process of sufficient intensity to have converted it into a serous cyst or even to have merely obliterated the fimbriated extremity, its structure and physiological functions are necessarily greatly impaired. On the other hand, I heartily believe in the value of really conservative operations, *partial resection of the ovary*, ignipuncture whenever a portion of the ovary is found to be diseased, the tube being healthy, as is sometimes the case in sclero-cystic degeneration. Resection of the ovary has been per-

formed in such cases by Martin, Zweifel, Gusserow, Wiedow, etc. I reserve it for the large follicular cysts (serous or blood-cysts) and for those cysts of the corpus luteum which are about the size of a walnut. A cone-shaped piece is removed from the diseased ovary, and the two lips are united by means of catgut sutures. In the more common cases of diffuse œdematous ovaritis, or of micro-cystic degeneration, I perform ignipuncture of the ovary, inserting the point of the thermo-cautery into the little cysts. Their whole internal surface must be well cauterized. Should the cyst be somewhat large (large follicular cyst), the wall must be resected with the scissors, so as to remove a flap which might mortify. Cauterized surfaces of sufficient extent are united by a catgut stitch or series of stitches; all persistent oozing of blood should be stopped in the same way.

The benignity of conservative operations (resection or ignipuncture) is very great, since, out of 49 cases operated upon, I have observed no accidents. The ultimate results are most favorable. Last year (1895) I saw 22 women operated upon within six months at latest, and three years at most; 13 were completely cured. Out of this number 4 became pregnant and 3 of these were delivered at term of living children; 4 were greatly benefited; 1 was only temporarily helped; only 2 were not improved and were later obliged to undergo a complementary operation. Since then 3 other women operated upon have become pregnant. I have several times performed salpingorrhaphy, that is to say, suture upon the ovary of the ampulla of a tube which was healthy, but kept apart from it by adhesions which I ruptured. In every case I first performed resection of a portion of the ovary.

We must remember that the good effects of removal of the ovary and tubes may not be felt for weeks or even months. During this time the patient may continue to suffer abdominal pains, which, though certainly less severe than before, discourage her by causing a belief that the operation has not attained the hoped-for result.

These phenomena are to be attributed to two causes: (1st) The irritation of the peritoneum near the ligature, which being upon inflamed tissue produces a certain amount of peripheric reaction; (2d) the persistence of inflammation in the stump of tube left in place. I think that we should always remove as much as possible of the tube, leaving attached to the uterus only the amount necessary to insure a firm ligature. Finally, every operation upon the tubes should be followed by curetting of the uterus, and injections of iodine solutions, to modify the accompanying endometritis, and at the same time cure the inflammation of the tubal stump. I usually practise this curetting about a month after the operation.

The menopause does not always follow at once after removal of both tubes and ovaries. The persistence of the menses for any length of time seems often to depend upon a lesion of the mucosa (endometritis, etc.) that plays the part of an irritating body in the uterus; hence the value of the subsequent local treatment I have advised. Removal of the tubes alone, how-

ever, does not cause a cessation of the menses; although Tait gives these organs the chief rôle in the menstrual function. But salpingotomy without oöphorectomy will cause sterility.

Vaginal Hysterectomy.—Vaginal hysterectomy, or utero-ovarian castration by the vagina, was recommended by Péan and popularized by P. Ségond as the operation to be preferred in bilateral inflammatory lesions of the appendages. The operative procedure which I prefer is that recommended by Ségond, the description of which I borrow from Baudron's thesis. The cervix being firmly seized by each lip with Museux forceps, the vaginal mucosa is incised. Ségond always completes the classical circular incision by two lateral incisions. The posterior cul-de-sac having been opened and the bladder completely detached by the finger, two short forceps are placed at the base of the broad ligaments upon the uterine arteries, and the portion of the ligament thus rendered bloodless is cut. The cervix liberated by this means is by two lateral incisions divided into an anterior and posterior flap, each of which is resected. At the same time, the operator, holding the anterior portion of the uterine stump with a strong Museux forceps, makes an anterior hemi-section according to Doyen's method. In many cases this alone allows one to draw down the uterus. If not, we perform a conoid central "hollowing out." With a curved bistoury we outline in the uterine tissue a cone whose base corresponds to the Museux forceps. Before completely detaching this cone we insert a mouse-toothed forceps upon the concentric lip of the hollow core just made, and then proceed to the complete removal of the cone. This same manœuvre is repeated as we advance step by step from the cervix to the fundus. The important point is to keep to the median line of the anterior uterine surface. If we observe this fundamental precept, even if we exert a slight degree of traction upon the uterus, we, so to speak, operate in the light. Little by little, and thanks to the disappearance of the anterior uterine wall thus resected by the successive removal of the cone-shaped portions, the organ sways forward into the anterior cul-de-sac, taking with it the superior border of the broad ligaments. It is only at this point of the operation that the surgeon need think of hæmostasis. Outside the appendages, if they have been dragged after the uterus, within them if adhesions prevent their descent, we place from above downwards some small pressure forceps, usually two to each broad ligament. Each ligament is then cut, and the forceps in falling cause the portion of ligament which they protect from bleeding to undergo a torsion of 180°. As soon as one forceps is in place, a portion of ligament equal to the length of its jaws is divided, and with two or three clips of the scissors the uterus is liberated and the operation finished with four to six pairs of forceps.

Should posterior adhesions prevent the anterior swaying of the uterus, we must not hesitate to treat the posterior wall of the uterus in the same way as the anterior wall, by hollowing out the median portion in such a way that the uterus, reduced to two tubular angles, will bend at the fundus, as if on a hinge.

The uterus once removed, the hæmostatic forceps on the broad ligaments are gathered into a right and a left bundle, and the appendages are sought for. Should their removal entail pain or danger, it is better to leave them in place after having opened any purulent or cystic cavities with the finger. The dressing is made with strips of sterilized or iodoform gauze, whose ends are gathered together and carried beyond the teeth of the forceps. A catheter is left in the bladder. The forceps are removed in forty-eight hours. The gauze is left in place from six to eight days if the temperature remains normal; should it become elevated, the strips are removed, and antiseptic vaginal injections given under low pressure night and morning.

I prefer this procedure to the systematic anterior hemi-section of Doyen, or the total hemi-section of Müller-Quenu. With Segond, I hold that the preliminary liberation of the uterus gives the greatest amount of security as regards the ureter, which, after this step in the operation is accomplished, is in no further danger of compression.

Gravity of the Operation (oöphoro-salpingotomy for inflammatory lesions, Tait's operation). In order that the statistics be of real value in assisting us to form an opinion as to the gravity of the operation, they should be made in conformity with the following classification:

1st. Acute catarrhal, non-suppurative oöphoro-salpingitis.

2d. Suppurative oöphoro-salpingitis—(*a*) non-cystic; (*b*) cystic, which can be enucleated; (*c*) cystic, which cannot be enucleated.

3d. Chronic oöphoro-salpingitis (hypertrophic and atrophic).

4th. Cystic (serous or bloody) oöphoro-salpingitis (hydro-salpinx, hæmato-salpinx).

Unfortunately but few of the published records are careful to make these distinctions; still we are able to assert, from what we know, that the operation is usually beneficial. In the case of pyo-salpinx it is serious, but becomes of great gravity only when the suppurative process has invaded the cellular tissue and peritoneum. The presence of a pus fistula, even where the abscess is sharply limited and can be enucleated, is sufficient in itself greatly to impair the prognosis. The general condition of the patient, too, calls for careful consideration; oftentimes exhaustion is so great that an operation performed *in extremis* has small chance of succeeding. Yet we have seen cases that might be called absolute resurrections, and no surgeon has a right to refuse to give a patient this last chance of life.

It seems to me useless to quote the statistics of the operation of oöphoro-salpingotomy as performed by various surgeons, the number having increased so enormously during the past few years. The following are my own personal statistics in the Broca Hospital during the past five years (February 1st, 1891, to February 1st, 1896):

Out of 262 laparatomies for inflammatory lesions of the appendages of varying degrees of severity, I had 255 cures, or a mortality of 2.66 per cent. Of this number 176 were non-suppurating lesions. I have not had one death,

in spite of the fact that the majority of these cases were cystic oöphoro-salpingitis, or parenchymatous oöphoro-salpingitis with adhesions. The suppurative lesions (pyo-salpinx with or without suppurative perimetro-salpingitis) numbered 86; there were 79 cures and 7 deaths, or a mortality of 8.13 per cent.

I would observe that during the past two years in especial, I performed vaginal hysterectomy for inflammatory lesions of the appendages much more frequently than I used to do, although I remain a partisan of laparatomy for the great majority of cases.

Laparatomy and Vaginal Hysterectomy Compared—Comparative Gravity.—Many surgeons have entirely replaced laparatomy by Péan's operation of vaginal hysterectomy in cases of bilateral lesions of the appendages, whatever the extent of the inflammatory disorders. They claim that it is a less grave operation, that the cure is more permanent, and that it leaves no cicatrix. I forcibly opposed so positive a declaration, and I believe that I succeeded in demonstrating that in that form it was incorrect. With the exception of a limited number of cases which I will presently enumerate, laparatomy is quite as benignant as hysterectomy. Its results are more complete and more durable, for it permits of a more complete removal of all lesions of the appendages. Should endometritis persist it can readily be overcome by curettage. The abdominal cicatrix is trifling if the methods of incision and suture which I have recommended are followed.

Finally, laparatomy permits of a rectification of diagnostic errors which in a clinical examination are not always avoidable; it sometimes prevents needless extirpation. It is due to laparatomy that in some cases when double castration has been thought necessary we find that resection or ignipuncture of the ovary are all that is required.

I therefore consider laparatomy to be the operation to be preferred in nearly all non-suppurative inflammatory lesions of the appendages, and even in bilateral suppurative lesions in which the tumor is distinct from the uterus and can be easily separated from it. On the other hand, I believe that vaginal hysterectomy is a decided step in advance in two classes of cases: 1st. Suppurative or non-suppurative tumors of the appendages when they are fused with the uterus and could not be detached from it without great injury, in view of the great degeneration and friability of the uterus in these cases. 2d. Suppurations originating in the appendages which have extended to neighboring tissues and caused suppurative perimetro-salpingitis, which will be studied in the next chapter.

Hysterectomy is therefore superior to laparatomy in cases of cystic or non-cystic oöphoro-salpingitis, markedly *adherent to the uterus.* I must insist upon this indication, which for me constitutes the *criterium* of the surgeon. It is true that before Péan's operation was suggested, these complicated cases were often cured by laparatomy, with the aid afforded by the Trendelenburg posture and evisceration, and thorough drainage with or with-

out Mikulicz's tamponade. I have already published convincing data upon this subject. None the less have I come to value hysterectomy more highly than I did at a time when I was arguing against the extreme tendency of surgeons to adopt it in every case. My opinion at present is this: *Vaginal hysterectomy is to be preferred to laparatomy in all cases where the appendages appear to be strongly adherent to the uterus, and in those in which the suppuration extends to the neighboring tissues* (*suppurative perimetro-salpingitis*).

The question of the *comparative gravity* of laparatomy and hysterectomy has given rise to the publication of numerous statistics which lead to diametrically opposed opinions. I do not propose to discuss them, and will merely observe that in the hands of skilful operators both of these operations would appear to be equally benign in simple cases; laparatomy being perhaps a little the better. In complicated cases, with adhesions or diffuse inflammation, hysterectomy is incontestably less grave.

This operation has rendered great service to surgery in severe inflammations of the appendages. We must not, however, adopt it in all cases. In my eyes it is an exceptional operation, laparatomy being practised, as a rule, it being more certain, more efficacious, and more benign. Finally, the women who by its means are not rendered completely sexless, either because the uterus is preserved or because a segment or portion of the ovary permits of even an irregular menstruation, appear to be less exposed to the various troubles which sometimes follow castration than those from whom all the internal genitalia have been removed.

Total Abdominal Hysterectomy.—In consequence of the sometimes imperfect results often given by simple extirpation of the appendages by laparatomy, some surgeons have not hesitated to remove both tubes and uterus through the abdominal opening. Performed for the first time by Polk, this operation has in America found enthusiastic partisans in Baldy, Krug, and Pryor. In France it has been performed only by Chaput and Delagéniere.

According to Pryor, the operative procedure is as follows: The patient having been placed in the Trendelenburg position, and the abdomen opened as in ordinary laparatomy, the upper part of the broad ligament is divided between two ligatures. The uterus may then be uplifted, the bladder detached, and the posterior cul-de-sac opened. The uterus is now held in place only by two lateral pedicles containing the uterine arteries; these are tied by means of a Deschamps needle, and the uterus is removed. The incised portion of the broad ligament is closed on each side by sutures; the upper pedicles are cut close and left in the abdominal cavity, the lower ones pushed back into the vagina. The peritoneal cavity may be entirely sewed up, or the pelvis may be drained by a piece of iodoform gauze carried into the vagina. In any event the abdominal wound is completely closed.

As I have already stated, I think it a mistake to exalt a manœuvre which is one of *necessity* into a method of *choice*. I do not approve of hysterectomy except when the adhesions of the *appendages* to the uterus cause great diffi-

culties in the way of hæmostasis. In such a case, had it been possible to diagnose correctly beforehand, a vaginal oöphoro-hysterectomy would have been preferable. The reason why American surgeons prefer total abdominal hysterectomy is because they long remained without a thorough knowledge of the technique of vaginal hysterectomy by *morcellement* with forcipressure, the only procedure adapted to such cases. I do not doubt that when they have become more familiar with this operation they will recognize its superiority over abdominal oöphoro-hysterectomy.

CHAPTER XXVI.

PERIMETRO-SALPINGITIS.

(*Peri-uterine Inflammation, Perimetritis, Parametritis, Pelvic Peritonitis, Phlegmon of the Broad Ligaments, Adeno-lymphitis, Juxta-pubic Adeno-phlegmon, Pelvic Abscess, Pelvic Cellulitis.*)

The confusion which has long existed in the classification and complete understanding of diffuse inflammations of the pelvis still prevails to a certain extent. Yet, thanks to the better knowledge of tubal inflammations acquired by a more enlightened study of clinical facts, aided by careful observations of conditions revealed by operations, we are beginning to obtain more exact information, which at the same time greatly simplifies the subject. This is our present status: though the starting-point of inflammatory processes is often in the uterus, yet it is more frequently from a salpingitis that we get inflammations in the neighborhood of the uterus, the broad ligament, cul-de-sac of Douglas, and pelvic cellular tissue. It is, therefore, essential to include the tube in denominating the disease, and to unite all these lesions under the generic name of oöphoro-salpingitis, or, for the sake of euphony, simply perimetro-salpingitis.

The invasion occurs with greatly varying clinical characteristics as to progress and intensity, according to the etiology. This naturally produces a series of distinct clinical types, although pathology includes them under one head.

Historical Sketch.—The more intense inflammations were the first to be observed, and the first described are the severe and rapidly suppurating forms following localized puerperal septicæmia. The works of Grisolle and Bourdon mark this first stage; phlegmon of the broad ligament was still confused with abscess of the iliac fossa of totally different origin.

Nonat, Valleix, and their pupils advanced the clinical knowledge of peri-uterine inflammations by describing the more sharply limited collections of pus which are found posterior to and upon the sides of the uterus; they considered them to be situated in the cellular tissue which they thought existed not only between the folds of the broad ligament, but around the supra-vaginal portion of the cervix, especially posteriorly, like a ring with its bezel directed toward the cul-de-sac of Douglas, to use a simile of Gallard.

Interminable discussions, more theoretical than practical in their nature, followed the promulgation of these views. At the same moment, almost,

another interpretation of the same facts was given by Bernutz and Goupil, in a remarkable description of the clinical phenomena which we now attribute to circumscribed or diffuse inflammation of the tubes, but which they thought due, without exception, to pelvic peritonitis. A few eclectic authorities, as Matthews Duncan and Simpson, admit the two preceding views of the origin of the inflammation; Virchow invented the terms perimetritis and parametritis to distinguish inflammation of the peritoneum from that of the cellular tissue surrounding the uterus. A new interpretation of analogous if not identical series of events came to add to the perplexity of nosologists.

The part played by the lymphatics in peri-uterine inflammations following labor had been dimly apprehended by many authorities. J. L. Championnière, especially, attributed great importance to them, and thought that their influence extended outside the puerperal state, even to an empty uterus. Alphonse Guérin believed that he had discovered a new clinical type, and a different localization of the inflammation around the uterus; he describes it under the name of juxta-pubic adeno-phlegmon. The origin would seem to be in a retro-pubic or obturator lymphatic ganglion and in the afferent vessels below the peritoneum and around the uterus. According to Guérin, whenever phlegmon of the broad ligament spreads into the cellular tissue of the abdominal walls, we have to do with a juxta-pubic adeno-phlegmon. Moreover, Guérin, Championnière, Guéneau de Mussy, Siredey, and Martineau considered that adeno-lymphitis satisfactorily explained the more circumscribed peri- and parametric inflammations.

From that moment the "lymphatic interpretation" carried all before it, and no active part was left to the cellular tissue or to the peritoneum. According to this theory as in all the preceding ones, the inflammation started from the mucous membrane, and the initial endometritis claimed the full attention of the clinician. At the very outset of these contradictory debates, which divided the gynæcological world, a theory was timidly put forward, but, because of insufficient demonstration, did not receive the attention it deserved. Aran, who was the first to perceive clearly the extreme importance of the part taken by the ovaries and tubes in uterine pathology, may be said to have anticipated this generation by attributing pelvic peritonitis to inflammation of the uterine appendages. He clearly showed that these are the foci around which gather pus and false membranes. Isolated observations by other writers which demonstrate the truth of this proposition were published, but attracted no attention. At the present time, the tendency is to return to Aran's views, but in my opinion there is not enough emphasis laid upon this theory as the only possible solution of all peri-uterine inflammations. The more recent writers still give a separate description of parametritis and perimetritis, to which they sometimes add adeno-lymphitis, with the result that the bewildered reader can scarcely follow the subtleties of diagnosis. For my part, I frankly acknowledge that I believe in Aran's theory. The facts which I have personally observed have shown me that nearly

all peri- and parametric inflammations are merely forms of salpingitis and peri-salpingitis. The lymphatics certainly have an important part to play, but even this is subordinated to the previous inflammation of the uterine mucous membrane and its extension into the oviduct. Now, the primary phenomenon is always the one whose name should be given to the disease.

I will describe in succession the various anatomical forms that may be assumed by inflammation about the uterus and its appendages, beginning with the mildest. These clinical types are: 1. Serous perimetro-salpingitis. 2. Pelvic abscess. 3. Phlegmon of the broad ligament. 4. Diffuse pelvic cellulitis.

Pathological Anatomy. 1. *Serous Perimetro-salpingitis.*—This lesion cannot be seen at autopsies, but may be observed during the course of certain

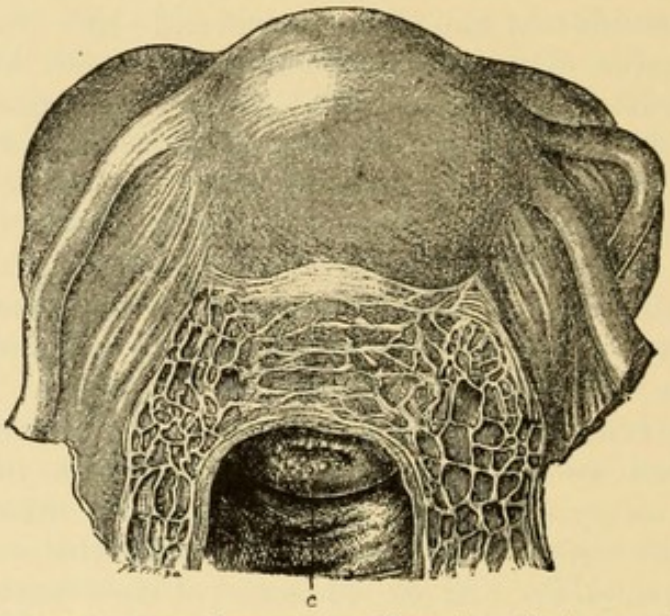


FIG. 405.—SEROUS PERIMETRO-SALPINGITIS (INFLAMMATORY ŒDEMA). *c*, Cervix seen through opening in the vaginal wall.

operations. For my own part, I have twice found an œdematous infiltration of the folds of the broad ligament about a tube which was affected with purulent salpingitis. Before laparatomy, by bimanual palpation, this infiltration gave the sensation of a rather large tumor, which might have been mistaken for a tumor of the tube itself. Lymphangitis surely has something to do with this acute œdema giving rise to inflammatory nodules. The proof of this fact is seen in the engorgement often produced in the inguinal glands communicating with the lymphatics of the surface of the uterus by a small vessel which accompanies the round ligament (Fig. 352).

These hard œdemas may doubtless invade the loose cellular tissue surrounding the oviduct, under the influence of an acute attack of salpingitis. Neither is it impossible that an effusion of muco-pus or of blood may from time to time come from the inflamed mucous membrane and irritate the cul-de-sac of Douglas or the frequently prolapsed appendages. Whatever the

source, there is no contesting the fact of an intermittent inflammatory œdema around the diseased tubes. Direct observation has demonstrated it, and the law of induction permits us to suppose it present, in those cases in which voluminous masses appear and disappear in the course of a few days upon the sides of the uterus—a process witnessed by all clinicians. In the same way dental caries may cause a large swelling of the cheek which disappears without a trace at the end of forty-eight hours.

By the side of this serous peri-salpingitis we must place serous perimetritis. There are cases in which the inflammatory œdema is produced at the base of the broad ligament, around the large lymphatic vessels which come from the cervix uteri (Fig. 353). This is especially noticed after certain operations upon this organ (Schröder's, Emmet's, etc.), if they have not been perfectly aseptic.

To this inflammatory œdema of the subperitoneal connective tissue, which may anatomically be compared to the experimental œdema produced by Ranvier's process, is often added a secretion of serous fluid between the adventitious membranes around the appendages, and especially in the pouch of Douglas, forming serous collections of fluid. Capillary punctures performed as a therapeutic measure have demonstrated their existence and proved their frequency. They have, moreover, been found during some laparatomies. A. Doran has published the report of a curious case in which such a collection of fluid was, after opening the abdomen, mistaken for a sarcoma of the ovary, which they did not dare remove: the rapid disappearance of the tumor left no doubt as to its nature.

This is the first degree of peri-uterine inflammation: in the great majority of cases, it corresponds to a well-defined clinical type, that of ephemeral acute attacks during the course of inflammation of the appendages. To it also may be ascribed the circumscribed and masked parametritis which has been supposed to cause the relaxation or retraction of the uterine ligaments.

Suppurative perimetro-salpingitis is met with clinically under two very different types. One of them corresponds to the later stages of pelvic peritonitis, as salpingitis and pyo-salpinx correspond to the early stages: that is, pelvic abscess. The other, phlegmon of the broad ligaments, is characterized by a special mode of extension of the suppurative process, determined by certain etiological circumstances.

Pelvic Abscess.—This expression must not be misinterpreted as has been the case even recently. Voluminous pyo-salpinx, forming large purulent cavities adhering by a large portion of their surface to the pelvis, have long been taken for encysted collections of pelvic peritonitis or for abscesses beneath the peritoneal folds, and have erroneously been called pelvic abscesses. Their real origin is difficult to demonstrate, as it demands a tearing apart of the tubal sac, which the earlier operators, in search of pus in the abdomen, would not have dared undertake, even had they supposed it feasible. Upon opening the abdomen, if you find a pouch as large or larger than both fists,

circumscribed by adhesions upon every side, seeming to be joined posteriorly to the cul-de-sac of Douglas, which it fills, adherent laterally to the pelvis and superiorly to the epiploön or even to the intestine, it is very natural to suppose that an abscess has formed either in the subperitoneal tissue (parametritis), or in the peritoneum, shut in by adventitious membranes (pelvic peritonitis); yet in the majority of cases we have to do with a purulent tubal cyst, free in the beginning and afterward rendered immovable. This may be demonstrated by boldly tearing apart the walls of the cyst (first emptying it by aspiration). When this oftentimes laborious work is finished, we frequently find a cyst with an internal pedicle inserted upon the horn of the uterus, and we recognize it as a dilated tube.

The greater number of so-called pelvic abscesses treated a few years ago by laparatomy and incision, without any attempt at total extirpation, were nothing but adherent pyo-salpinx, which should really be entirely removed. Their clinical and operative history belongs to the chapter on pyo-salpinx, to which I refer the reader. There remain, however, among the number of encysted collections of fluid, a certain proportion of cases in which the connection with neighboring parts is so intimate that total removal would be impossible or dangerous. These cases may properly be differentiated by a special name, and may be called pelvic abscess if we clearly specify that this name be reserved for collections of pus which cannot be enucleated. The name has a surgical rather than an anatomical value. In point of fact, at the autopsy it is usually impossible in advanced cases to determine the exact nature of the abscess wall, and to ascertain whether it be peritoneum, false membrane, or dilated tube.

For the same reasons we should include under the head of pelvic abscess certain cysts within the broad ligament, certain forms of hæmatocele which have suppurated and become transformed into a purulent mass; a real abscess, which adheres on every side to the soft or hard portions of the pelvis, and which cannot be removed. Among the cases of pelvic abscess reported cured by laparatomy and incision by Tait was one which he traces to an extra-peritoneal intra-ligamental pregnancy. No vestige of a fœtus was found in the pus, but only the placental débris. We thus see that if an extremely adherent pyo-salpinx constitute the great majority of cases of pelvic abscess, in exceptional cases the latter may be located elsewhere. In some cases, moreover, the appendages, which are diseased but not greatly enlarged, form the starting-point for a large pelvic abscess whose cavity is limited by false membranes and agglutinated loops of intestine. It is especially in these cases that one is tempted to attribute the most importance to inflammation of the peritoneum, and apply the term pelvic peritonitis, not attaching sufficient importance to the initial lesion of oöphoro-salpingitis. Finally, I have quite exceptionally observed collections of pus rather widely separated from a pyo-salpinx, and probably developed around lymphatic vessels which have been infected from a utero-tubal lesion. This primary le-

sion may, however, always be found to exist. In other words, if among the complex lesions which give rise to pelvic abscesses we always find either a pelvic peritonitis, a lymphangitis, or a cellulitis, we must bear in mind that these morbid elements are themselves only secondary; consequently I have given them the second place, from a nosological point of view, and have given to the disease the more comprehensive name of perimetro-salpingitis, a name serving as guide to both clinician and operator. Pelvic abscesses, which are a variety of this species, are more especially due to peri-oöphoro-salpingitis, while phlegmon of the broad ligament, a second variety of pelvic suppuration, usually follows perimetritis. The intimate adhesion of a pyo-salpinx to the pelvic walls, or to the pelvic organs, is the first step toward spontaneous rupture. Its tendency is to open into the rectum; a first evacuation relaxes the sac, but it is very soon filled again, and the communication between sac and rectum becomes, if not permanent, at least regularly intermittent. These fistulæ are more rarely produced into the vaginal cul-de-sac. Finally, if the abscess has developed soon after labor, when the appendages which have been carried upward by the gravid uterus tend to fall forward, the suppuration may gravitate into the anterior portion of the pelvis, and, after invading the pre-vesical cavity of Retzius, spread into the groin or toward the umbilicus. These fistulous pelvic abscesses are a most important variety. Long after their first development, they become reduced to passages of no great width, but very sinuous, and surrounded by chronically indurated tissue which it is exceedingly difficult to cure.

Klob has pointed out the frequency of fatty degeneration of the muscular fibres of the uterus, when pelvic suppuration exists. I also have had occasion to observe it; it is especially noticeable when one attempts to remove an abscess sac which is adherent to the uterus, as the latter then tears easily.

Indurated masses due to the infiltration and proliferation of connective tissue are often found by the side of and extending beyond the abscess. These may continue after it has been evacuated, and form residues very hard to cure. Upon the omentum also may be seen the ligneous masses of chronic epiploitis. All these lesions rapidly disappear after evacuation of the purulent focus.

Phlegmon of the broad ligament is nearly always secondary to a recent labor, when the cellular tissue of this serous membrane has been stretched and relaxed, and the veins, which have become varicose, are the seat of thrombi or may even rupture and let the blood spread more or less extensively around. The result is an anatomical condition eminently favorable to the rapid development of suppuration.

What is the exact starting-point of the process? Does the infection come from the inflamed tubes situated at the upper border of the folds of the ligament? or is it caused by a peri-lymphangitis of the large vessels at its sides? Either process is possible, and the two may indeed coexist; the

important fact to bear in mind is the pre-existing anatomical condition or the intensity of the infective process, which permits the lesion to assume its special character from the start—that of phlegmon, with a tendency to become diffused, which is a different thing from a circumscribed abscess.

There are few exact anatomical documents upon this subject. In the report of an autopsy published by A. H. N. Lewers we find some interesting details. The two folds of peritoneum were separated by an abundant exudation which came from the inferior border of the tube and extended to the base of the ligament below, and to the pelvic walls beyond. The tube was stretched below the convex surface of this swelling. The writer gives no details as to its anatomical condition, which he seems not to have examined; but he calls attention to a small abscess in the substance of the ovary, whose surface adheres to the surface of the broad ligament by recent exudations. The probabilities are that the tube was diseased, and in any case the broad ligament may have been infected by the suppurating ovary. A section of the broad ligament showed spongy areolar tissue the cavities of which were filled with a sero-sanguineous fluid. In an autopsy at which Carter assisted, the section of the broad ligament conveyed the idea of an interstitial injection of plastic material which separated the normal elements, and kept the veins distended and the lymphatics immobilized and gaping.

Delbet reports an autopsy upon a patient three weeks after labor, when he found at the base of each broad ligament a purulent cavity containing 100 gm. (3 oz., 2 dr.) of pus, traversed by thick bridles formed of arteries and veins. An injection into the hypogastric artery demonstrated that these vessels were the visceral branches of the internal iliac. Raffray and Jayle also reported a case of post-puerperal phlegmon of the lower part of the broad ligament, the pus containing the streptococcus.

The inflammatory infiltration is easily carried beneath the peritoneum, along the psoas iliacus, as far as the anterior superior spine of the ilium, and from there extends into the subcutaneous adipose tissue, through weak points in the musculo-aponeurotic layers, the vascular orifices, and nerve channels. As soon as the purulent sac comes in contact with the abdominal walls it adheres to them, and gives rise to the sensation of a plaque or resistant flattened mass. Suppuration usually follows infiltration, but it may be absent; the process then stops, and the phlegmon resolves, leaving only indurated masses of cellular tissue. At times I have noticed a curious and little-known phenomenon, which persists for a long while after the peri-uterine inflammatory phenomena have subsided: just as the whole process seems at an end, we discover signs of a suppuration at a greater or less distance from the original site of the abscess, toward the iliac fossa, in the sheath of the psoas or even in the perinephric cellular tissue. It would seem as though some septic residues had been left there and developed slowly after having lost all connection with their point of origin. It is also probable that the lymphatics have a share in the production of these tardy abscesses,

which closely resemble those produced in situations where there has been a pre-existing lymphangitis.

In all the preceding affections, septic infection is more or less localized, and the lesions produced remain within clearly defined limits. This is not always the case, however; following certain cases of puerperal infection, the infiltration rapidly extends through the whole pelvic cellular tissue, spreading in the same way as malignant erysipelas; hence the name of erysipelas malignum puerperale given to it by Virchow. The œdematous tissues are livid, the lymphatics full of micrococci, the vein contain blood-clots or pus; these cases usually terminate fatally. The predominant part played by the lymphatics is beyond dispute; this is a veritable septic lymphangitis, starting from the uterine wound and invading everything that surrounds the generative apparatus. It is for this clinical type that I suggest we reserve the name of diffuse pelvic cellulitis.

General Etiology.—I shall not repeat what has already been said about the etiology of tubal inflammations, which applies perfectly to the affections under consideration, since, with the exception of diffuse pelvic cellulitis, which constitutes a class by itself, all, or nearly all, peri-uterine inflammations are merely an extension from a tubo-ovarian centre. I will only mention the etiological factors peculiar to the various classes which I have named.

Nodules of inflammatory œdema are observed during the course of every variety of acute or chronic inflammation of the tubes.

Pelvic abscesses follow pyo-salpinx, suppuration of an imprisoned ovarian cyst, or pelvic hæmatocele in the vicinity of an inflamed tube. Temporizing treatment or too prolonged or violent explorations favor their development. Is phlegmon of the broad ligament ever observed outside of the puerperal state, which, as I have tried to show, exercises so strong a predisposing influence? Bernutz admits that seventeen out of twenty cases are due to the puerperal state. Farrier, in a work which has become widely known, held that this affection was never due to any other cause. Delbet states that more phlegma of the broad ligament will soon be observed outside of the puerperal condition than within it. These two opinions are too exclusive. Assuredly infection of the uterus from septic operations has caused the same accidents as the puerperal state, but its occurrence is rare, and invariably indicates negligence of the rules which should govern all operations. These pathological conditions are still too frequently found following cases of labor or abortion; from this it follows that the puerperal state is the most usual cause of phlegmon of the broad ligament. Finally, diffuse pelvic cellulitis may result from labor or operation upon the genital tract under exceptionally septic conditions. It may be likened to the cellulitis which used to accompany serious operations upon the bladder or rectum.

Symptoms and Diagnosis. 1. *Serous Perimetro-salpingitis.*—In its milder forms the symptoms of an invasion by inflammation of the parts sur-

rounding the tubes and ovaries are those which I pointed out in rather cursory fashion, in the chapter on salpingitis, under the name of acute attacks. Excellent descriptions have been given by several authors, but under various names. Peter, Guéneau de Mussy, mention them without specifying their exact location. Martineau ascribes them to peri-uterine adenitis; Courty also believes in a lymphatic origin. Mundé in America, and A. Martin likewise take this view. Cantin devotes good work to the upholding of this view.

Besides the signs of coexisting salpingitis, the following are some of the symptoms met with: The patients complain of an increase of their usual malaise; a marked febrile state is, however, rare; gastric disturbance is slight. By vaginal touch we find increased sensitiveness in the culs-de-sac; touching one particular spot often will cause very sharp and localized pain. There may be general puffiness about the affected region, especially if previous similar or more severe attacks have caused adhesions, which have, so to speak, ankylosed the uterus. In these cases, the signs perceptible to the touch may from an acute exacerbation of the trouble assume an apparently serious nature, of which the experienced clinician alone will understand the real significance; the mildness of the general symptoms will aid in preventing an exaggeratedly gloomy prognosis.

In the course of a few days the puffiness will be seen to disappear, leaving in its place indurated masses not attached to the uterus, which may be once more quite freely movable. There are usually several nodules in the posterior and lateral culs-de-sac, which, as Guéneau de Mussy was the first to point out, feel like rounded ganglia and are more or less sensitive to the touch. These tumors so rapidly change in character that, unless the results of the daily examinations are carefully noted, one might almost fancy the whole thing to have been the work of the imagination.

Occasionally we may note the long duration of hard, ligneous nodules, which in shape and consistence bear a marked resemblance to fibromata. They may be distinguished from the latter by the lack of intimate connection to the uterus, and by the absence of dilatation of the uterine cavity. A prolapsed ovary is larger, and forms an isolated tumor which gives rise to peculiar nauseating pain and faintness. The tumor of small ovarian cysts or a cyst of the broad ligament is entirely different; it possesses elasticity or fluctuation, is absolutely lateral, single, and perceptible by bimanual palpation only, not by vaginal touch. Scybala can cause an error of diagnosis only to careless examiners and those who omit the rectal exploration. The use of the speculum is of no value. The course and progress of these œdematous nodules and collections of serous fluid of peri-salpingitis are uncertain and intermittent; they constitute one of the elements of the recurring inflammations of the appendages described in the chapter on salpingitis; they show a tendency to return, but none to suppurate.

2. *Pelvic Abscess.*—This name does not imply merely a collection of pus

situated in the pelvis, otherwise pyo-salpinx would have to be included under this head. The surgical characteristic of pelvic abscess is this, that it is a collection of pus which is not free, not capable of being enucleated or tied off and removed, but a true pelveo-parietal collection adhering to the pelvis, which forms its walls. It has been described under the names of pelvic peritonitis and suppurating parametritis; even phlegmon of the broad ligament, which is an entirely distinct clinical variety, has been called pelvic abscess.

Clinically, a pelvic abscess is usually the last phase in the development of pyo-salpinx, and there is no symptomatic boundary line between them. Yet occasionally acute phenomena may mark the transition from circumscribed suppuration of the tubes and ovaries (pyo-salpinx, ovarian abscess) to the diffused form. If the pus break into the peritoneal cavity, or if there be simply an acute peripheric inflammation, we may have the sudden appearance of sharp pain causing faintness, and accompanied with phenomena analogous to those of peritonitis—chills, vomiting, distention of the abdomen, drawn and anxious facial expression, and thready pulse. At the same time the fever (which may until then have been absent, or discovered only by the most careful thermometric examination) appears, and assumes a remittent form with evening exacerbations. There are functional disorders of neighboring organs—constipation, dysuria, rectal and vesical tenesmus. If the abscess project toward the rectum, there may be complete retention of fæces.

(A peculiar but quite frequent epiphenomenon of pelvic suppuration is the production of diaphragmatic pleurisy. Potain noted the fact that simple inflammations or ovarian or peri-ovarian irritations might act by a sort of nervous reflex upon the pleura. A. Lasne took up this subject, and considers the pleurisy to be due to a propagation of the inflammation from the pelvic peritoneum to the diaphragmatic peritoneum by means of the lymphatics, more especially those which accompany the tubo-ovarian vessels and go to the pillars of the diaphragm. This pleurisy is usually dry and not severe.)

Touch and bimanual palpation should be used with the greatest care. By these we ascertain that the uterus is immovably fixed in the pelvis by plastic matter, which is merely the œdema produced by intense inflammation, and which has infiltrated all the adjacent cellular tissue. After a few days, this œdema diminishes, and as it were unmasks the projecting abscess, which is separated from the cervix by a groove. This tumor is smooth, regular, and difficult to define at its upper limit: it imparts a sensation of heat to the finger, and arterial pulsation due to the dilatation of the vessels may often be felt. Fluctuation is rarely appreciable, because of the indurated cervix, which is often as hard as pasteboard; and because of the great thickness of the infiltrated tissues intervening between the examining finger and the purulent mass, which is often quite small, although surrounded by an inflammatory exudate. An important characteristic is the immobility of the

uterus and the tumor, which are firmly united together. By means of bimanual palpation we also note that the tumor is adherent to the pelvic walls. The uterus is displaced, with the cervix flattened against the pubis if, as is most frequently the case, the tumor is situated in the posterior cul-de-sac. The mass may also project at the sides, and more rarely it is situated between the uterus and bladder.

Rectal touch is of value in furnishing additional information as to the connections formed by the tumor; the speculum is useless.

The formation of protective adhesions which serve to limit the extension of the abscess may cause a prolonged remission of the symptoms. But when there is an attempt at evacuation, the lancinating pains and the fever become intensified. If the pus point toward the posterior cul-de-sac, the vagina becomes indurated; if toward the rectum, there is a sensation of weight on the perineum, and an exceedingly painful rectal tenesmus.

Severe crises often precede the opening of the abscess into the rectum, vagina, or (which is rare) the prevesical cellular tissue, and are followed by short periods of calm. The abscess, as a rule, is not completely emptied, and symptoms of chronic absorption appear; or else the abscess may be completely emptied, but quickly refilled, and continue to discharge its contents at irregular intervals with the same accompaniment of general symptoms. The patient falls into an enfeebled and hectic condition similar to that described in relation to fistulous pyo-salpinx. At this stage the two affections are not to be clinically distinguished; and the difference between them due to the fact that the abscess may in one case be enucleated, and in the other not, concerns operative medicine alone. Exceptionally the patient is cured after evacuation of the pus, but the abscess usually leaves fistulæ of interminable duration. There have been a few cases of sudden death due to the rupture of the abscess into the peritoneum; their rarity is due to the formation of false membranes which circumscribe the focus of suppuration.

Pelvic abscess may be tuberculous, as may be the pyo-salpinx which causes it; in such cases we shall usually find signs of the disease in the pulmonary tract.

The diagnosis of pelvic abscess and of pyo-salpinx is easily made when there is any mobility of the cystic and pediculated tubal mass, but if this cystic tumor is closely adherent, or has developed fistulæ, the diagnosis becomes impossible; a study of the general symptoms and commemorative signs will lead us to suspect that the inflammation is becoming diffused, and laparatomy alone can completely decide the matter. Phlegmon of the broad ligament forms a tumor laterally placed on the uterus; it appears shortly after labor. Pelvic hæmatocele from the outset shows fluctuation; it gives rise to febrile symptoms only if it suppurate and become transformed into a pelvic abscess.

3. *Phlegmon of the Broad Ligament.*—Foreign writers usually describe this under the head of parametritis; it seems to me highly desirable to pre-

serve the old name under which in France it was the subject of descriptions which have become classical, the more so that this name clearly indicates the principal if not the initial seat of the lesions.

It usually makes its appearance toward the end of the first week after a labor rendered septic by special conditions (epidemics, lack of sufficient antiseptic precautions, etc.). A severe chill may mark the onset. In some cases local pain is the initial symptom; it is situated in the lumbar region and extends into the thighs. Anorexia and sleeplessness, profuse sweating, slight erratic chills, fever of a remittent type, a profound alteration of the facies usher in the process of suppuration. When the pus is fairly collected in a mass, there may be a delusory period of relative calm. By vaginal touch, we find in the early stages only a general puffiness of the culs-de-sac, which renders the uterus immovable, and which usually projects upon one side of it. A later examination with bimanual palpation shows that there is a localized unilateral mass joined to the uterus and uniting it to the pelvic wall, and reaching to the superior strait, as if the broad ligament were solid. A crescentic prolongation of this mass usually surrounds the cervix, from which it is separated by a groove. There is a marked lateral version of the uterus toward the unaffected side.

It is not impossible that resolution may occur, and the disease terminate by a resorption of the plastic products and nodular retraction of the broad ligament. This, however, is very exceptional. Usually, after a short remission, the chills reappear, with profuse perspiration and diarrhœa, the general condition clearly indicating septic infection. Death may supervene at this stage, but, as a rule, the pus succeeds in finding a channel for evacuation, unless the surgeon have anticipated the efforts of nature. The purulent infiltration invades the whole of the broad ligament, and finally goes beyond its limits, toward the vagina and the sides of the pelvis; the vaginal cul-de-sac becomes thickened and indurated, and gives to the examining finger the sensation of what has been called pasteboard vagina. Within the anterior superior spine of the ilium, or a little below it, just above Scarpa's triangle, from which it is separated by the crural arch, there appears an indurated plastron, which indicates the invasion of the subcutaneous cellular tissue. When this occurs, the tumor may have gone beyond the boundaries of the pelvis into the iliac fossæ. The plaque-like surface spreads, becomes softened at the centre, and reddens, while the greenish and viscid pus is often poured forth in enormous quantity from a small aperture. The opening may be into the vagina, or, more rarely, into the rectum, the cæcum, or even the bladder. Fatal peritonitis is due rather to an extension of the inflammation than to the opening into the serous cavity. The aperture may remain fistulous, smaller and smaller quantities of pus issuing therefrom, and may finally close after a protracted period. The patient may die of hectic, unless surgical interference open the abdomen, drain and disinfect the suppurating region.

The diagnosis offers difficulties only at the outset, when it is a matter of

doubt whether the pus will remain circumscribed and form a pelvic abscess, and at the termination of the process, when, the suppuration having extended beyond the pelvis, phlegmon of the broad ligament has been transformed into an abscess of the iliac fossa. A decisive opinion can be reached only by a study of the course of the disease, which is very characteristic and not in the least like that of perityphlitis, ossifluent abscess, or rapidly formed cancer of the ilium.

4. *Diffuse pelvic cellulitis* is merely the local manifestation of a general condition of septicæmia, which of itself so attracts the attention of the physician that I have no need to dwell upon it. I would simply call attention to the rapidity of its extension, which has been compared to that of erysipelas; to the tendency to mortification of the cellular tissue, which may give rise to emphysema; to the ulceration of blood-vessels, often causing formidable hemorrhages; and to the frequency of a fatal issue.

Prognosis.—This varies according to the variety and the degree of the perimetro-salpingitic inflammation. A lack of careful observance of these distinctions will account for the differing opinions entertained by various authorities upon this matter of prognosis.

The prognosis in regard to serous perimetro-salpingitis is that of the tubal lesion which occasions it. Its course is apt to be one of recurring attacks, but it does not endanger life; it is a prolonged infirmity rather than a disease.

Pelvic abscess is more serious; it may cause death from acute peritonitis, from rapid septicæmia, or from slow consumption. The course is uncertain and marked by exacerbations, as Gosselin pointed out. But this surgeon, together with his contemporaries, evidently included, under the name of peri-uterine phlegmon, catarrhal salpingitis, with inflammatory œdema and pyosalpinx. Though the patient may escape acute accidents, and the disease, from resorption or spontaneous evacuation of the focus of inflammation, may be said to be cured, yet the future health of the patient will be constantly impaired because of the chronic lesions of the tube and also because of abnormal adhesions, retractions of ligaments, and displacements of the uterus and ovaries. Sänger has noticed that the ureters can be much more easily felt in patients who have had peri-uterine inflammations, as if their walls were thickened by the inflammatory processes in their vicinity. Some cases have even been reported of accidents due to pyelo-nephritis caused by retraction of cicatricial tissue resulting from pelvic abscess. Freund describes under the name of chronic atrophic parametritis a disease which might frequently be due to a pelvic abscess cured by spontaneous absorption with resultant sclerosis of the inflamed tissues. By this retraction the vessels are compressed, and as a result there is atrophy of the whole genital canal, with a premature menopause. Sänger has observed that the ureter was more easily reached, larger and more indurated upon the side where a parametritis had existed; this condition may be due to inflammation by contiguity and a

species of consecutive parenchymatous uteritis. Phlegmon of the broad ligaments is very serious. Death may take place during the inflammatory stage at the outset, or supervene upon prolonged suppuration, or occur suddenly from an embolus caused by thrombosis of the pelvic veins. Diffuse pelvic cellulitis is nearly always fatal.

Treatment.—Perimetro-salpingitis should be treated in the same way as the salpingitis which has given rise to it. The essential features are rest, revulsives, and prolonged injections of hot water. The cases which have been so rapidly cured by electricity surely belong to this category. Acute attacks have often been known to disappear rapidly after energetic intra-uterine treatment, curetting, and injections, and this result has been adduced in proof of the lymphatic origin of perimetritic affections.

These acute attacks are not the least of the indications which have led surgeons to remove the appendages, thus curing the salpingitis and the peri-salpingitis at the same time.

The tumors formed by acute inflammatory œdema show no tendency to suppuration; and as these are the tumors which occur most frequently, they have brought about a habit of expectant treatment which has been too widely applied.

I entirely disapprove of punctures for the evacuation of collections of serous fluid; they may cause suppuration and do not hasten resolution.

In pelvic abscess and abscess of the broad ligament the principal indication is to moderate the intensity of the inflammation by prolonged hot douches, by local bleeding, etc. Then, as soon as the pus is formed, we must go in search of it.

In what locality shall the collection of pus be opened, and how shall it be done? I will successively consider the different cases which may cause a variation in the surgical procedures.

A. *Abscess Pointing toward the Vagina.*—Is puncture with a trocar all-sufficient? Simpson has recommended it, and recently Tenneson has taken it up, penetrating into the posterior cul-de-sac, even in the absence of fluctuation. He uses capillary puncture with aspiration for the evacuation of the serum or the pus of perimetritis. This procedure is not to be recommended; there is danger of wounding the intestines should the abscess sac be far from the vaginal wall; it is inadequate if the sac be adherent; its only use in the latter case is to confirm the diagnosis and to serve as a preliminary measure to immediate and more efficacious treatment.

Laroyenne, of Lyons, also practises puncture through the vagina into the masses of inflammatory products of chronic peri-uterine disease, with latent effusions of serous or bloody pus. His trocar, which is of quite large calibre, has a groove upon the side, making it answer the purpose of a grooved director and permitting the introduction of a lithotome after the puncture, to make a lateral incision of from one and one-half to two and one-half inches (Fig. 406). A glass tube with a bulb at one end is introduced, and through

it we can apply antiseptic irrigations under slight pressure. Laroyenne has obtained good results from this method. I believe that the technique of the operation can be simplified by following the aspiratory puncture, which has revealed the presence of pus, by incision of the successive layers of the vaginal cul-de-sac, arresting hemorrhage by hæmostatic sutures such as Martin introduced in the early days of vaginal hysterectomy. Tamponade would also control hemorrhage for the time being. When the abscess is opened, a cross-shaped rubber drainage tube may be inserted, and iodoform gauze packed around it. This is in substance Mundé's method. He supplements it by a careful cleansing of the abscess cavity with a blunt curette, which seems to me to be of use in a few exceptional cases only. A dermoid cyst containing hair and other débris was the nucleus of one of the abscesses opened by Mundé. Curetting is not free from danger. Laroyenne has demonstrated that the superior wall of a pelvic abscess is usually very friable and may be lacerated by mere forcible injections.

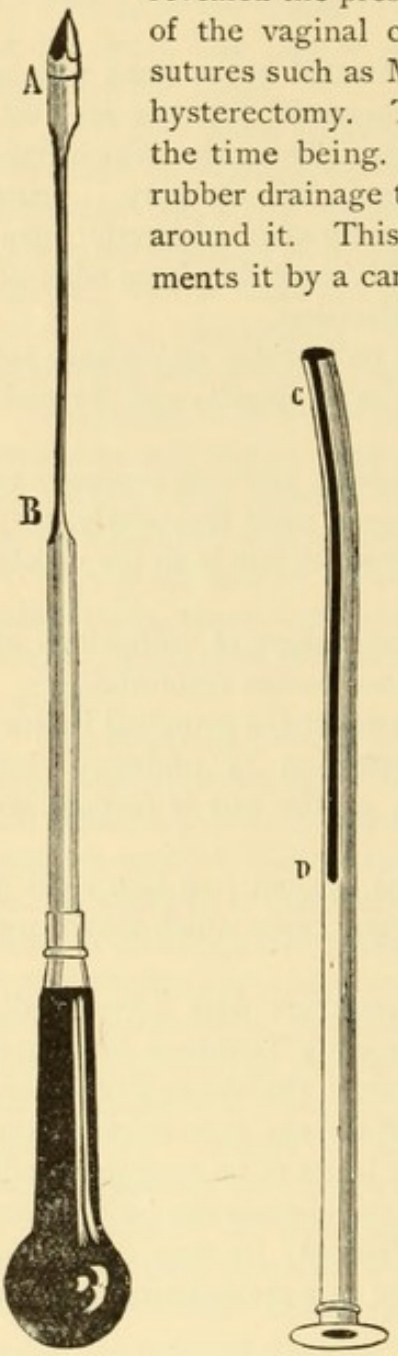


FIG. 406.—LAROYENNE'S TROCAR AND CANULA.

To avoid wounding the ureters and the uterine and vaginal arteries, we should observe the following rules in the choice of a locality for the incision:

Tumor posteriorly placed: transverse or vertical incision directed in accordance with the axis of the tumor.

Tumor laterally situated: an oblique incision, directed posteriorly and outward; in front it must not go beyond the prolongation of the transverse diameter of the cervix.

Tumor in front: small transverse incision, combined with a longer antero-posterior incision.

It is my opinion that incision through the vagina should be reserved for a small number of particularly favorable cases, and that as a general mode of procedure it is far inferior to laparatomy. Direct exploration alone, after opening the abdomen, will show whether the sac can be removed; this is curative treatment, whereas simple incision does nothing to prevent constant recurrence of the trouble. Moreover, in making an opening through the vagina, we can never be sure of not wounding loops of intestine agglutinated in Douglas' cul-de-sac.

B. *Abscess Pointing toward the Rectum.*—Does the fact of its pointing in this direction oblige us to make an incision in a region so unfavorable to the future antiseptic condition of the abscess cavity? I think not. The pus can be much better evacuated by means of an incision in the para-sacral region or by perineotomy.

C. *Abscess Situated at an Equal Distance from the Vagina and the Abdominal Walls.*—Various ways of reaching it have been suggested:

1. The perineal method.
2. The pelvic or sacral method.
3. Making an incision above Poupart's ligament and loosening the peritoneum to the abscess by means of an operation similar to the one used for tying the iliac artery, and which I propose to call subperitoneal laparatomy.
4. Laparatomy properly so called, or transperitoneal laparatomy. This really means two processes, according to whether we suture the abscess walls to the abdomen or reset them, reducing the cavity to the smallest possible dimensions and draining through the vagina.
5. Incision at two different times.

I will rapidly consider these various methods:

1. *Through the Perineum.*—Hegar long ago proposed to evacuate pelvic abscesses through the ischio-rectal fossa, by carrying an incision from the tuberosity of the ischium to the tip of the coccyx.

Vertical perineotomy recommended by Sänger is simply an enlargement of Hegar's perineal method; the incision is made to one side of the median line, begins at the level of the posterior third of the labia majora, and ends an inch from the anus, between that orifice and the tuberosity of the ischium; by this means we may penetrate above the levator ani (Fig. 407).

Otto Zuckerkandl's transverse perineotomy, dividing the recto-vaginal partition, has been especially recommended for the removal of uterine cancer, and Sänger has pointed out that it may also be useful for the evacuation of pus in the cul-de-sac of Douglas. The incision is carried from one ischium to the other and at each end may be slightly prolonged from before backward, and from within outward, giving it the form of a trapezium without a base. The cul-de-sac may be deeply incised, and the pus evacuated with less chance of infection than if done through a rectal opening. But the wound, being funnel-shaped, will not allow of the manipulations necessary for the removal of a pyo-salpinx (Fig. 408).

2. *Pelvic or Sacral Method.*—Quite recently several plans for reaching the abscess have been proposed.

E. Zunkerkandl's and Wölfler's para-sacral incision, carried deeply along the side of the sacrum, penetrates into the superior pelvi-rectal space, above the levator ani. Temporary or permanent resection of the coccyx and sacrum is a method adopted by Kraske, and modified by Hegar. This operation is of use only when we need a large field, as in the removal of a tumor; it is not needed for the purpose of evacuation.

These various processes all show ingenuity, and may be of real service in special cases, but they are inferior to laparatomy, in that the latter alone permits of an incision large enough and so situated as to enable us to ascertain where there is a removable pyo-salpinx or a pelvic abscess, which only an

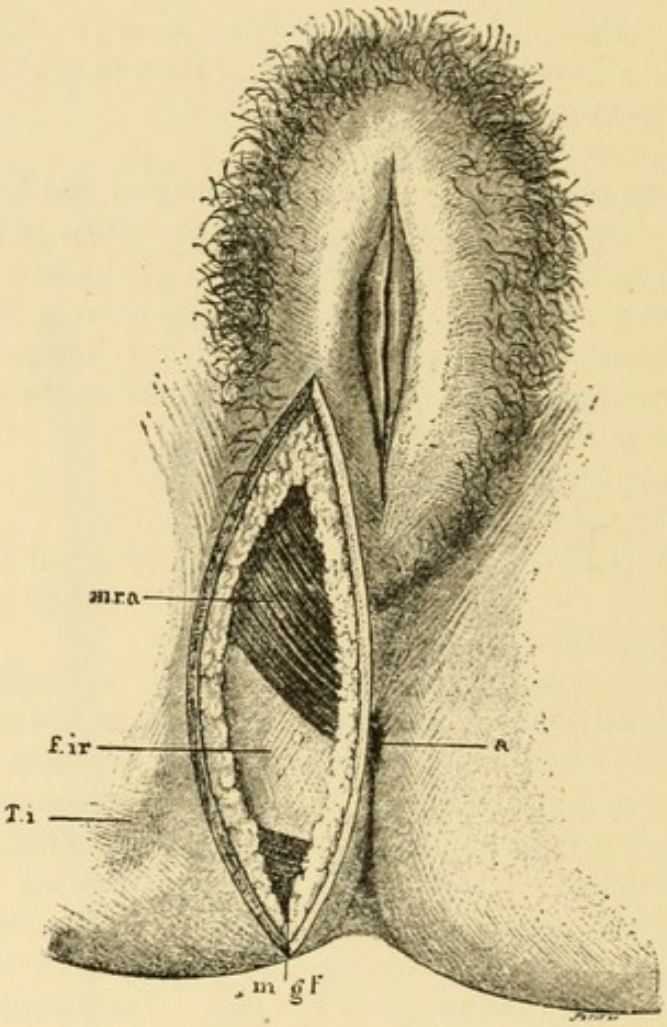


FIG. 407.—VERTICAL PERINEOTOMY (HEGAR, SANGER). *a*, Anus; *Ti*, tuber ischii; *mgf*, gluteus maximus; *mra*, levator ani; *Fir*, ischio-rectal fossa.

incision can relieve. By adopting the former means, there is always the risk of simply cutting into sacs which might be more rapidly and completely cured by removal.

3. *Subperitoneal laparatomy* possesses the decided advantage of avoiding the dangers consequent upon an effusion of pus into the serous cavity; it is, for this reason, more advantageous than laparatomy properly so called, or transperitoneal laparatomy. But it has this drawback, that if the sac is enucleable, even though adherent, it cannot be removed, but merely incised. I am less in favor of this operation since our knowledge of pyo-salpinx has become more definite; yet as it may in some cases be very useful, I will give a rapid description of it.

We must, in the first place, by touch and bimanual palpation, ascertain the exact situation of the abscess. Then about half an inch above the crural arch we make an incision of four to five inches in length, cutting through the successive layers of tissues until we reach the subperitoneal cellular tissue. The serous membrane, as in ligation of the external iliac, is separated

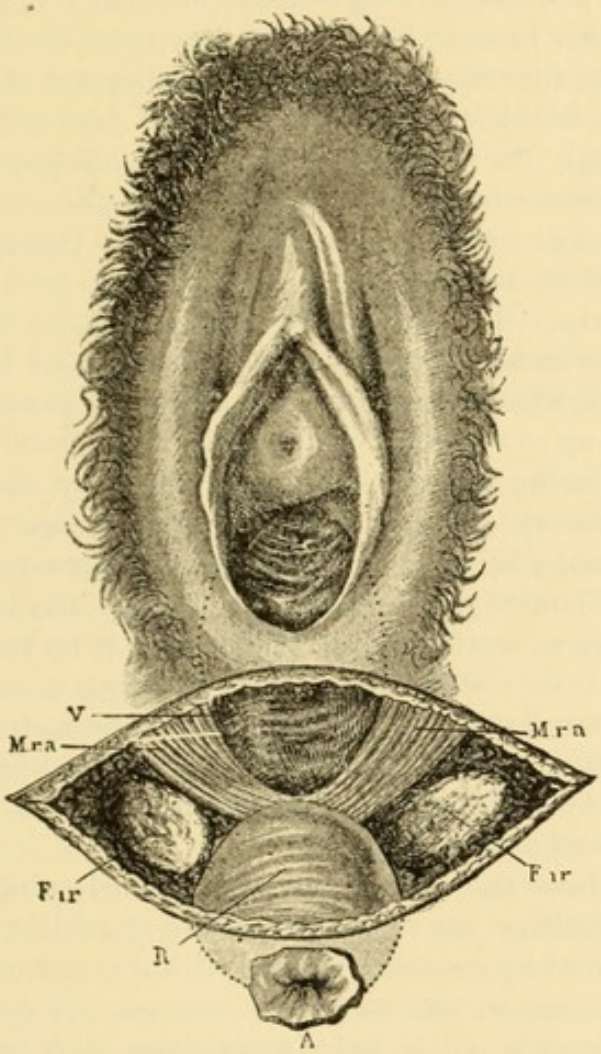


FIG. 408.—TRANSVERSE PERINEOTOMY (O. ZUCKERKANDL). *A*, Anus; *R*, rectum; *V*, vagina; *Mra*, levator ani muscle; *Fir*, ischio-rectal fossa.

by the fingers toward the horizontal ramus of the pubis. The peritoneum is now pressed up from within, either by a large retractor or the fingers of an assistant, while the operator carries his index finger into the wound and endeavors to find the resistant abscess. He may little by little reach the base of the broad ligament, in the deepest portion of the pelvic cavity. When the purulent mass is recognized by the fluctuating sensation which it imparts, it is opened, and the cavity carefully cleansed, and then drained, either through the abdominal wall or by a cruciform tube which can readily be introduced by the aid of Wölfler's forceps (Fig. 52). For the success of the latter manœuvre, we must ascertain, both by vaginal touch and an exam-

ination of the bottom of the wound, that only a short distance separates the two cavities. I have used this method several times with resulting cures. A patient of mine operated upon last year, from whom I removed a collection of pus with staphylococci weighing about five hundred grams (more than a pound), is at the present time pregnant, and free from suffering. The separation of the peritoneum may at times not suffice to give us free access to the abscess, either because its situation has been erroneously diagnosed, or because previous inflammation has caused adhesions of the serous membranes and it is so friable that there is danger of laceration. In such cases we may at once apply the first part of Hegar's ingenious process of incisions at two different times, which I shall describe later on.

4. *Incision by laparatomy* properly so called, or transperitoneal section, was first practised by Lawson Tait, whose example was then followed by many other surgeons. The abdominal opening is rather small (from three and one-half to five inches); the fingers are introduced for the purpose of finding the abscess, which is evacuated by aspiratory puncture; the abscess sac is then drawn up to the edge of the abdominal wound and opened, and its walls stitched to the lips of the wound; it is then thoroughly cleansed, and filled with antiseptic gauze, or else two large drainage tubes are inserted. There have been many brilliant results from this operation, and some failures. Several difficulties may be met with; the sac may be so closely adherent to the pelvis, or so small, that we cannot draw it up to the edges of the abdominal wound; or else if we succeed in fixing it in position it subsequently tears apart and there is an effusion of septic matter into the peritoneum. Emmet states that he has seen Lawson Tait himself abandon the operation because he could not separate the sac from the loops of intestine which adhered to and covered it.

When the walls of the abscess are well defined (which is rare), but its enucleation is impossible, we should proceed in the following manner: The sac is to be evacuated by puncture, opened with the greatest care so as not to injure the peritoneum, and cleansed; its base and the posterior vaginal cul-de-sac are to be explored, in order to ascertain whether drainage be possible in that direction. If it be found practicable, a large trocar or Wölfler's forceps should be pushed through the vaginal cul-de-sac, introducing a rubber cross drainage tube the arms of which are to be inserted in the bottom of the abscess cavity. We now resect as much as possible of the purulent pouch, and close it on the abdominal side by a continuous suture with a few additional supporting catgut stitches. A careful "toilet" of the peritoneum follows, and the abdominal wound is sewed up.

If the abscess walls are not clearly enough defined to allow of the preceding measures, we shall have to be satisfied with a thorough cleansing of the cavity, subsequently filling it with iodoform gauze according to the method of antiseptic tamponade of the peritoneum described on page 62.

5. Finally, Hegar has proposed an opening in two stages, as Volkmann

did in the case of hydatid cyst of the liver. At the first *séance* we perform a laparatomy, and tampon with iodoform gauze, so as to make a channel from the abscess cavity to the abdominal incision. At the second *séance*, four or five days later, when the adhesions are strong enough, we incise the abscess sac. Olshausen has employed this method with success. These proceedings may be performed through the posterior vaginal cul-de-sac.

D. *Abscess Close to the Abdominal Wall.*—In this case we find the pus by making an incision just above Poupart's ligament, and if necessary we loosen the peritoneum for a limited distance. A slight wound of this membrane is not dangerous if the abscess sac be large and superficially placed, for the intra-abdominal pressure will push the sac between the lips of the incision and keep it there in such a manner that the pus cannot find its way into the peritoneal cavity. We must not confuse subperitoneal laparatomy with the incision of a collection of pus in the iliac fossa, accompanied by the separation of a very small portion of the serous membrane, but without any deep penetration into the pelvic cavity. Some writers have committed this error.

In the case of a larger collection of pus, as in phlegmon of the broad ligament, the incision should be from three to four inches long, and should be kept open by the insertion of two large drainage tubes joined together like gun-barrels, which are to be gently pushed to the bottom of the sac. We may use in their stead a strip of iodoform gauze. If irrigation be used, the solutions should be weak (carbolic, 10 parts to 1,000; bichloride, 1 in 5,000) and the last injection used should be merely of filtered and boiled water, so as to avoid all danger of absorption of a poisonous fluid. If in spite of these precautions we observe symptoms of sepsis, then we may fill the diverticula of the sac with iodoform gauze. Finally, if the abscess extend inferiorly almost to the posterior vaginal cul-de-sac, and is recognized by vaginal touch, we may drain in this direction. But we must take great care not to wound the bladder, by guiding the point of Wölfler's forceps or Chassaignac's larger trocar along the finger to the posterior vaginal cul-de-sac, from above downward, while a finger of the other hand is inserted in the vagina. Mundé has twice had occasion to deplore this accident, which, however, had no serious results.

E. *Abscess which has Infiltrated the Pelvic Floor.*—The abscess forms a species of purulent sponge, the meshes being represented by thickened connective tissue and resistant false membranes. In these cases the uterus and the appendages are imprisoned and, so to speak, cemented like stones in a wall, by the products of inflammation. Intervention by laparatomy becomes a serious matter. It must be restricted to opening the collections of pus, tamponing and draining them through both the abdominal opening and the vagina, by a counter-opening in the cul-de-sac of Douglas. A cure is long and difficult, and leaves persistent indurations and fistulæ. Yet I have obtained some remarkably successful results in such cases, and so has Bouilly.

Vaginal Hysterectomy was proposed by Péan in the first place for these cases, though he later applied it to all bilateral inflammatory lesions of the appendages. This extension of its application seems to me improper. But when limited to very marked cases of diffuse suppuration, vaginal hysterectomy is sometimes superior to abdominal intervention or to the simple incision of the posterior cul-de-sac of the vagina recommended by Laroyenne.

There is great difficulty in making an exact diagnosis between the lesions which I have just described and pyo-salpinx, which is moderately adherent and capable of enucleation, surrounded by a zone of serous infiltration.

Hysterectomy, however, is far from being an easy operation. The uterus is immovable, and cannot be brought down; the surrounding parts are thickened, friable, and bleeding. To liberate an organ thus impacted requires consummate skill, and even when it is accomplished, one is apt to find that the peritoneal cavity has not been entered, and that it is so effectually closed by inflammatory products that the fundus uteri is fixed in this ligneous mass like an acorn in its cup. When once effected in these complex cases, hysterectomy puts the patients in excellent conditions for a cure. A hole has been punched, so to speak, out of the whole inflammatory magma composed of plastic products and pus, and this perforation permits of extensive drainage whose efficacy is assured by the dependent position. Because of this loss of substance, antisepsis by means of iodoform tampons and detersive injections can be carried to the very centre of the purulent sponge whose meshes are often opened to a great extent by the operation. After ablation of the uterus we should by the help of bimanual palpation seek out the purulent foci, and, as recommended by Péan and Ségond, introduce the fingers deeply into the vagina and search for fluctuating points, which should then be opened to allow of rapid and complete evacuation. One should not, however, insist upon complete removal of the diseased parts as in laparatomy. This might lead to the displacement of the hæmostatic forceps, to the carrying of infection to remote parts, and even to the wounding of unrecognized and tense loops of intestine.

The operatory technique of *vaginal hysterectomy* performed for the cure of peri-uterine suppuration (which I therefore propose to call *evacuating*) was first described by Péan. The uterus being usually more or less fixed by adhesions can only be removed piecemeal. I will not here discuss, as in the case of hysterectomy applied to cancer, the comparative advantages of ligatures and of forcipressure, the latter only being possible in this case.

Before beginning a description of the technique I will call attention to the value of the long bent retractors used by Péan, to assure gaping of the operatory field, and by pressure to secure temporary hæmostasis. A number of strong-toothed forceps should also be at hand. They are indispensable in morcellement of the uterus. Finally we should be provided with forceps with short and parallel jaws for forcipressure of the broad ligaments. I

repeat, that ligatures are not to be thought of, owing to the depth of the operating field because of immobility of the uterus.

Technique of Vaginal Hysterectomy for Purposes of Evacuation.—The patient is placed in left lateral decubitus, or in the dorso-sacral position, the vulva widely separated by means of the curved retractors, and the cervix seized by a traction forceps. The vaginal mucosa is then incised all around the cervix, which is then freed by detaching it as far up as possible. Then begins the morcellement, which is done by successive stages, each one of which is composed of four chief manœuvres: 1. Liberation of the anterior and posterior surfaces of the uterus. 2. Section of the broad ligaments. 3. Division into two flaps of that part of the uterus liberated by the two preceding manœuvres. 4. Excision of the two flaps thus obtained.

Liberation of the anterior and posterior surfaces of the uterus is to be accomplished by juxta-uterine detachment by the aid of the blunt end of Péan's long retractor used like a rasp. This must be done with caution, the instrument being kept constantly against the uterine tissue, which will prevent injury to the bladder and rectum, and according to circumstances the peritoneal cul-de-sac or a collection of pus will be opened out. The detachment may possibly be concluded without any opening into either peritoneum or any purulent mass, in which case the uterus may be enucleated from the mass of false membranes surrounding it. We must be prepared for all these contingencies.

Section of the broad ligaments is performed in the following manner: the two retractors, which have been introduced against the anterior and posterior surfaces of the uterus either by sub-peritoneal detachment, or by breaking of the juxta-uterine collections of pus, or by intra-peritoneal penetration, remain *in situ* to protect the bladder and rectum. By means of forceps with parallel jaws, the portion of broad ligament corresponding to the uterine segment rendered accessible and visible by the retractors is seized, and then divided close to the uterus.

The last two stages of the operation are as follows: the segment of uterus liberated by partial section of the broad ligaments is divided into two flaps which are excised successively, the precaution having been taken to fix the base of each by traction forceps. Thus a section of the uterus is excised, and by repeating the same manœuvres for the remaining portion of the uterine body we gradually remove the whole organ without notable loss of blood, and by keeping the whole process in sight. It is only exceptionally that we have to leave the upper part of the organ in the depths of the wound, yet even this, we are told, does not interfere with the therapeutic result of the operation. The chief requisite to its efficacy, indeed, seems to be a sufficiently large opening for the exit of the pus.

The operation finished, the whole field is carefully cleansed with aseptic sponges carried in upon forceps and deeply inserted. In this connection I would state that vaginal hysterectomy is the only operation in which I still

use sponges, which are, however, completely sterilized. Tampons of absorbent cotton are inferior in absorbing power, and the compresses which I use in laparatomies are in this case not easily managed.

Drainage is secured by the introduction of strips of iodoform gauze into the cavity left by removal of the uterus. These strips are placed among the forcipressure forceps which secure hæmostasis, to prevent them from wounding the vaginal walls. The bunch of forceps is then wrapped in absorbent cotton, and a rubber catheter is introduced into the bladder and left there until such time as the vaginal tampons can be dispensed with.

The forceps are to be removed at the end of forty-eight hours, and the tampons on the third day, after which morning and evening irrigations are to be given of a 1 : 2,000 bichloride solution, care being exercised that they shall not be carried in farther than the entrance to the vagina, and shall be under low pressure, and that the vagina be kept open by two fingers pressed upon the fourchette. It is really necessary to give detersive injections, on account of the mortification of the portions of tissue compressed by the forceps, but it would be highly dangerous to let the antiseptic fluid penetrate with force into the midst of the operatory field.

A good method to distinguish the various forceps so as not to run the risk of pulling a forcipressure forceps instead of traction forceps, is to have the former nickel-plated, both rings of the handles of the latter being gilded. Sponge forceps may have only one ring gilded.

The residues of old peri-salpingitic inflammations, false membranes, adhesions, etc., give rise to complex and painful phenomena, by the pressure which they exert upon the ovaries and tubes, by the displacements of the uterus which they cause, the agglutination of loops of intestine, the adhesion of the omentum to the pubis, compression of the ureters, etc. It is particularly in these cases that massage is of benefit, as it assists in the absorption of the plastic products. When the pain is a prominent symptom and neuralgic in character, the faradic current may give relief.

As I mentioned above in reference to the treatment of salpingitis, it has been suggested that laparatomy should be performed solely for the purpose of setting the compressed or displaced organs at liberty, by destroying the adhesions, without removing the uterine appendages. The good results obtained by this procedure, while they do not prove the absolute efficiency of these incomplete operations, which far too often have served as an excuse for errors of diagnosis, at least show how large a share should be attributed to this pathological element in an interpretation of the morbid symptoms. Another remote result of inflammations around the uterine appendages is the modification in the resisting power of the ligaments, the broad, round, and utero-sacral. Our knowledge upon this subject is exceedingly limited, and the deductions drawn from the supposed lesions are mainly theoretic. Yet it is certain that uterine displacements are often due to ligamental relaxation or contraction, the result of previous inflammatory conditions. I would

especially call attention to the contraction of the broad ligament so frequently observed in cases of extensive laceration of the cervix on the same side, producing a certain amount of lateral displacement of the uterus from chronic parametritis. It may perhaps be merely a chronic perilymphitis, sclerosis of the connective tissue of the broad ligament around the numerous lymphatic vessels at the base of the ligament, which go from the cervix to the iliac ganglia (Fig. 352). Here again, massage may be of use. I will speak in this connection of a lesion described by Freund under the name of chronic atrophic parametritis, although it would seem to be straining a point to include it under the head of parametritis. In some young women the sexual organs are found to be as shrivelled as if the menopause had long since been reached; the broad ligaments are contracted and indurated. It would seem as though the uterine atrophy had extended to the neighboring parts. Freund recommends hot douches and massage as treatment.

I append a few technical details of *massage of the internal genital organs*, which I have borrowed from a monograph of Vulliet. External massage of the abdominal walls is a mere preparatory measure to render the parts supple. Mixed massage or abdomino-vaginal massage is the kind most used. However rigid may be the abdominal and vaginal walls, there is always one place when the two hands may meet; it is in the suprapubic region, just behind the symphysis. The heel of the external hand rests upon the mons veneris, the fingers toward the umbilicus. The index and middle fingers of the other hand enter the vagina together if it be large enough, otherwise one after the other; their dorsal surface is now turned to the perineum, with the palmar surface against the vesico-vaginal wall. The anterior commissure is thus out of reach and not affected by the manœuvres. The movements (friction, pressure, kneading) are to be slow and well sustained. The abdominal hand pushes upon the tissues from above downward, the vaginal hand from below upward. The mistake most frequently made is that of pushing too hard from above and too little from below. Each hand must do its share of the work. Just above the symphysis the hands are separated from each other only by the abdominal walls, which they push upon, and by the bladder; but a trifle farther back the uterus, if in normal position, will be interposed between them. A condition of anteversion is the most favorable to massage, and the uterus must be brought into this position. In chronic endometritis, and in all uterine affections except neoplasms, which have produced hypertrophy of the organ, the following method is observed: When the uterus is well to the front, the fingers in the vagina keep it immovable in this position, while the external hand practises a series of frictions upon its posterior surface, and then endeavors to seize the fundus and press it concentrically as is done in the obstetrical manœuvre of expression.

If there be an infiltration of the cellular tissue around the cervix, the external hand will keep the uterus down, while the fingers of the other hand

gently and slowly exercise frictions around the cervix. To *masser* the sides of the uterus, both hands unite upon the side of the organ and push it to one side; this brings the lateral region more to the centre and renders it more accessible. Bands of adhesion are usually found in the antero-lateral region of the uterus, uniting one side of the uterus to the pelvic peritoneum of the same side; these are stretched by the sideways pushing of the uterus. By means of these movements we can determine their point of attachment. The massage consists in kneading the regions where the adhesions exist, to cause their absorption, and in moving the uterus to free it from the constricting bands.

CHAPTER XXVII.

PATHOLOGICAL ANATOMY OF OVARIAN CYSTS.

From a histogenetic point of view, tumors of the ovaries have been divided into neoplasms of connective-tissue origin and epithelial neoplasms. The first group, desmoid tumors, include fibromata, sarcomata, and myxomata, all, especially the last two, of very rare occurrence. The second group, epithelial tumors, include cystomata, carcinomata or alveolar epitheliomata, and adenomata or mucoid epitheliomata. From a clinical point of view, the best division is that which separates solid from cystic tumors. The latter, being by far the more frequent, claim our first attention.

Pathological Anatomy of Ovarian Cysts.—Any portion of the tubo-ovarian apparatus may be the starting-point of cystic growths; the cortical portion and medullary portion or parenchyma; the inferior border or hilum, the region between the tube and ovary in which are found the remains of the Wolffian bodies (Rosenmüller's organ or parovarium, Morgagni's hydatid, obliterated remains of the canal of Gärtner). Essentially distinct from a histogenetic and anatomical point of view, these various neoplasms may at times be artificially placed in the same clinical category; for instance, the mere fact of a cyst being within the folds of the broad ligament is sufficient to form a well-defined surgical class. This cyst may have been developed in that situation (unilocular cyst with limpid contents), or it may have originated in the hilum of the ovary (papillary cyst) or the parenchyma of the ovary (glandular cyst) and have insinuated itself between the ligamental folds.

I will classify ovarian cysts in the following order:

I. Proligerous or glandular proliferous. II. Proligerous or papillary proliferous. III. Dermoid, simple or mixed. IV. Parovarian, including several varieties—hyaline, papillary, dermoid.

I. and II. *Proligerous or Proliferous Cysts.*—These tumors vary greatly in appearance, yet they have a sufficient number of common characteristics to admit of a description under one head, to which may be added a few special details.

Both ovaries may be affected, but the lesions are not usually of equal development; for instance, on one side there may be an enormous tumor, while on the other there is simply a beginning of the process with scarcely any increase in size. Before closing the abdomen, the surgeon should always examine the side which is supposed to be sound.

The tumor may be so voluminous as to entirely fill the abdomen, pushing

out the costal cartilages in such a way that after the tumor is taken out the patient looks like a gutted fish. The shape is spherical or ovoid, but with nodules corresponding to weak spots in the walls which have yielded to internal pressure. At the thickest portion of the walls the color is pearly white or bluish, and marbled by the veins; in the thinner portions the color is purplish, greenish, or blackish according to the nature of the contents.

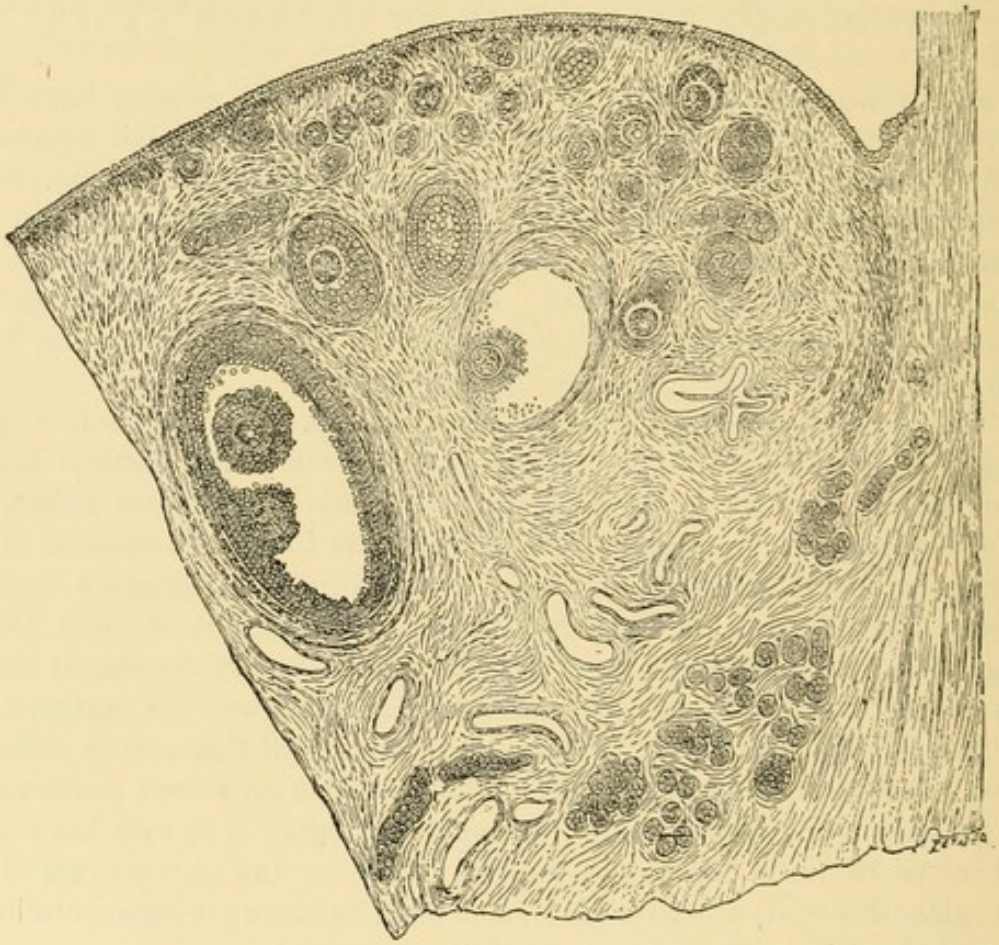


FIG. 403.—VERTICAL SECTION OF THE OVARY OF A BITCH. Over the whole extent of the free surface of the ovary is seen a layer of columnar endothelial cells (germinating epithelium, *Keimepithal* of the Germans). At one point there is a glove-finger depression which pushes a tube of this epithelium into the substance of the ovary. Just beneath is a layer of dense connective tissue in which are the young follicles and vesicles. To the left, near the centre, are two more mature follicles, with completely developed ovules. On the right is seen the stellate cicatrix of an old follicle. Here also we see the stroma of the hilum, rich in vessels, and the tubes of the parovarium in longitudinal and transverse section. The largest follicle, on the left, contains two ova, and well shows the general follicular structure; membrana fibrosa, membrana granulosa, and discus proligerus with the ovum; in the ovum we can distinguish the zona pellucida, vitellus, the germinative vesicle and nucleolus (Waldeyer).

The external surface, smooth and oily, is sometimes covered with small papillary growths resembling frogs' spawn or the vegetations of certain mucous patches. The tumor is usually pediculated.

The internal structure varies according to the number of pockets and their contents. Cruveilhier divided cysts into unilocular, multilocular, areolar, and compound. This classification need not be retained; but for the

purposes of description it is well to keep the words areolar, unilocular, and multilocular.

We know that the first-named variety is due to the destruction of intervening walls whose remains are found in the shape of spurs or trabeculæ. One pocket is usually larger than the others, though there may be several pockets of equal size; by the side of cavities containing several quarts we find small cysts the size of an orange or a nut.

Sometimes a large part of the tumor may be formed by the agglomeration of very small cavities separated by a more or less dense tissue (occasionally gelatinous) giving the section a honeycombed appearance (Fig. 411). In

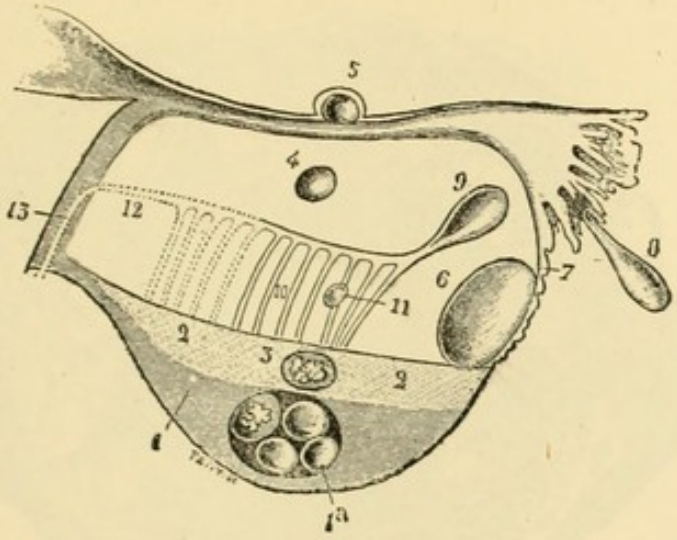


FIG. 410.—SCHEMA OF TUBO-OVARIAN APPARATUS, TO SHOW THE VARIOUS POINTS OF ORIGIN OF CYSTIC GROWTHS (DORAN). 1*a*, Multilocular glandular cyst developed in 1, ovarian parenchyma; 3, papillary cyst developed in 2, tissue of the hilum of the ovary; 4, unilocular cyst of the broad ligament free from the parovarium 10; 5, unilocular cyst of the broad ligament situated just above the tube but not united to it; 6, similar cyst near 7, tubo-ovarian ligament; 8, hydatid of Morgagni, which is never the starting-point of a large cyst; 9, cyst developed at the expense of the horizontal canal of the parovarium; 11, cyst developed at the expense of the vertical tube. According to Doran, these are the papillary cysts of the broad ligament; 12, 13, course of the obliterated canal of Gärtner; papillary cysts may be developed at any portion of this canal (Coblenz), and these may be the origin of papillary cysts connected with the uterus, 13.

cysts which are considered to be unilocular, and which surgically deserve the name, the pathologist will nearly always find a certain number of secondary cavities in the thickness of the walls.

The cystic pouch can often be separated into three distinct layers, especially near the pedicle; the external layer is fibrous, the middle layer of connective tissue, the third is formed of a capillary network covered by epithelium. The veins, which may be as large as the femoral or even the vena cava, ramify upon its external surface, and adhere to it like sinuses, which makes it a dangerous matter to wound them. We occasionally see large bands of unstriped muscular tissue spread out upon the tumor, near the pedicle. The endothelium covering the external surface is columnar, thus differing from the flat endothelium of the peritoneum. The internal surface of the cyst is covered with very low cylindrical cells. Waldeyer describes

one layer, Rindfleisch several. Malassez and De Sinéty lay much stress upon their polymorphism. They found a layer of sub-epithelial endothelium, and showed that in the same type of cysts the most varied forms of epithelium, metamorphosed and superposed, may be met with. They pointed out the importance of the goblet cells in maintaining viscidity of the cystic fluid; and finally, they showed the analogy between the cells derived from the normal type met with in cystic growths, or metatypical cells, and that of the glandular epithelioma of the mammary gland.

In a section of the walls we find depressions of the lining endothelium, which give the appearance of acinous glands with a narrowed opening. We

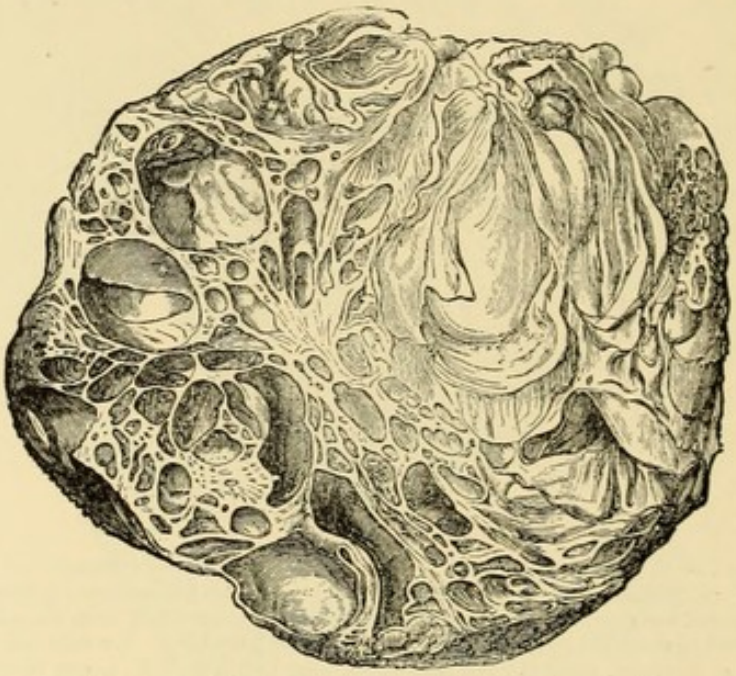


Fig. 411.—Proligerous Glandular Ovarian Cyst of Areolar Appearance.

also find, on the internal surface of cysts, vegetations formed by a proliferation of the stroma, which resemble myxoma or fibro-sarcoma; they are covered with a single layer of endothelium, and have a tufted appearance. Sometimes epithelial prolongations of a tubular form penetrate them from below upward, and give them the appearance of carcinomata; small cysts may also develop in these papillæ. In spite of the hybrid forms so often met with, it is well to follow Waldeyer in distinguishing neoplasms in which the chief vegetations come from the epithelium and lead to the formation of glandular tubes (proliferous glandular cysts), from those where the connective tissue of the walls is the part which develops and projects in the form of vegetations into the interior (proliferous papillary cysts). To be sure, the process of proliferation is the same in both cases, taking place superficially in one variety, deeply in the other; but the appearance of the neoplasm is, nevertheless, greatly altered, according to whether the epithelial or connective-tissue elements predominate. There is, moreover, a mixed vari-

ety of papillary and glandular cyst. The proligerous or proliferous glandular cyst is characterized by a great number of small glands in the cystic walls. Newly formed glandular tubes are transformed into cysts by the following process: Their orifices opening into the principal cystic cavity become obstructed and obliterated; the other end dilates, new glandular tubes develop and in turn pass through a cystic phase and give rise to a new glandular growth. The multiplication of glands may become excessively great.

Proligerous or proliferous papillary cysts show the indications of an abundant proliferation of connective tissue; this projects into the cyst cavity in the shape of small buds pushing aside the epithelium and dividing into

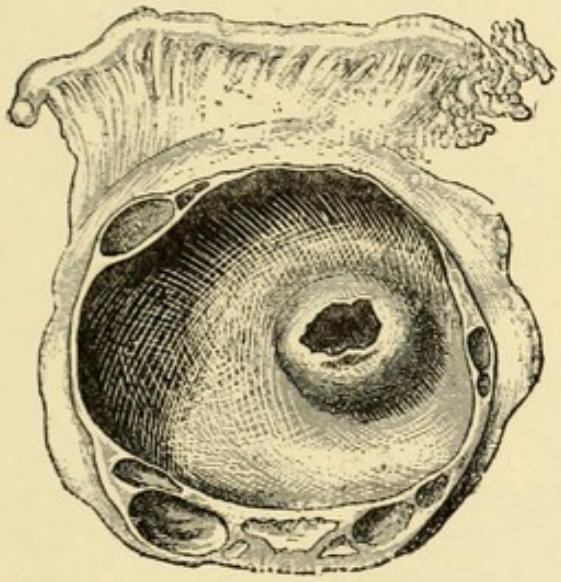


FIG. 412.—SMALL GLANDULAR MULTILOCULAR PROLIFEROUS CYST (DORAN). The section of the wall shows accessory cavities; in the interior of the cyst is one of these pouches broken open.

ramified papilliform masses. These branching excrescences may so distend the cyst as to burst it open, and appear on the outside, either through a small crack or a large tear. Then the cyst may turn its convexity inside out, showing the vegetations upon its surface, and the whole tumor changes its aspect. At the same time, the secretions fall into the peritoneum and cause ascites and the metastatic production of disseminated papillary masses. Tumors originating in this manner have often been described as superficial papillomata* of the ovary, whereas they are due to a previously existing cyst whose dehiscence caused their appearance. Yet vegetations may apparently arise spontaneously upon the surface of the ovary. Prochaska, Gusserow and Eberth, Birch-Hirschfeld, Marchand, and Coblenz quote cases in illustration. Such cases as these, however, should really be described with dehiscent cysts, and the two cases studied by Coblenz plainly show this rela-

* The word *papilloma* having already received a different histological signification is unsuitable to use in this connection, and will only be employed as a descriptive appellation without histological classification.

tionship; the stroma of the ovary contained in both cases epithelial cells which were in process of transformation into cystic cavities, and in the last case papillary growths had even begun to form within the small cysts. Upon the surface of the ovary, by the side of the large papillary mass, may be seen small vegetations which spring from the depressions left by the bursting of the superficial cysts. We may then assert that superficial papilloma of the ovary is merely the product of the dehiscence of very small superficial papil-

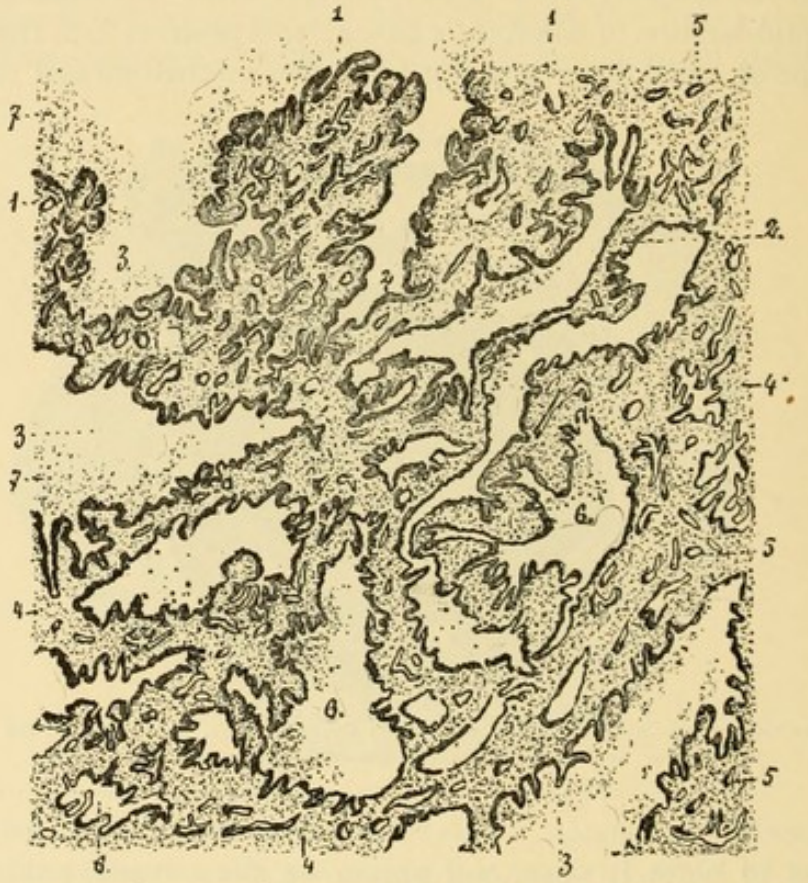


FIG. 413.—PROLIFERATING GLANDULAR CYST OF THE OVARY. General view, slightly magnified. 1, Papillæ; 2, slender pedicles; 3, space between papillæ; 4, connective tissue; 5, new gland lumina; 6, old gland lumina which have become cystic; 7, contents of cavities.

lary cysts. This will explain the cases sometimes found of a papillary cyst upon one side, and a papilloma of the ovary upon the other.

Papillary cysts are often found within the folds of the broad ligament, for they arise from the remains of the Wolffian bodies, or from the hilum of the ovary into which these vestiges penetrate; originating thus from the border of the ovary, the tumor in delevoping naturally insinuates itself into the ligamental folds. In this position they grow more slowly, and also give rise to symptoms of compression, as do all intra-ligamental growths, bound down against the pelvic walls. The papillary vegetations may penetrate the capsule not only in the direction of the peritoneal cavity, but below, causing adhesions between the cyst and the pelvis, bladder, rectum, or uterus. The fundus uteri has been invaded by such growths.

It is not a very rare occurrence to find calcareous grains, like grains of sand, in the papillary growths (corpora arenacea). They are somewhat analogous to the lime sometimes deposited in a placenta. Calcareous concretions are found in other vascular tumors, as those of the arachnoid membrane, cavernous angiomata, etc., which are called psammoma.

The mode of origin of proligerous cysts of the ovary (glandular and papil-

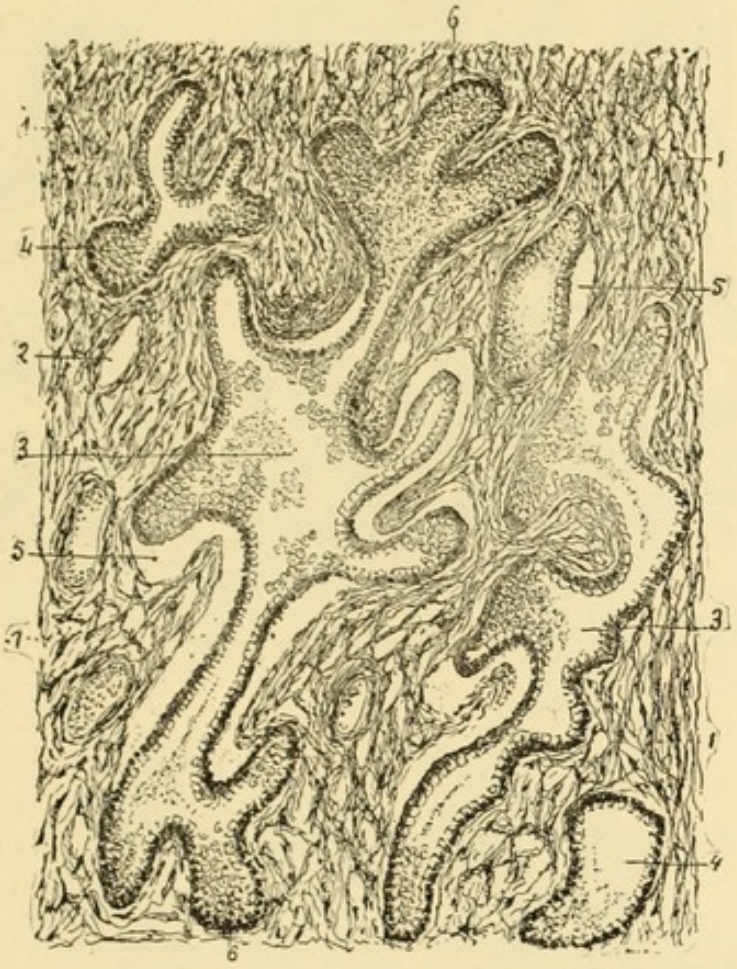


FIG. 414.—PROLIFERATING GLANDULAR CYST OF THE OVARY. More highly magnified. 1, Loose connective-tissue stroma, myxomatous in points; 2, blood-vessels; 3, glandular lumina of irregular form or dilated to form cysts; 4, smaller cavities; 5, lacuna produced by detachment of epithelial layer; 6, proliferated epithelium, cells collected in glandular culs-de-sac.

lary) has given rise to numberless controversies, not yet at an end. The old idea of hydatids was replaced in 1807 by Meckel's theory of hydrops of the Graafian follicle. Huguier and Bauchet accepted the follicular theory for simple unilocular or multilocular cysts only. After the investigations of Cruveilhier, Virchow, and Rokitansky, a new growth with areolar or colloid degeneration of the ovary was generally admitted in cases of the more complex forms. The stroma and its colloid degeneration at that time received all the attention, and the epithelial element was entirely lost sight of; it was the same with the researches of Rindfleisch and Mayweg.

The restoration of the epithelial element in the origin of proligerous

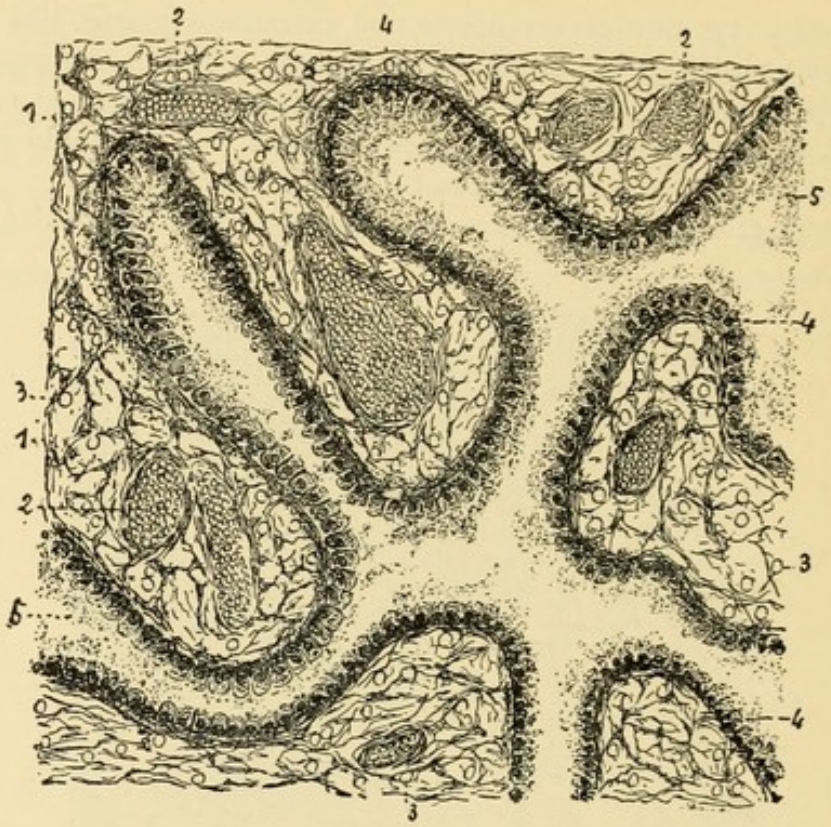


FIG. 415.—PROLIFERATING PAPILLARY CYST OF THE OVARY (500 diameters). 1, Myxomatous connective tissue with anastomosing fibres; 2, vessels full of blood; 3, vacuolated connective-tissue cells; 4, villosities covered with small low epithelial cells with large nuclei; 5, colloid material between papillæ.

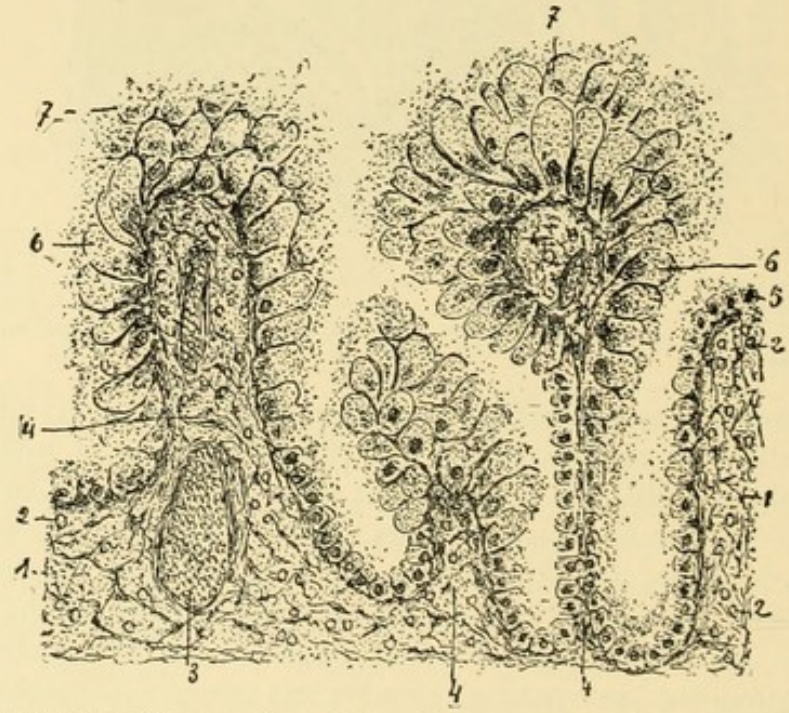


FIG. 416.—PROLIFERATING PAPILLARY CYST—COLLOID DEGENERATION OF CELLS (500 diameters). 1, Loose connective tissue in state of colloid degeneration; 2, more or less degenerated cells; 3, vessels; 4, papillary villosities; 5, normal cuboidal epithelium; 6, same, swollen and ruptured, allowing escape of mucus; 7, cells still showing nuclei.

cysts was accomplished chiefly by Klebs and Waldeyer. I will give a *résumé* of Waldeyer's theory, which is accepted by many authorities. It is well known that in the embryo the ovary contains many epithelial tubes derived from the germinal epithelium covering the surface of the ovary. These tubes of Pflüger are destined later to divide and diminish in order to produce the Graafian follicles which are a product of secondary evolution.

(I have borrowed from De Sinéty the following items of information regarding germinating epithelium, primordial ovules, and Pflüger's tubes.

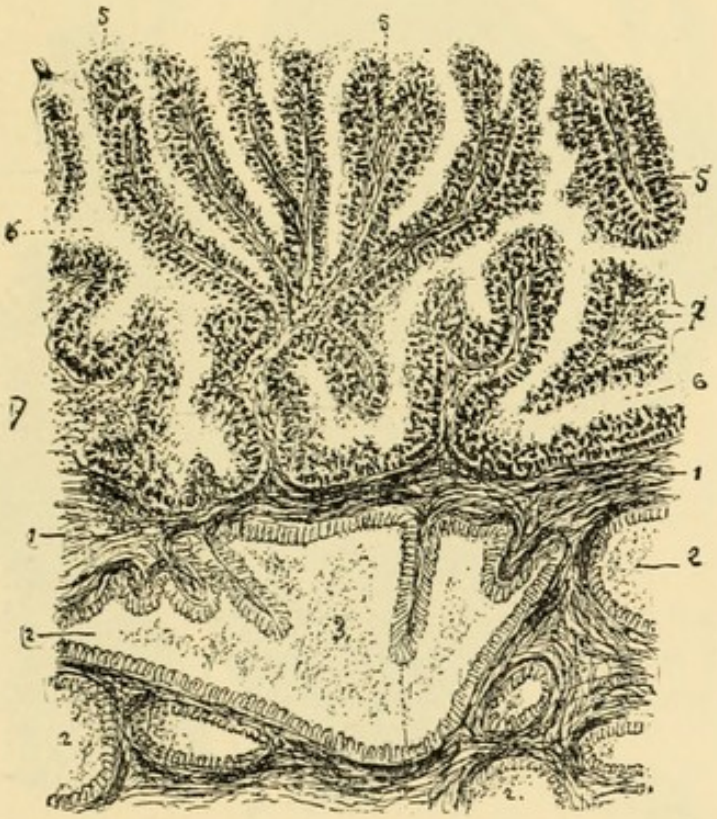


FIG. 417.—MIXED MULTILOCULAR CYST (PAPILLARY AND GLANDULAR) OF THE OVARY. 1, Dividing connective tissue ; 2, cysts lined with cylindrical epithelium filled with colloid material ; 3, projections on inner surface of cavities; 5, cauliflower-like branching papillary growth ; 6, space between these ; 7, infiltrating embryonal cells.

In the early stages of embryonic life, about the fourth day of incubation in a chick, a slight thickening of the epithelium is seen in the anterior portion of the Wolffian body. A small spot of connective tissue is simultaneously developed just below this epithelial thickening. Among the cylindrical cells which constitute the larger part of the epithelial mass, called by Waldeyer the germinal epithelium, may be seen a few larger, rounder, nucleated cells; these are called primitive ova. In order to study the first stage of this development in the human being, Waldeyer advises the choice of a fœtus about four and a half inches in length. In a fœtus of three or four months, the ovary is almost entirely composed of what will later be developed into the cortical substance. The medullary substance, formed of blood-vessels and embryonal connective tissue, looks in transverse section like a

pedicle separated from the cortical substance, with which it communicates to a very limited extent only. At five months the ovary shows important modifications. The bundles of connective tissue are thicker and more abundant and clearly define the utricles or tubes of Pflüger or Valentine, called by some anatomists cordons glandulaires. We can at this stage study the formation of the primitive follicles by the constriction of the epithelial follicles. Some isolated primitive follicles may be seen, in which we can clearly distinguish the ovum with its vesicle and germinal spot, surrounded by a

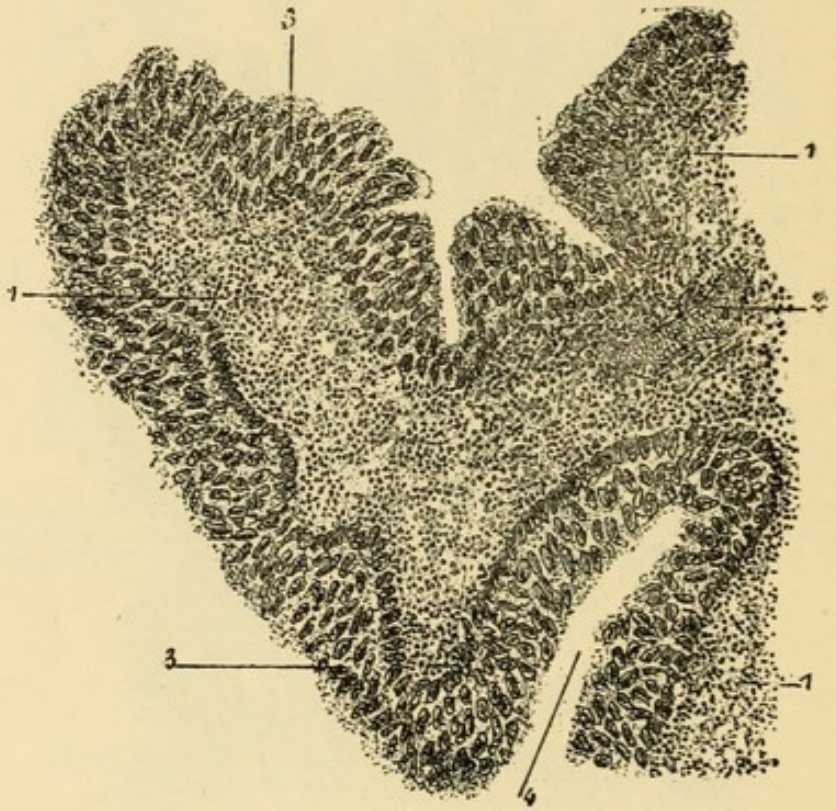


FIG. 418.—MIXED MULTILOCULAR CYST (PAPILLARY AND GLANDULAR) OF THE OVARY. Portion of Fig. 417 (500 diameters). 1, Connective tissue forming stroma of papillæ, with innumerable small round cells; 2, vessel filled with blood; 3, epithelial lining composed of several layers of irregular cells closely connected and containing irregularly arranged nuclei; 4, groove between villosities.

layer of epithelial cells, and a limiting layer of connective tissue. At term we still find germinating epithelium composed of two kinds of cells on the surface of the ovary; but the round cells have become much fewer in number. The anastomosing ovarial tubes are for the most part separated from the external epithelium by a thin layer of connective tissue. Still, a few may be seen in which there is direct communication between their contents and the germinating epithelium; this anatomical peculiarity has even been known to persist in the adult.)

Pflüger's tubes are still to be found in a new-born infant, and may persist abnormally or be formed by heterochronia in the adult. Their persistence to quite an advanced age has been proved beyond a doubt, and Slav-

janksy has found them slightly cystic in the ovary of a woman thirty years of age. These tubes may exceptionally be transformed into cysts before the age of puberty, and in the newly born some have been found of the size

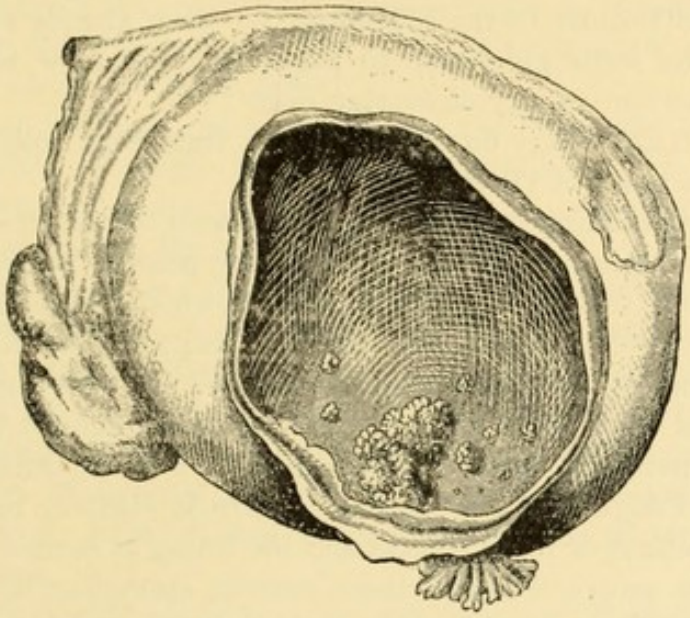


FIG. 419.—PAPILLARY CYST STARTING FROM THE HILUM OF THE OVARY (DORAN). On the left lower extreme of the picture is the ovary, which is almost intact. The cyst is developed within the broad ligament, which is opened so that we may see above a portion of the Fallopian tube. An opening has been made in the cyst wall to show the papillary vegetations within.

of a pea, increasing in size only after puberty. We may then state that not only are all ovarian cysts congenital, but many of them are congenitally formed and either remain stationary or develop at some later period.

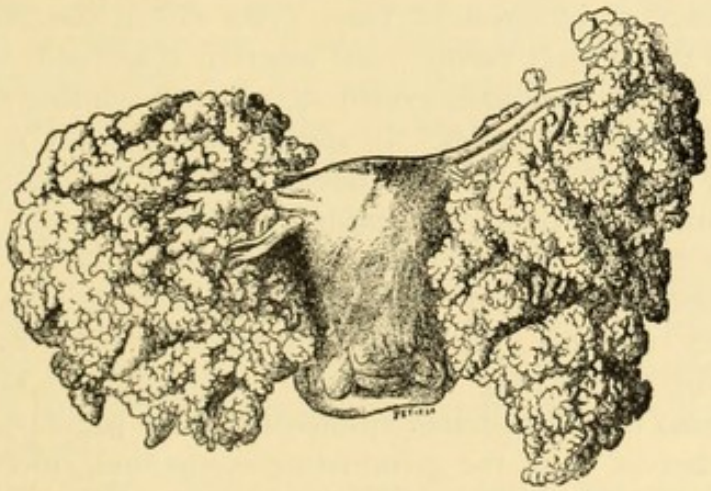


FIG. 420.—PAPILLARY OVARIAN TUMOR, COVERING THE WHOLE OF BOTH BROAD LIGAMENTS.

When a cyst is formed at the expense of the glandular tubes of Pflüger, the most central cells soften and liquefy, and the walls of the distended tubes acquire vegetations and give rise by budding to new tubes. The most

complex cyst is in the beginning nothing but a small pouch of connective tissue lined with epithelium, which is merely primitive glandular epithelium, partly liquefied to form the cyst contents. The fusion of several of these primitive cysts may end in the formation of enormous cavities; all unilocular cysts are multilocular in the beginning. I have already shown how the vegetation of the walls gives rise to papillary projections whose name is given to an important variety of ovarian cyst.

Malassez and De Sinéty do not admit the important rôle attributed by Waldeyer to the tubes of Pflüger.

In their opinion, the germinating epithelium on the surface of the ovaries is the source of the neoplasmic growth, and the process begins by epithelial invagination; but this new epithelial growth, which physiologically should form the tubes of Pflüger and finally the Graafian follicles, in a pathological condition becomes diverted into a less specialized and less elevated channel, and is developed only into the ordinary lining epithelium, giving rise to more or less spherical tubes or cavities which have but a remote resemblance to the tubes of Pflüger and the follicles. Struck with the resemblance between the epithelium of these tumors and the lining of normal mucous membranes, Malassez proposed to call them mucoid epitheliomata. This name, though histologically correct, causes some confusion clinically, where the name epithelioma, by long usage, conveys a meaning of malignity; the same may be said of the term cysto-epithelioma adopted by some writers. The name of proligerous cysts seems to me preferable.

Is the histogenesis of papillary cysts different from that of glandular cysts? In 1877, Olshausen suggested the hypothesis that they came from the parovarium, after Waldeyer had shown that it penetrated into the hilum of the ovary. The reasons given were the presence of columnar epithelium, and the frequency of inclusion of these cysts within the broad ligament. Fischel carried the subject further, and asserted that these tumors sprang from the cells of the membrana granulosa, which, according to his opinion, originated in the Wolffian bodies. In spite of the support given by Doran to this view, by the exhibition of specimens in which the ovary was seen to be by the side of a papillary cyst springing from the hilum (Fig. 419), we could not at the present day unreservedly accept this opinion. In fact, Marchand and Flaischlen have shown that these cysts may develop upon the surface of the ovary, and that in this case they contain ciliated epithelium continuous with the germinating epithelium. According to Marchand, it is easy to understand that the ciliated epithelium of the papillary cysts may be pathologically derived from the germinating epithelium, since this filiation occurs normally with the epithelium of the Fallopian tubes; as to the papillary structure, that also is found in the mucous lining of the tubes, and there is nothing surprising in the fact of such an arrangement being produced in a morbid state of tissues similar to one another.

Upon the whole, we may conclude that the germinating epithelium is

the point of origin of papillary as well as of glandular cysts. It must be acknowledged that this idea of a common origin is not entirely satisfactory. How shall we account for the marked differences between these two species of neoplasm, and for the very special characteristics of the papillary growths. How explain the fact that they are so often bilateral, so frequently subserous, and so much oftener malignant? There can be little doubt that further researches are needed upon the subject.

In a study of the fluid contents of cysts, I will consider all the proligerous cysts together, although they differ markedly according to whether the cavity is glandular or papillary; still, we must not forget that both kinds of cavity may be seen upon the same tumor.

In general, we may say that the fluid of large cavities is more tenuous than that of small ones. Except in the majority of parovarian cysts, where it is as clear as a mountain stream, and non-albuminous unless there be inflammation or a discharge of blood, the liquid of ovarian cysts has a more or less oily consistence; it is somewhat viscid (*filant*), sometimes syrupy. The color varies from the yellow of barley sugar, or an apple-green, to a coffee- or chocolate-brown; these darker colors are due to the presence and decomposition of blood.

Cholesterin crystals are sometimes met with, and in small cysts we may see rice-shaped bodies. In papillary cysts, owing to the absence of goblet cells, the liquid is never as viscid as in the glandular cysts.

At one time great hopes were entertained in regard to the chemical composition of the cystic fluid, but they have been somewhat disappointed; it was hoped that in cases of doubtful diagnosis the fluid could be distinguished from that of ascites. Waldeyer considered paralbumin to be characteristic of ovarian cyst. It seems to be nearly constant in the glandular cysts; papillary cysts may contain merely a trace. Out of twenty-three cysts examined for the purpose of establishing this fact, Oerum found paralbumin in eighteen cases; in five cases it was absent. I would add that this substance has been found in the sputum of bronchitis, in a cyst of the neck, in the urine of patients with suppurating diseases of the bones, and even in some cases of ascites.

Another valuable datum furnished by chemical analysis, and one which seems more positive, is drawn from the amount of solids in the various fluids. According to Méhu, if there are two ounces and two drachms to the quart, it is certainly an ovarian cyst. According to Quénu, this estimation is too low, and should be raised to three ounces two drachms, and it would then be a valuable indication.

III. *Dermoid Cysts.*—These are usually small, but they may become voluminous by uniting with proligerous cysts, or even in consequence of an acute inflammatory attack which suddenly increases their fluid contents. Though they may be long unrecognized, and perhaps revealed only by chance at the autopsy, as soon as they begin to enlarge they approach, from

a clinical point of view, the ordinary or proligerous cysts that I have just described. Poupinel has gathered data in regard to forty-four cases in which both ovaries were transformed into dermoid cysts.

They are much less frequent than proligerous cysts. Olshausen collected statistics of 2,275 cases coming from a series of ovariotomies performed by Spencer Wells, Keith, Schröder, Krassowski, A. Martin, Billroth, C. v. Braun, Esmarch, Dohrn, and himself. Out of this number there were only eighty dermoid cysts (3.5 per cent).

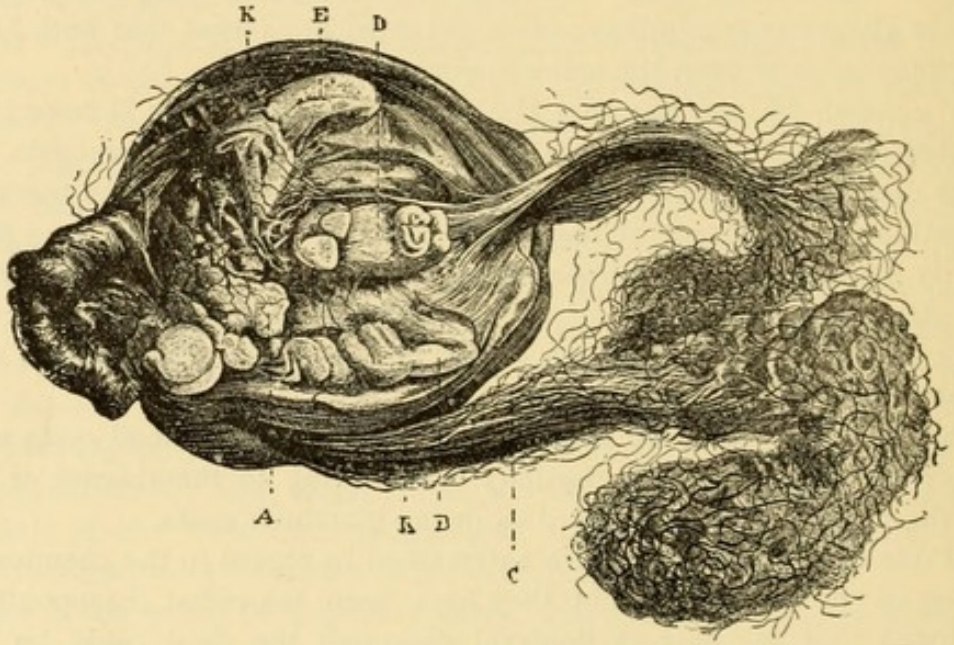


FIG. 421.—DERMOID CYST OF THE OVARY (POZZI). *A*, Myxomatous mass like Wharton's jelly; *B*, fatty mass; *C*, hair mixed with sebaceous matter; *D*, fragment of bone resembling the alveolar process with two incisors and one molar; *E*, close-grained fatty mass; *K*, *K*, cyst walls.

Their internal surface is covered with a membrane which looks like the skin and which has a similar structure; we may see on it a corneous layer formed of several layers of flat and then spherical cells, like those of the rete Malpighii.

A panniculus adiposus separates the dermic layer from the fibrous capsule of the cyst. Upon the surface of the derma are papillæ which may look like nipples and some hairs which are inserted into hair follicles occasionally provided with a sebaceous gland; the latter were first demonstrated by Friedländer. Sudoriparous glands are also found. The hairs, whether free or implanted, are long, tawny, agglutinated together by sebaceous matter, and sometimes rolled into little balls. Sebum resembling the vernix caseosa partly fills the cavity, and often forms small, isolated masses; it is sometimes oily in consistence, and contains many epithelial cells, cholesterin crystals, and fatty acids. Teeth and bones have been found in these cysts; the bones are inserted in the wall, and more or less covered by the dermic layer; they are irregular in shape, usually flat, and formed of com-

pact tissue; cartilage is present in small patches, which, according to Labbé and Verneuil, sometimes articulate by means of intervening fibrous bundles.

The teeth project into the cavity, and are often loosely inserted into alveoli formed of bony débris. They are never perfect in shape, and cannot be absolutely identified as incisors, canines, or molars; the cement is usually absent. Hollaender makes the interesting statement that the teeth are always placed with their crowns sloping toward the median plane of the body, so that an examination of the cyst cavity will always determine the side of the body upon which it originated. As many as a hundred teeth have been found in one cyst (Schnabel). Autenrieth describes a case in which three hundred teeth were taken out of a cyst, which contained even more. Some writers claim to have found carious teeth, but, as Lannelongue observes, Magitot is probably correct in thinking that this is not really caries, but a phenomenon of wear and absorption. P. Ruge found in a dermoid cyst, just below a bone which resembled the inferior maxillary with its molar teeth, a small mass which in form, size, and acinous structure had every appearance of a submaxillary gland.

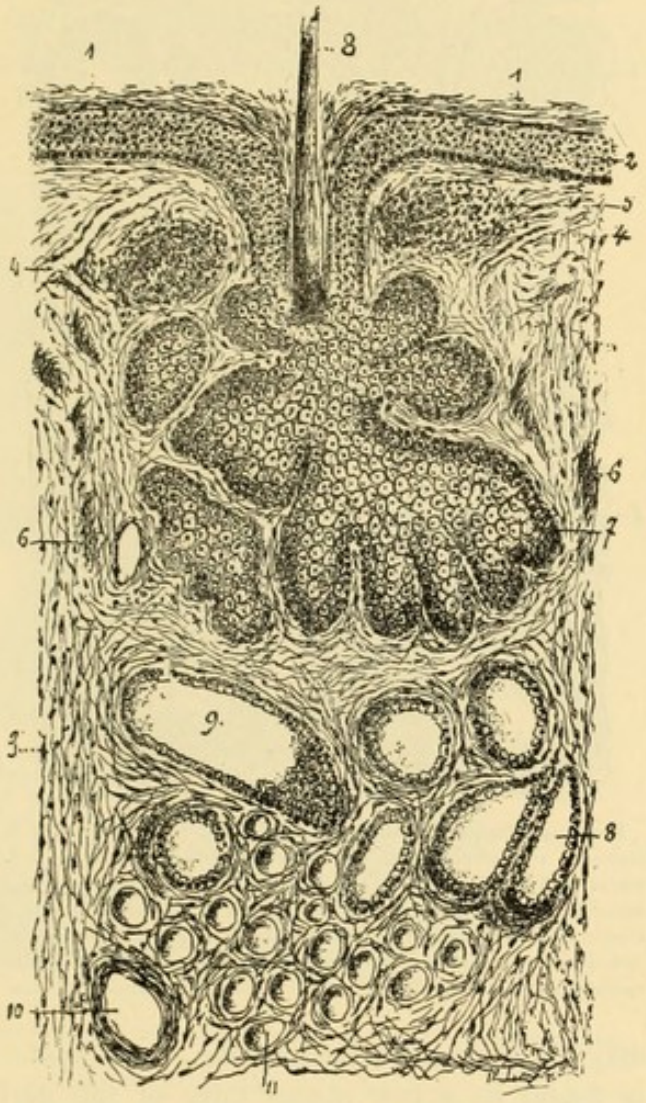


FIG. 422.—DERMOID CYST OF THE OVARY. Section perpendicular to internal surface. 1, Corneous layer; 2, Malpighian layer; 3, connective tissue with many cells; 4, vessels; 5, points of origin of inflammatory embryonal cells; 6, bundles of smooth fibres; 7, sebaceous gland; 8, sudoriparous gland; 9, same, dilated and cut obliquely; 10, vessel; 11, fatty tissue.

Unstriped muscle fibres have been found in the dermic layer; as to the striated fibres, Olshausen denies their existence, saying that where they are found the case is probably one of teratoma instead of dermoid cyst. In truth, many authorities confuse the two. Cruveilhier quotes a case in which nails were found; Baumgarten reports a most remarkable case in which the cyst, besides skin, hairs, and teeth, contained a body which resembled an eye, with a species of convex cornea and epithelium like that of the retina.

There was also a mucous membrane similar to that of the intestines and stomach, and encephaloid nerve substance.

The presence of gray matter in dermoid cysts is a knotty point. In one case Virchow found gray matter, laminated as in the cerebellum; Key found some enclosed in a bony cavity; Rokitansky, in a species of capsule near a bone; other pathologists have, in exceptional cases, found nerve filaments supplying the teeth.

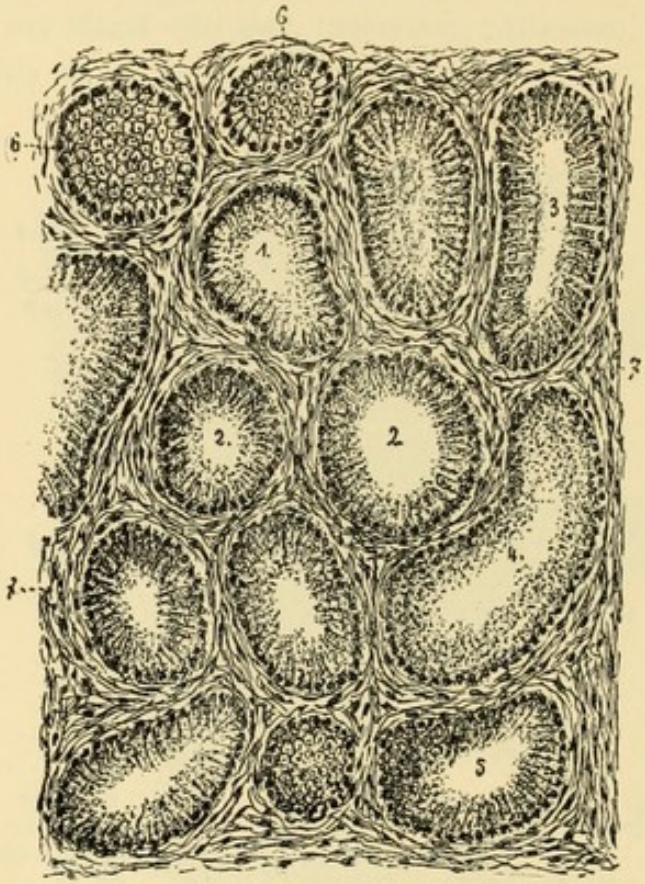


FIG. 423.—DERMOID CYST OF THE OVARY. Mucous glands in clusters. 1, Normal glands, cylindrical epithelium in place, protoplasm slightly granular; 2, outlines of epithelium becoming less distinct; 3, slightly hypertrophied gland; 4, epithelium forming merely a diffuse granular mass within acinus; 5, gland cut obliquely, cylindrical cells on the right cut transversely; 6, glands whose epithelium is seen from the end; 7, intra-glandular connective tissue.

Besides these solid substances, dermoid cysts contain a milky fluid in which are often found cholesterin crystals.

Mixed tumors, formed by a combination of dermoid with other forms of ovarian cysts, have long been known. The subject has recently been studied by Poupinel, who states that in one and the same tumor we may find in closest union dermoid cysts and cysts with pavement epithelium, cubical, ciliated, goblet, polymorphous cells, etc. More than this, in the same cystic cavity we may find the epidermis with its appendages (hairs, sebaceous and sudoriparous glands) and a lining of uniform or polymorphous epithelium. Finally, the interior lining of the cavity may be entirely formed of skin—which may, however, be incomplete. In some instances the cutaneous lining is found in a few places only of the dermoid cavity, and may be in the form of large papillæ into which are implanted the hairs. The rest of the cyst wall is smooth and fibrous, or else looks more mucous than cutaneous.

The foregoing description, which agrees with all other accounts of dermoid cysts, leads one to regret the rarity of thorough histological examinations. Were they more frequent, it is probable that many cases of so-called dermoid cysts would be classed with mixed tumors. The fibrous stroma is usually formed of young connective tissue, of adult or of myxomatous tissue. Yet, besides teeth, which are produced from the ectoderm and are met with only when there is a cutaneous lining, we find cartilaginous and bony tissue

in the fibrous walls of mixed tumors. It may also be seen in tumors which possess no dermoid characteristics. Poupinel reports an example of a mucoid cyst of the ovary, followed by the appearance of cysts of the same nature all over the body; cartilaginous nodules were found in its walls.

Mixed tumors, as well as dermoid cysts, often ossify; but a study of their structure emphasizes the interesting fact that the fragments of bone are not necessarily situated near the dermoid cysts, but may indeed be quite independent of them. Finally, we may find striped and unstriped muscle fibres and nerve tissue in the stroma of mixed tumors.



FIG. 424.—DERMOID CYST OF THE OVARY. Great development of sebaceous glands. 1, Loose connective tissue with long cells; 2, lymphatics; 3, normal lobules of small polyhedral cells possessing distinct nuclei; 4, lobule whose central cells have changed into vesicles containing an oily material; 5, granular cells without nuclei; 6, large lacunæ full of fat; 7, transverse sections of hair; *a*, sheath; *b*, hyaline layer; *c*, hair.

Both ovaries may be simultaneously affected. In that case, as in the case of unilateral ovarian tumors, combinations of every variety of cyst may occur. Each ovary may contain an epithelial mucoid tumor, with polymorphous epithelium or epithelium of one kind alone. For instance, both cysts may be lined with ciliated epithelium. Oftentimes both ovaries are transformed into mixed tumors.

There may be a dermoid cyst upon one side and a mucoid cyst upon the other, or a mucoid cyst on one side and a mixed tumor on the other. The

question of the origin of dermoid cysts is one of the most obscure points in general pathology. The theory which ascribed them to extra-uterine pregnancy scarcely deserves mention, since they are often met with in children. The theory of diplogenesis by fœtal inclusion is also inadmissible, and is at once disproved by the great number of teeth present. The term plastic heterotopia, used by Lebert, is no explanation, but merely a name.

There are a few more tenable theories; that of parthenogenesis, which considers their formation due to a proliferation of germinating epithelial cells, is not satisfactory, because it fails to account for the presence of similar growths in other parts of the body where there is no epithelium. The theory of impaction, although not beyond criticism, is on the whole the most satisfactory. According to this view, during intra-uterine existence certain portions of the blastoderm become impacted by pressure within the tissues, and develop there later, giving rise to an irregular formation of the normal tissues. Verneuil was the first to formulate this ingenious theory in regard to cysts of the branchial clefts of the neck and of the head. The demonstrations of His in regard to the axis cord, from which he claims that the genital organs are developed, assist us in understanding the complexity of the elements found in dermoid cysts of the ovary. The organs which are formed by all the layers of the blastoderm are the only ones which take part in the formation of the axis cord. It is impossible by dissection to identify the different germinative layers; we can easily imagine, therefore, that portions of tissue corresponding to the corneous layer, the medullary tube (ciliated epithelium), or the middle layer (muscles, bone) may become misplaced in the ovary as in the testicle. The theory of impaction receives strong corroboration from these researches. Lannelongue adopts it unreservedly. He calls attention, moreover, to the fact that the development of these tissues, foreign to the parts in which they are situated, brings about certain modifications in the structure of the latter, which add to the complexity of the abnormal growth. Perhaps this may explain the union of proliferating ovarian cysts to dermoid cysts, and the various transitional stages in these neoplasms. Still, Lannelongue does not entirely reject the idea of diplogenesis in cases in which fœtal remains are found in cysts, which he terms

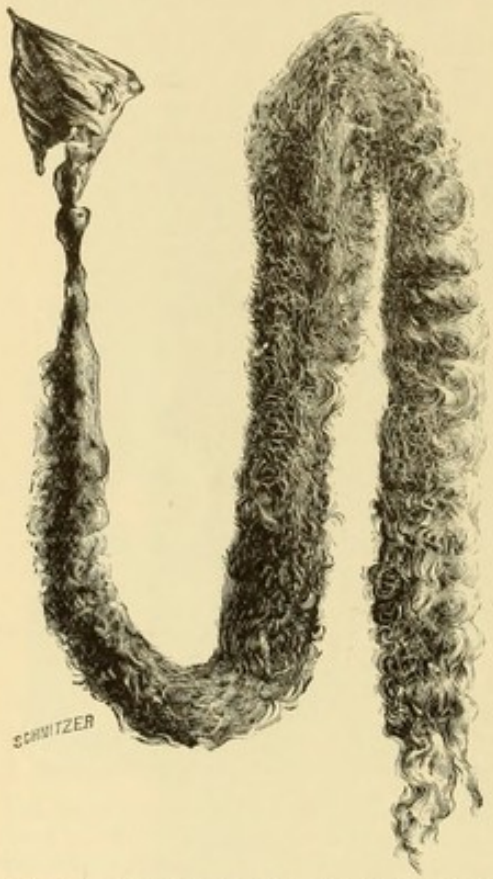


Fig. 425.—Switch of Hair Five Feet Long taken from Dermoid Cyst (Mundé).

fœtal cysts. He considers them to be a combination of cysts and double monsters; the cause giving rise to the production of the monster being intimately associated with that which determines the formation of a cyst. One

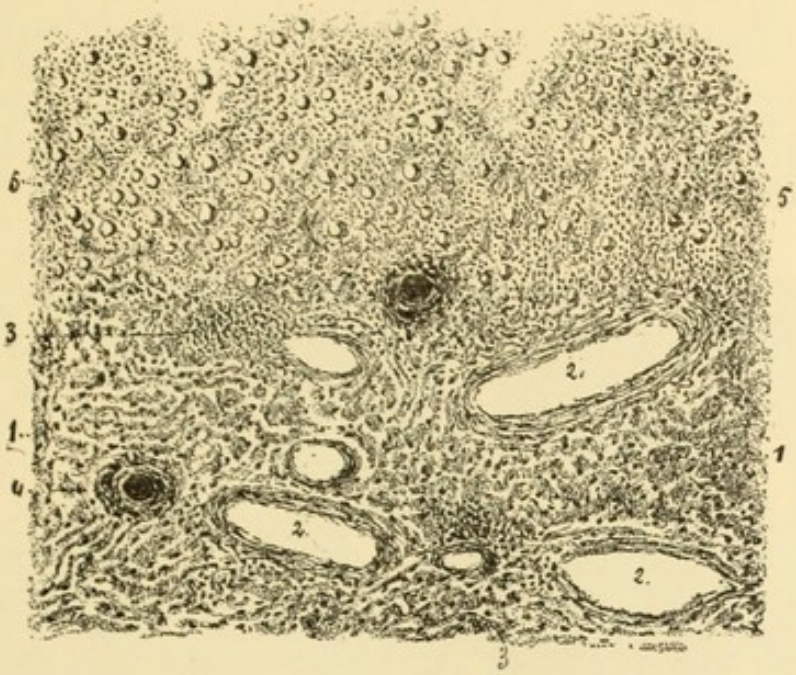


FIG. 426.—DERMOID CYST OF THE OVARY. Section perpendicular to cyst wall at point of granulo-fatty degeneration. 1, Compact connective tissue in wavy bundles, with fusiform cells; 2, vessels; 3, centre of development of perivascular embryonal cells; 4, transverse section of hair; 5, layer of round cells with many droplets of fat between, forming a soft grumous mass on interior of cyst.

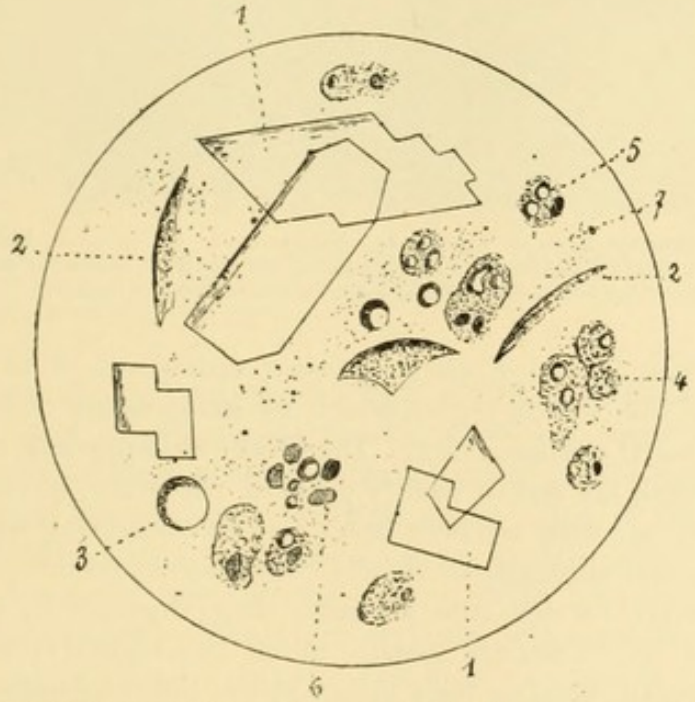


FIG. 427.—SEBACEOUS CONTENTS OF DERMOID CYST. 1, Cholesterin crystals; 2, epithelial cells; 3, free globules of fat; 4, cells containing fatty droplets; 5, cell with nucleus still visible and containing two fat globules; 6, small group of free nuclei and fat droplets; 7, fatty granules.

or the other may predominate, according to the case; the higher we go in the series, the more does the element of the monstrosity predominate, and the more does the cystic element tend to diminish and disappear. Thus, in the genesis of these tumors, there are two factors to be considered—the production of cystic cavities, and the existence of a centre of supplementary development. To admit the existence of this independent centre is to satisfactorily account for the complex character of these neoplasms, but it must be confessed that the admission creates problems quite as difficult of solution as those which it destroys.

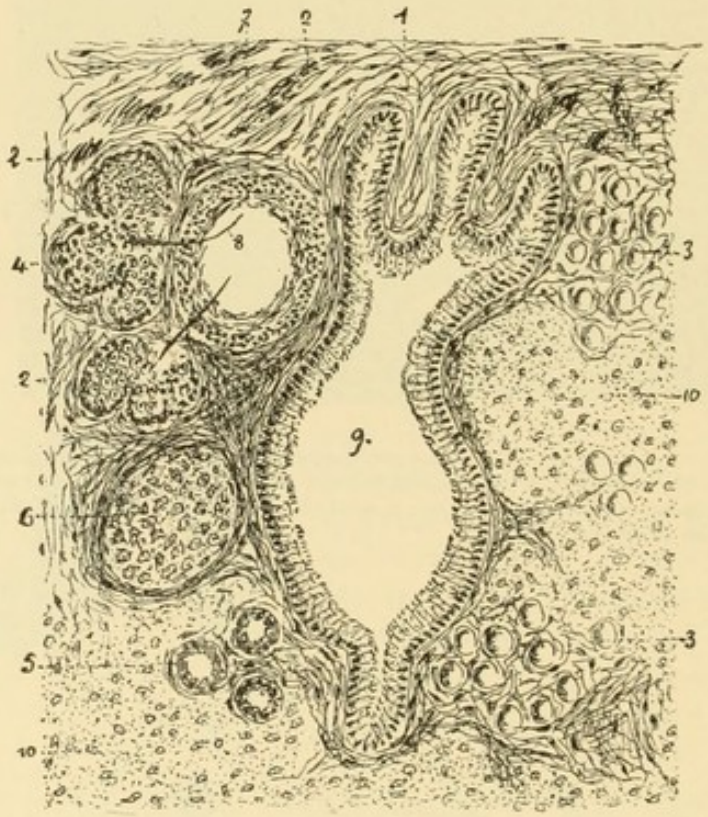


FIG. 428.—MIXED DERMOID CYST OF THE OVARY. Diagrammatic. 1, Connective tissue; 2, smooth muscle fibres; 3, cellulo-adipose tissue; 4, sebaceous glands; 5, sudoriparous glands, 6, nodules of cartilage; 7, cyst with cutaneous lining; 8, hair; 9, cyst with lining of ciliated cells; 10, small-celled nerve tissue.

IV. *Parovarian Cysts.*—From a practical standpoint, it is impossible to separate cysts of the ovarian region which are independent of the ovary from those properly called ovarian cysts. Therefore, although the cysts of which I am about to speak are not in reality cysts of the ovary, since anatomically separate from it, yet they are best described in connection with the latter, being surgically and clinically so closely connected to them.

These cysts are formed into a clearly defined group, by an *ensemble* of like characteristics. They are usually called parovarian cysts, or cysts of Rosenmüller's organ, because their origin in the broad ligament, where they are situated, corresponds to the seat of these embryonic remains, and because it seemed natural to give a special name to a specialized structure.

But it has not been demonstrated that these unilocular cysts of the broad ligament, with their thin walls and transparent contents, always originate from the parovarian. A. Doran has studied and made drawings of some specimens which antagonize this theory. He inclines to the belief that they are simple cysts with lacunæ or the subserous hygromata of Verneuil. Mangin also believes that they may be developed in the connective tissue independently of the parovarian. De Sinéty considers it very doubtful if they originate from the organ of Rosenmüller. He believes them to be similar to mucoid epitheliomata, and thinks that the difference in the fluid

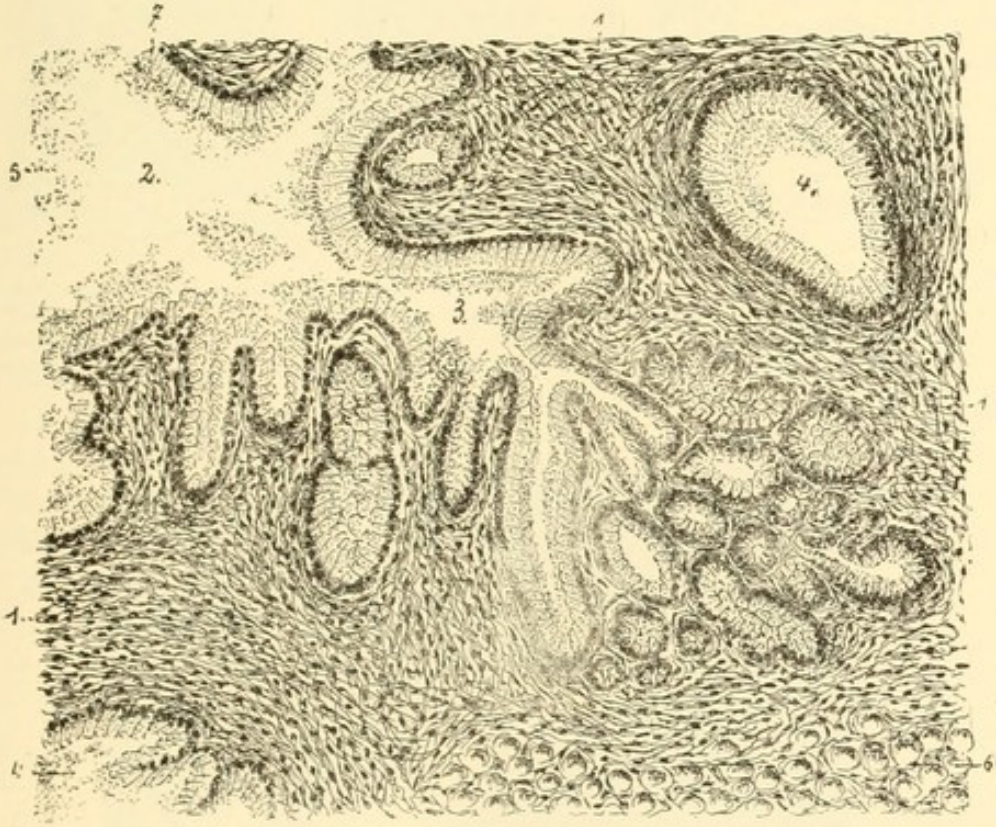


FIG. 429.—MIXED DERMOID CYST OF THE OVARY. Cavities lined with ciliated cylindrical epithelium. 1, Very embryonal connective tissue; 2, principal cyst cavity; 3, branching diverticulum; 4, small secondary cysts; 5, mucus; 6, fatty tissue; 7, point where ciliæ are preserved.

contents is due to the simple structure of the epithelial cells, for a clear fluid is also seen in proligerous ovarian cysts not lined with goblet cells. De Sinéty even wonders whether supernumerary ovaries may not have something to do with the production of these cysts. But, if their origin be the same as that of ovarian cysts, how shall we explain their constant, special structure? Moreover, how can we believe in so frequent an existence of supernumerary ovaries? There are certainly some nebulæ upon this point which need to be cleared away. Yet it is convenient to use the time-honored expression parovarian cyst to designate cysts of the ovarian region, independent of this organ which is found to be in normal condition close to

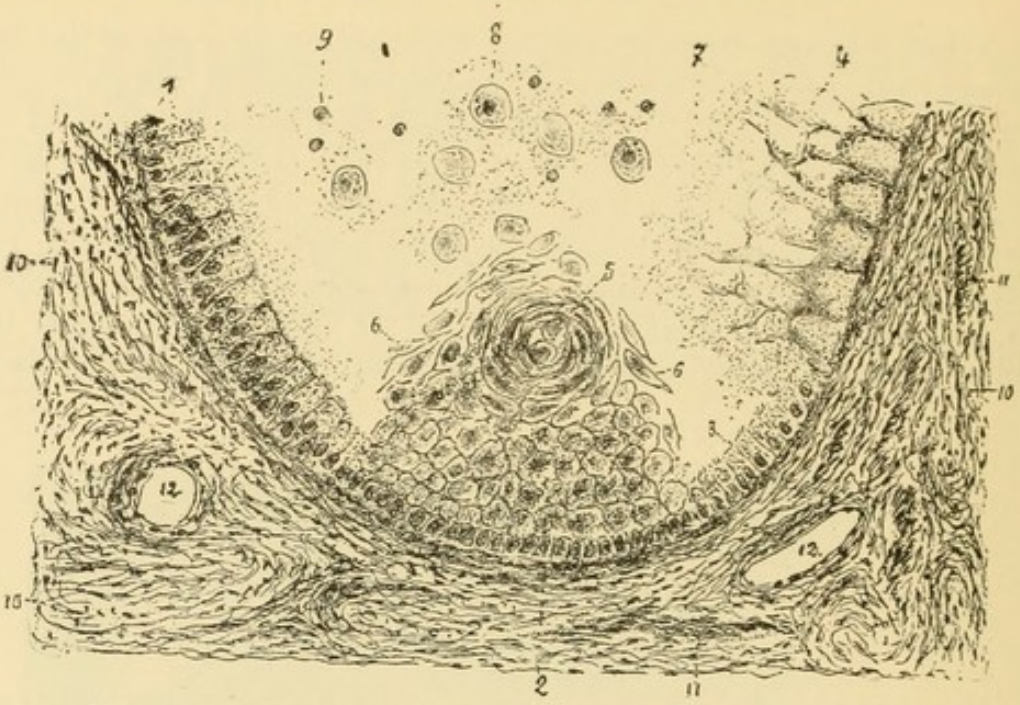


FIG. 430.—MIXED DERMOID CYST OF THE OVARY. Showing different changes of the epithelium (not diagrammatic). 1, Ciliated columnar epithelium; 2, transformation to squamous epithelium; 3, cylindrical ciliated form; 4, swollen, vacuolated cells undergoing colloid degeneration; 5, epithelial pearl; 6, desquamated squamous epithelium; 7, colloid material; 8, swollen and free granular epithelium; 9, free nuclei; 10, connective tissue; 11, smooth muscle fibres; 12, vessels.

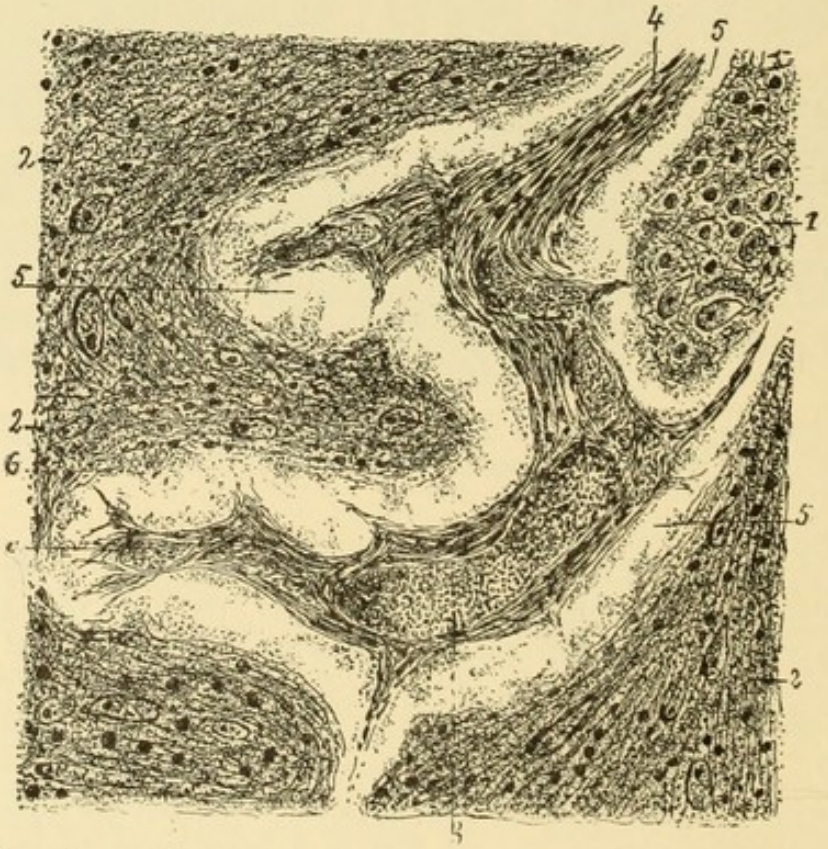


FIG. 431.—MIXED DERMOID CYST OF THE OVARY. Nerve tissue and lymphatic spaces around vessels. 1, Areolar nerve tissue containing large and small cells; 2, fibrillary nerve tissue; 3, vessels full of blood; 4, large mass of fibrous tissue sending off prolongations into masses of nerve tissue; 5, peri-vascular lymph space; 6, extravasated lymph.

the cyst, or separated by a fold of the ligament; only the name should be understood to mean a cyst in the vicinity of the ovary, rather than a cyst of the parovarium.

These neoplasms are not rare: Olshausen has found them 32 times among 248 ovariotomies, which is 11.3 per cent.

It is important to divide them into two classes: the first, and more frequently met with, I shall call parovarian hyaline cysts; the second, parovarian papillary cysts.

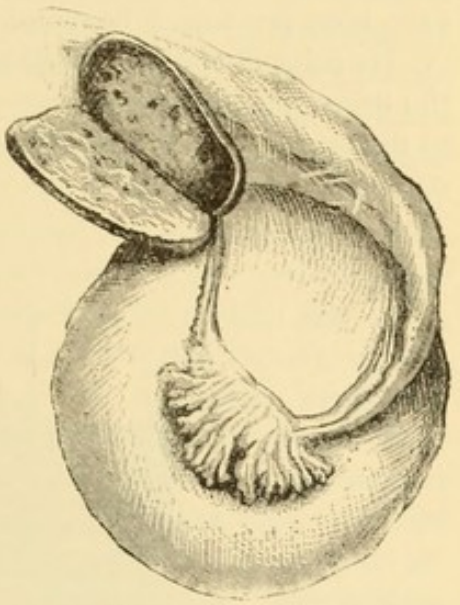


FIG. 432.—UNILOCULAR PAROVARIAN CYST OF THE BROAD LIGAMENT. To the left and above is the incised ovary, which is seen to be free. The elongated Fallopian tube is spread over the surface of the cyst (Doran).

Parovarian Hyaline Cysts.—These are usually unilocular, but there are some exceptions. L. Tait reports a case upon which he operated and which he carefully examined, where there were six sacs joined together, and he also states that Spencer Wells removed a bilocular cyst. Moreover, even when there seems to be but one cavity, a careful search will often reveal secondary cavities in the cyst wall, of the size of hempseed or peas.

The sac is very thin. Its external surface, wherever it is not in contact with the pelvic walls or neighboring organs, is covered by the folds of the broad ligament, which do not, however, adhere to it. In many cases a sort

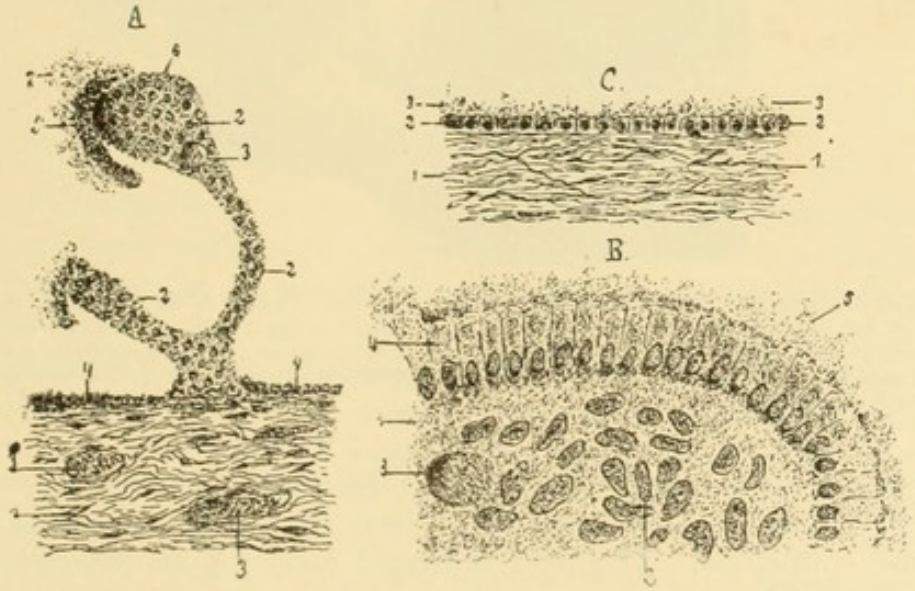


FIG. 433.—SUB-TUBAL HYALINE PAROVARIAN CYST. *A*. Section perpendicular to internal wall of cyst (300 diameters). 1. Cyst wall of connective tissue with elastic fibres; 2, branched villosity; 3. blood-vessels; 4, layer of small cuboidal-celled epithelium; 5, cylindrical ciliated epithelium; 6, point where epithelial layer is absent; 7, mucus. *B*. Part of villosity 2 (500 diameters). 1. Compact granular tissue; 2, nuclei; 3, vessels; 4, cylindrical ciliated epithelium; 5, mucus. *C*. Cyst wall, with small cuboidal epithelium (500 diameters). 1, Fibrous tissue with many elastic fibres; 2, epithelium; 3, granular mucus on surface.

of prolongation of the broad ligament seems to form a large pedicle. When the cyst is sessile, it is but loosely joined to neighboring parts, unless there have been previous inflammation.

Its color is white of a slightly greenish tint, and the fine blood-vessels of the investing peritoneal membrane clearly show through. The tube adheres to the surface of the cyst, the first effect of its development having been to open out the tubal folds; the ovary is thrown to the external side, sometimes

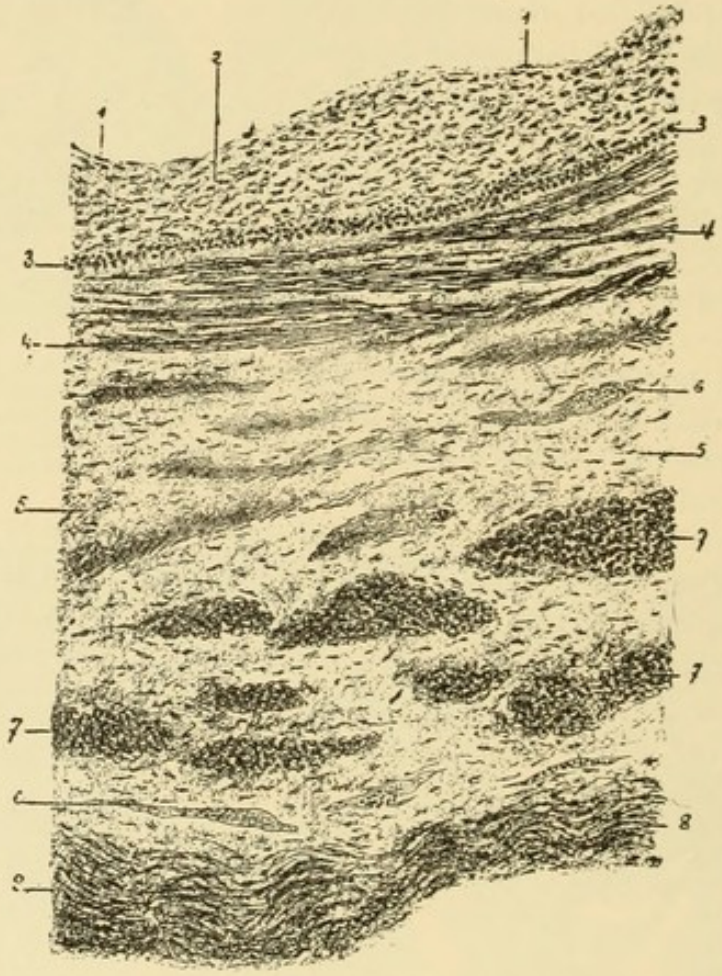


FIG. 434.—HYALINE CYST OF THE BROAD LIGAMENT. Section of entire thickness of wall (250 diameters). 1, Layer of flat cells on internal wall of cavity; 2, loose connective tissue with small cells; 3, several layers of rounded cells; 4, layer of very fine longitudinal smooth muscle fibres; 5, very dense fibrous tissue containing small elongated cells; 6, vessels; 7, transversely cut bundles of smooth muscle fibres; 8, fibrous limiting layer, with wavy, smooth muscle fibres.

flattened, but always distinctly visible. The internal surface is smooth and lined with ciliated epithelium, which may be accompanied by ordinary columnar epithelium. The fluid is limpid and of a crystal clearness, its density scarcely greater than that of water (1.002 : 1.008). It is not precipitated by heat, for it contains no albumin if there have been no suppurative process nor effusion of blood. It contains a large proportion of chlorides.

Parovarian Papillary Cysts.—Besides the more common parovarian

hyaline cyst of the broad ligament, with its smooth walls and transparent fluid contents, there is another variety characterized by the presence of papillary growths. Is this variety of separate origin, or is it, according to L. Tait, simply a stage of further development of the other? This question we cannot answer. However that may be, it is important for us to know that this variety exists. For a long time there existed a certain amount of confusion in the science of gynæcology owing to our incomplete knowledge of this subject. On the one hand, some writers erroneously used parovarian cysts and cysts of the broad ligament as synonymous terms; on the other hand, many believed that parovarian cysts always had thin walls, and transparent, non-ropy fluid contents, poor in albumin. Now this variety, though the more frequent, is not the only one. There are parovarian cysts with viscid contents, for which result it is only necessary that they should have papillary growths; the contents may even be made albuminous or of various colors by recent or past extravasations of blood. Yet these characteristics should not lead to a confusion of these cysts with mucoid ovarian cysts exceptionally enclosed within the folds of the broad ligament. They possess

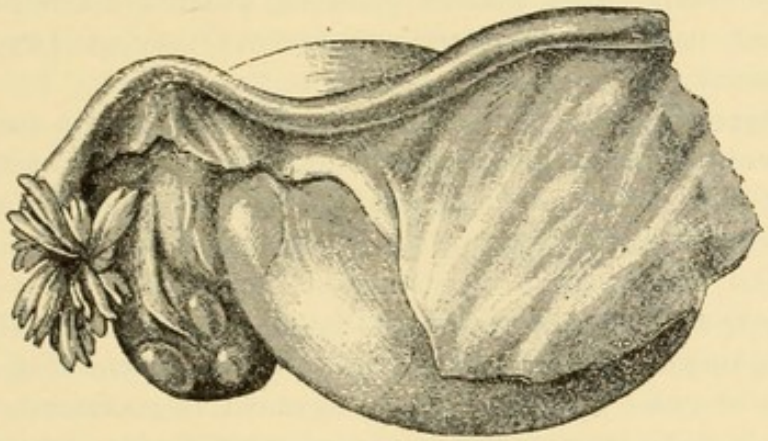


FIG. 435.—CONGLOMERATED FOLLICULAR CYSTS (CYSTIC DISEASE OF THE OVARY) IN THE BROAD LIGAMENT.

one special characteristic, in that they are always unilocular (except for the almost microscopic cavities in their walls), while ovarian cysts are almost invariably multilocular. Cases which have caused confusion have been only apparently similar.

Exceptionally the cysts, especially if they develop in the direction of the abdomen, become to a certain extent mobile, and, by dragging upon the broad ligament, form a kind of laminated pedicle. These cysts, which are ordinarily benign, may sometimes become malignant in the extreme. L. Tait quotes the case of a young girl from whom he removed a parovarian cyst of apparently simple nature, and without any interior vegetations; six weeks later the patient showed symptoms of ganglionic infection, and three months later died from metastatic cancers in various organs.

Parovarian Dermoid Cysts.—A certain number of well-authenticated free dermoid cysts of the ovary have been reported.

The Pedicle.—Whatever the origin of ovarian cysts, one important morphological distinction presides over their surgical history. This is the presence, the disposition of, or the absence of a pedicle. It is sometimes very thin, almost membranous, and the tube is separated from it by the free peritoneal fold of the ovary. This mesovarium aileron is often unfolded, and the tube, which is dragged upon by the tumor, adheres to it and is somewhat lengthened in consequence. The pedicle then contains two parallel cords—the tube and the ovarian ligament. The narrowest part of the pedicle is at the infundibulo-pelvic ligament or the fold of peritoneum going from the pelvic wall to the ovary, through which the vessels go to that organ. The length and thickness of the pedicle vary greatly, and often depend upon the distance which separates the tumor from the edge of the uterus, and upon the thickness of the broad ligament whose muscular fibres are often hypertrophied, connective tissue œdematous, and veins dilated. It is in the vicinity of the pedicle that the cystic walls are the most thickened and that we find the remains of the ovary.

Certain cysts originating within the broad ligament (dermoid and parovarian) may exceptionally possess pedicles, which are formed simply by distention and displacement of the peritoneum; they are large, laminated, and membranous.

When there is no pedicle, the cyst is either wholly or in part within the broad ligament. This is the usual situation of parovarian cysts, hyaline or papillary, of some dermoid cysts, and of some proliferous, glandular, or papillary ovarian cysts, to account for which circumstance Freund believes in a congenital malformation consisting in impaction of the ovary. Small follicular cysts and cysts of the corpus luteum may exceptionally be within the broad ligament, where I have myself observed them (Fig. 435). The classification of cysts within the broad ligament is necessarily an artificial distinction; it is of interest from a surgical point of view, but is of no value as a nosological classification. It is a mistake for surgeons to use this term as a synonym for parovarian cysts, or even for the most frequently occurring parovarian cyst, the one with thin walls and hyaline fluid contents. In point of fact, all of the following varieties of cyst may be situated within the folds of the broad ligament:

A. Parovarian hyaline and papillary cysts (always in this situation, at least in the beginning).

B. Proligerous ovarian cysts, papillary and glandular (rarely).

C. Dermoid cysts, ovarian (often) or parovarian (seldom).

The enclosed cyst may be on the external side of the ligament near the pelvis, or on the internal side and adhere to the uterus, or it may fill up the whole of the ligament, throwing it upward and outward from the opposite side. A segment of the tumor may project beyond the broad ligament toward the abdominal cavity, forming a free additional cyst to the enclosed cyst, from which it is separated by a groove.

According to Terrillon, secondary impaction of proliferous cysts differs from the primary impaction of parovarian cysts. In the first case, the enclosed portion of the cyst forms such intimate adhesions to neighboring tissues that we might add a second vascular pedicle to the primary utero-ovarian vascular pedicle; it comes from the horn of the uterus and is due to dilatation of the normal anastomosis between the superior branch of the uterine artery and the termination of the utero-ovarian vessel; the result is a purplish appearance and a thickening of the broad ligament which do not exist with parovarian cysts. It seems to me that such a distinction is fallacious, and based upon observations of hyaline parovarian cysts alone. The remarkable tendency of some parovarian cysts to invade neighboring parts and to adhere to the uterus is well known.

It is important to distinguish another variety of sessile cysts—those which do not remain within the broad ligament, but go beyond it and travel beneath the peritoneum in the cellular interstices, quite a distance from their point of origin. These might appropriately be called retro-peritoneal cysts.

Any kind of cyst may travel in this fashion; it has especially been noticed in hyaline or papillary parovarian cysts, but also in dermoid cysts and glandular ovarian cysts. On the left side, the tumor may stretch the iliac meso-colon and come in contact with the ilium. I enucleated a hyaline parovarian cyst which had followed this course. On the right side, the cyst may go as far as the cæcum, or even pass beyond it within the mesentery, to the kidney, liver, and diaphragm. Posteriorly, the cul-de-sac of Douglas may be lifted up, and the cysts lodge between the rectum and uterus.

Anteriorly, the vesico-uterine cul-de-sac is sometimes displaced upward; the bladder, pulled upon by it and the urachus, is enormously elongated, and liable to be wounded by the knife of the operator. Laterally, the cystic masses glide under the peritoneum, between it and the pelvic aponeurosis or even into the iliac fossa, press upon the ureter, and are often the cause of renal disease. The papillary and glandular cysts of an areolar or gelatinous variety are the ones which give rise to the most extended and most serious cases of retro-peritoneal migration; contrary to the hyaline parovarian cyst, they form adhesions to neighboring parts and are difficult and often impossible to enucleate. Dermoid cysts have been found in the retro-peritoneal pelvic cellular tissue.

The mistake has often been made of supposing that they originated from the walls of the bladder, rectum, or uterus to which they were adherent. They have sometimes formed an obstacle to delivery.

Adhesions.—During the first stages of cystic development, the columnar epithelium which covers them is an efficient protection against the formation of adhesions. After it desquamates, however, adhesions may result from friction and external irritation. Loose in the beginning, these adhesions become closer and closer as time goes on. The anterior surface of a cyst is

sometimes so closely glued to the peritoneum that operators have detached the latter from the abdominal walls under the supposition that they were detaching the cyst. The mesenteric attachments may be so extensive and so rich in blood-vessels as to furnish the chief elements of nutrition to the cyst. In a case of this kind, I found it more convenient to begin the ovariotomy by cutting the pedicle, which was relatively slender, and then successively to tie the various adhesions by turning the cyst from below upward. The intestines also may be so closely adherent that it is impossible to dissect out the cyst, and one is obliged to split (*entamer*) the cyst to remove it. Adhesions to the pelvic walls are serious because of the danger of lacerating the ureter or a large blood-vessel, and it is sometimes impossible to destroy them if they are very extensive. In the latter case we usually have to do with direct adhesions of retro-peritoneal cysts, without any intervening serous membrane.

Ascites.—The presence of a small amount of fluid in the peritoneal cavity is not unusual, but a large accumulation is rare. Terrier seems to have had an exceptional experience in finding 10 cases of abundant and 25 cases of slight ascites out of 100 cases of ovariotomy. Out of 68 cases of ovariotomy, Terrillon only once found this complication.

In the majority of instances in which there is ascites, we have to do with papillary cysts with vegetative growths outside of the cavity, sometimes even with metastatic growths upon the neighboring peritoneum. In the case of glandular cysts, there may be partial fatty degeneration of the wall, or even, according to Quénu, rupture of small superficial cysts whose contents irritate the peritoneum. This author, in my opinion, attributes too much weight to the phenomena of osmosis caused by the colloid matter secreted by the vegetations or poured out by small cysts; this explanation is not needed to account for the ascites produced by the irritation of a pathological fluid. Ascites constitutes a real protection to the peritoneum when the serous membrane has been unable to isolate the irritating body by the production of adhesions. Some have considered the vascular richness of the tumors to be the cause of the ascites; but this factor seems to me to be of small importance, since telangiectatic fibromata may exist without causing ascites. The characters of the ascitic fluid accompanying ovarian cysts often aid in its recognition. It is richer in solids than the ascitic fluid of cirrhosis, and often contains characteristic cellular elements. It may be yellowish (*citrin*) or tinged with blood, the latter characteristic seemingly corresponding to a greater degree of malignity of the tumor.

Intra-cystic Apoplexy.—Small hemorrhages frequently occur within the cyst, giving a dark and even chocolate-colored appearance to the fluid. Hemorrhages so serious as to threaten life have even been observed; the cyst is then found to be distended with clots, and it may be impossible to find the point of rupture of the vessels. Elongation and torsion of the pedicle predispose to hemorrhage.

Suppuration.—A cystic cavity may suppurate after it has been punctured for purposes of evacuation or exploration, the introduction of pathogenic germs being the cause of the process. To this cause also must be attributed so-called spontaneous inflammations, for the adhesions to the inflamed tubes seem really to permit the introduction of germs.

Suppurative inflammation may follow mortification from torsion of the pedicle. Finally, after parturition, and under the influence of attenuated puerperal septicæmia, suppuration of dermoid cysts has been noticed.

Torsion of the Pedicle.—This accident, though infrequent, is not rare. The cyst may be seen free in the abdomen, quite detached from its former place of insertion, or else held by only a few filaments. When this is the case, we usually have to do with polycystic areolar tumors, or dermoid cysts with thickened walls, having the consistence of solid masses. I have seen an excellent example of this nature. Baumgarten and Hofmeier have seen dermoid cysts that had become quite free from all attachments. If the tumor have not formed any adhesions before its separation, it becomes a foreign body, causing reactionary troubles in the peritoneum and ascites, which might be called acute.

In the contrary event, it may continue to live through its adventitious roots, which in their turn, however, may become the seat of the same troubles. If torsion takes place slowly, in a chronic manner so to speak, it has been known to exercise a beneficial effect, and cause an arrest of development of the neoplasm, without causing any reaction. Fatty degeneration, with partial absorption, is produced; calcification has occurred. But as a usual thing, this progressive torsion is accompanied by acute attacks of peritonitis, and increase in the size of the cyst from hemorrhages. One of the rare results of torsion is gangrenous inflammation of the tumor; to produce it, the torsion must have occurred suddenly and caused mortification of the neoplasm and the intestinal adhesions which serve as a means of ingress to germs.

Intestinal occlusion is one of the possible consequences of torsion.

General Peritoneal Infection—Metastasis.—The metatypical proliferation of the epithelium of glandular cysts, upon which Malassez justly lays so much stress, colloid and carcinomatous new growths, are very similar in character to the atypical malignant neoplasmata; it is therefore not surprising that from some influence yet unknown ovarian cysts should take on the characteristics of malignant tumors, spreading into the peritoneum or even farther, and recurring after removal. These various processes have been included under the somewhat vague, but at this date fully established, name of metastasis. We can divide them into the two following classes:

A. Metastasis from spontaneous infection.

B. Metastasis from infection due to operations.

A. *Metastasis by Spontaneous Infection.*—The cauliflower growths of papillary cysts may remain for a long time within the cyst cavity; but at

some given moment, whether from distention and rupture, or simply from erosion and perforation of a limited portion of their wall, these vegetations emerge upon the external surface of the cyst. From that time a new phase in the life of the cyst begins; on one hand, the protective epithelial covering having been broken through, the peritoneum is irritated and ascites produced; on the other hand. the neoplasm which has burst through its boundaries tends to spread, inoculating neighboring parts, in a fashion which has been compared to the contamination by contiguity (*de proche en proche*) by the auto-inoculation of mucous patches.

These vegetations are found in great number not only upon the ovary, tube, and uterus, but upon the intestines, mesentery, parietal peritoneum, and even the walls of the aorta. We may well ask ourselves whether in such cases all operative measures would not be necessarily inefficient, and what would be the course of the secondary growths when the primary tumors were removed. Still, numerous observations show that even under these circumstances a cure may follow; it seems as if the scattered vegetations underwent atrophy or a process of retrogression. In a case reported by Thornton, of bilateral papillary cyst, which burst open and caused a dissemination of vegetative growths upon the peritoneum, a complete cure was established at the end of four years; in another, the patient became pregnant after an operation when the whole of the pelvic peritoneum was covered with papillomata; in a third case, in which Thornton was obliged to leave a tumor as large as a walnut in the cul-de-sac of Douglas, at the end of three years this mass was found to have undergone no increase in size. Flaischlen and L. Tait report similar cases.

Metastatic infection of the peritoneum has been very rarely observed in glandular ovarian cysts. It seems to follow spontaneous rupture of the cyst, and we then find in the peritoneal cavity small sacs, with or without accompanying gelatinous masses, grafted upon the epiploön or the intestines, or retro-peritoneal. I recently saw a case of this kind. The tumor was bilateral, polycystic, and there were metastatic growths in Douglas' cul-de-sac, besides a free cyst of the size of an orange which adhered to the intestines and doubtless came from the rupture of one of the ovarian tumors; there was slight ascites; the patient succumbed rapidly. Runge, in a similar case, obtained a complete cure six months later. Cystic growths were scattered upon the epiploön, bladder, and posterior abdominal wall.

Metastasis has been noticed with dermoid cysts. Kolaczek reports an observation of Martin's, in which, during the course of an operation for dermoid cyst with thick, smooth walls, considerable ascites was met with, and several yellowish nodules of the size of peas were scattered upon the peritoneum; several of them contained hair of a light color. Fraenkel, in a case of Billroth's, also saw dermoid growths in the abdomen, associated with a cyst of this nature. There are cases in which the infection is not limited to the peritoneum, but invades the pleura through the lymphatic

vessels, after having infected the inferior surface of the diaphragm. In a case reported by Marchand the pleural tumors contained a gelatinous substance, and alveoli lined with columnar epithelium of which some was ciliated. In another case, reported by Terrier, the tumor of the diaphragmatic pleura possessed carcinomatous properties. In fact, these metatastic products of ovarian cysts may take on a malignant histological structure. Thus, a dermoid cyst may become the starting-point of an epithelioma which may invade the uterus, epiploön, duodenum, liver, spleen, and lungs. Degeneration of dermoid cysts into malignant neoplasms, epithelioma, sarcoma, carcinoma, has often been observed.

B. *Metastasis by Infection Following Operation.*—Many cases have been reported in which a little while after ovariotomy gelatinous masses have appeared upon the peritoneum (myxoma peritonei), apparently developed from the dissemination of similar substances contained within the cyst. These masses are in the form of vitreous nodules, from the size of a hemp-seed to that of a walnut, disseminated or gathered into a mass which may be as large as a uterus at term. They have the yellow color of barley sugar or are grayish in tint, and delicate partitions of connective tissue, in which blood-vessels may or may not be present, may traverse them as in the vitreous body. Werth has demonstrated that these are not real myxomata, and proposes to call them pseudo-myxomata of the peritoneum.

Is the peritoneum inevitably destined to infection when there is an effusion of the contents of dermoid cysts? Two curious facts observed by Engström show that there may be a perfect recovery, even after the abdominal cavity has been invaded by septic matter. We know, moreover, that, while contamination of the peritoneum by the colloid contents of proligerous cysts is of prognostic import for the success of an operation, yet it does not make that success impossible.

CHAPTER XXVIII.

ETIOLOGY, SYMPTOMS, COURSE, AND DIAGNOSIS OF OVARIAN CYSTS.

Etiology.—Cysts of the ovary are most frequently observed during the period of sexual activity. Yet it is undoubtedly true that not only do the germs of many of these tumors date from fœtal life, but that the actual formation of the neoplasm has often begun at that time, to remain latent until it receives some impulse which causes it to develop. This certainly occurs in the case of dermoid cysts, and many observations tend to show that it also occurs with proliferous cysts (mucoid cysts of Malassez, cysto-epitheliomata, glandular, and papillary cysts). Doran, Winckel, and De Sinéty have seen in the fœtus or in an infant at term small cystic cavities whose significance and development are as yet unknown. Dermoid cysts may attain such a growth, even in a child, as to necessitate removal. On the other hand, there are cases of cyst which develop at an advanced age, at sixty-five and seventy-five years. I will return to this subject when speaking of the indications for ovariotomy. Some curious cases of ovarian cyst have been noted as occurring in the same family, among sisters, for example. The affection is often bilateral. Out of 1,000 ovariotomies performed by Spencer Wells, it occurred bilaterally 82 times (8.2 per cent). The proportion is greater for papillary cysts, Olshausen estimating it at 77 per cent; while for glandular cysts considered by themselves, it would be only 4 per cent. Scanzoni's view that chlorosis is an etiological factor is purely hypothetical.

Symptoms.—The onset is characterized by vague disturbances which do not differ from those described under the head of uterine symptoms. They are at first simply reflex troubles due to the congestion and stretching of the appendages. Later come pressure symptoms of the rectum, bladder, or nerves if the cyst be impacted beneath the peritoneum and unable to move freely in the abdominal cavity. These phenomena are often absent. Following this latent or metritic (pseudo-metritic) period, suddenly appears the period of tumefaction, when the abdomen becomes more or less distended. The general health now begins to be affected, and a period of decline precedes the accidents which will surely cause death unless surgical science interfere.

We distinguish two stages in the development of cystic tumors, each one characterized by well-defined physical signs: First stage: The tumor, which is small, is hidden in the pelvis, and recognized only by bimanual palpation. Second stage: The tumor has become ventral, and may be easily felt through the abdominal walls.

1. *Pelvic Stage.*—Usually, as soon as the tumor has attained twice or thrice the size of a normal ovary, its weight causes it to fall within Douglas' cul-de-sac; still, in some cases in which retroversion of the uterus opposes a barrier, it may remain at the side or in front of the uterus. Bimanual palpation will determine its presence, and its situation and connections will show its ovarian nature; it is usually hard, because of the small size and great tension of the capsule, rarely elastic or irregular. Hegar's manœuvre (pulling down the uterus with a tenaculum, and using rectal touch or bimanual palpation) is often of assistance in finding the pedicle. When the tumor has a well-defined pedicle, it is very mobile and can be perceived through the vagina only when pressed upon from above downward. When included in the broad ligament, it seems to be one with the uterus, but careful examination will reveal a slight groove between them; we must not forget that the uterus is pushed to the side or behind, or even to the front. In the case of papillary cysts the tumor is often bilateral, and we may exceptionally feel upon its surface, through the vaginal cul-de-sac, vegetations which resembles cocks' combs; there is usually some ascites.

In speaking of the pathology, I have already mentioned the existence of a well-defined type of cystic lesions of the ovary, for which I suggested the name of cystic disease. It is characterized by the number of sacs, their small volume, which usually limits the growth of the tumor to the size of a fist or a fœtal head, and by the frequency of their occurrence bilaterally. Owing to their small size, these tumors remain indefinitely in the pelvis; by touch and bimanual palpation we feel them either upon the sides of the uterus or in the cul-de-sac of Douglas, where they may be fixed by adhesions. One of the most constant symptoms which they cause is menorrhagia. L. Tait incidentally but clearly pointed out this special clinical variety, which he considers to be a result of follicular cysts. He noted the frequency with which it accompanies uterine fibroids, but he also mentions (and I have observed several cases in point) that it occurs independently of other lesions. In the latter event, an exact diagnosis is rarely made, as we are more apt to think there is some tubal affection (hydro-salpinx or hæmato-salpinx), which is more common and which, it must be confessed, is difficult to differentiate from it.

2. *Abdominal Stage.*—The external characters of the tumor vary greatly when it may be felt at a certain height above the pelvis. If the patient be very fat, or if she be a nullipara with firmly contracted abdominal walls, anæsthesia may be useful to cause relaxation and permit of a careful examination of the relations of the cyst. It is equally useful in the first or pelvic stage of the tumor. By abdominal palpation we feel a spherical tumor well-defined superiorly and laterally, less marked inferiorly; an irregular shape, or protuberances upon the surface, usually indicate a polycystic tumor; the larger the tumor the more elastic and less resistant does it feel; fluctuation, previously non-appreciable, is often felt after the administration of an anæs-

thetic. Percussion over the tumor gives dulness; it must be very lightly done, otherwise we will get a sonorous note transmitted from the intestines. This neighboring sonorous body often makes it difficult to outline the cyst with any great exactness by the use of the plessimeter.

By touch and bimanual palpation we usually find the uterus anteverted, just in front of the pubis, and pushed slightly to the opposite side from that of the cyst; the cervix is drawn upward and not easily accessible; it often seems to disappear owing to the stretching of the vaginal culs-de-sac. The sound will show decided elongation of the uterine cavity. Later, as the cyst increases in size, it will push the uterus backward (Peaslee). Finally, there are some cases in which the uterus is pushed downward; I had a case of this kind, in which the patient was cured after I had performed ovariotomy with fixation of the pedicle into the abdominal wound. In large cysts of the broad ligament, the uterus may be completely pushed to one side.

If the cyst attains enormous dimensions, the abdominal walls become thin and striated, the linea alba is widened, the umbilicus protrudes. Dilated veins are seen upon the walls, especially in the region of the iliac fossæ, while in the ascites of cirrhosis they are most prominent in the supra-umbilical region. When the tumor extends beyond the umbilicus, fluctuation is easily felt over the greater part of its area, and is most distinctly felt in thin-walled parovarian cysts. In determining the amount of its repercussion, we get an idea of the size of the sacs, and if there are several centres of fluctuation we may affirm that the tumor is polycystic. Toward the sides we often find solid masses, which feel like a placenta; these are areolar and colloid microcystic conglomerations. Percussion elicits flatness over an irregularly spherical area; convex above, separated by a zone of resonance from the hepatic dulness, unless indeed the great size of the tumor has united the two dull areas. Intestinal tympanitic resonance surrounds the tumor. The resonance of the stomach may be diminished, but may always be found in the epigastrium and on the left side of the thorax. A change of position does not affect the dulness. In extreme cases the costal cartilages and the xiphoid appendage are bent, the liver becomes horizontal and is pushed into the concavity of the diaphragm, the heart is pushed upward, and the abdomen projects into the thorax. It is no longer cylindrical, but projects anteriorly, and slopes by a gentle curve from the chest, which seems to be merely an appendage to it. Pressure upon the aorta and the crural arteries may cause vascular souffles which are of no importance.

There is one sound which is perceived more by the hand than by the ear, which is like the crepitation of crushed snow. According to Olshausen, it is due to the displacing of colloid matter either in one of the cavities or upon the surface of the cyst if it is ruptured. I think that simple friction of the peritoneum gives the same sensation, and I do not attach much importance to it.

Menstrual disorders are more rare than we should imagine *a priori*.

Since large cysts are usually unilateral, the remaining normal ovary maintains a regular condition of the function.

Gallard studied sixty-nine cases of cysts in order to determine what influence was exerted upon menstruation. Once out of every five cases there was diminution of the flow or delay in its appearance; once out of eight, irregularity, pain, or increase of the flow. We have already mentioned the fact that menorrhagia often occurs in the case of cysts impacted in the immediate neighborhood of the uterus. After the menopause, cases have been noticed of congestive uterine phenomena causing the reappearance of a more or less irregular flow of blood which leads the patient to believe in a return of the menses. Under the influence of ovarian as well as uterine tumors, there is often a reflex swelling of the breasts with pigmentation of the areola as in pregnancy. A milky secretion has been noticed, even in quite young girls. Sterility is an inevitable result only when both ovaries are affected, and we know that ovarian cysts often complicate pregnancy. We must be careful to make a distinction between the pressure phenomena in the early stages, which appear only when the tumor is imprisoned in the pelvis (cysts within the broad ligament, and retro-peritoneal cysts), and the pressure symptoms caused at a more advanced stage by the weight and size of the cyst rather than by its relations.

Pressure upon the bladder often produces incontinence of urine in the early stages of cysts within the broad ligament; and sharp pain from pressure upon the nerves may arise under the same circumstances. Pressure symptoms, as a usual thing, are not marked until the tumor is so large as to distend the abdomen. Then there may be vesical troubles, frequent desire to urinate, from diminished size of the bladder. Constipation is the rule from pressure upon the rectum and interference with the physiological efforts of defecation. Interference with the normal dilatation of the stomach and with peristalsis of the intestines causes anorexia and vomiting, and contributes to the advent of marasmus. When the tumor reaches very high in the abdomen, the movements of the diaphragm and even of the ribs may be seriously embarrassed, causing painful dyspnœa and cyanosis. Another cause of dyspnœa which is frequently not recognized is the compression of the ureters, causing chronic uræmia. We can scarcely exaggerate the importance of this complication, nor the necessity for careful examination of the urine.

The cardiac affections noted in these cases may, perhaps, be due to the renal disease. I dwelt at length upon this subject in the chapter upon Fibroids, and need not repeat the details in this connection. Varicosities, hemorrhoids, œdema of the extremities, purpura, pendulous belly, need no more than a passing mention.

As soon as the cyst attains a certain size, the columnar epithelium which surrounds and protects it desquamates in places, and then adhesions are produced from friction. They are formed especially upon the anterior wall,

which is the one most in contact with a resistant surface, but they may grow in connection with every organ contained within the abdomen. This result of partial peritonitis takes place quietly and without any febrile symptoms, unless indeed it be caused by torsion or rupture of the cyst, in which case all the signs of a more or less severe inflammation may be manifested.

The general health is rapidly impaired. Two chief factors are concerned in this gradual decline of strength: compression of the various portions of the digestive apparatus, which, joined to the reflex dyspepsia observed in the course of all utero-ovarian diseases, prevents repair of the constant tissue waste; and compression of the ureters, which, though it may not for a long while cause albuminuria, does cause serious uropoietic disturbances, and adds to the malnutrition of the system, long before it is clinically recognized. Pressure upon other organs, causing pain and sleeplessness, act in the same way by adding to the general enfeeblement. The patients become greatly emaciated, but I cannot see that the facies of ovarian disease, so strongly insisted upon by some writers as almost pathognomonic, are specially marked.

Accidents. Inflammation, Suppuration.—Temporary elevation of temperature and sensitiveness over the abdomen, in women suffering from ovarian cyst, indicate acute inflammation, either around or within the cyst. Suppuration of the cyst itself will cause regularly recurring and intense fever, with chills and sweating, accompanied by intense pain. A slight effort of memory will probably recall the cause of these accidents (contusion, puncture, torsion of the pedicle).

Torsion of the Pedicle.—This accident was first pointed out by Rokitansky. Many studies have since been made of this especial point. Thornton has recently collected the reports, adding the results of his large personal experience. Out of 600 ovariotomies he found torsion of the pedicle 57 times. This accident is less frequent than in Rokitansky's time. It was then about 13 per cent, and is now about 9.5 per cent. This is accounted for by the fact that at the present day cysts are operated upon at a much earlier stage. In the etiology we must mention pregnancy; out of 6 cases of cyst complicated by pregnancy, upon which Thornton operated, torsion was present 5 times, and in 9 cases the acute symptoms were first manifested after labor or abortion. In 4 instances there was arrest of menstruation from cold; 4 followed puncture of the cyst; in 8 cases there was no discoverable lesion. Torsion of the pedicle has been produced by exploration of a very movable tumor and by the change of position due to evacuation of the cyst. Anything adding to the mobility of the tumor—as ascites, length and slenderness of the pedicle—is a predisposing cause. Dermoid cysts are especially liable to it, however movable they may be, because of their weight.

Lawson Tait has seen torsion more often upon the right side, Olshausen on the left. Veit, Röhrig, and Thornton have seen it on both sides.

If this torsion is slowly acquired, it has been claimed that a gradual decrease in the size of the tumor may result; I cannot look upon this as a favorable symptom. A torsion which at first is slight may be rapidly followed by complete torsion and lead to severe accidents. A sharp and sudden pain is the first indication. If the torsion is complete the signs of peritoneal reaction soon appear. If the pedicle is lamellated and not very vascular, as in the exceptional cases of pediculated cysts of the parovarium, they may be slight. More often they precede peritonitis of varying degrees of intensity. It may be rapidly fatal or assume a dropsical character. Meteorism and acute ascites are also developed. Sometimes these accidents disappear in the course of a few days. Olshausen believes that there may be temporary torsions of the pedicle; he has seen two examples of it, which he thinks conclusive. Finally, the febrile symptoms may continue because of an absorption of the products of slow mortification of the tumor (septic intoxication rather than infection), and the patient dies of marasmus and cachexia. Rupture of the cyst often occurs at the same time as torsion of the pedicle; the latter is often complicated by extensive internal hemorrhages, the arterial supply continuing, while the veins are obliterated by the torsion. These hemorrhages add acute anæmia to the grave condition of the patient already existing. Symptoms of a localized peritonitis around the cyst soon declare themselves, so that the formation of extensive adhesions is one of the most frequent results of torsion.

Rupture of the Cyst.—The rupture of small cysts due to follicular dropsy seems to be of frequent occurrence and little importance; it may arise by spontaneous dehiscence.

As to the large cysts, their rupture is due either to traumatism, a blow upon the abdomen, a fall, the strain caused by vomiting, or to wearing away of the wall, or fatty degeneration caused by thrombosis. It has been observed during the course of a surgical exploration. This accident occurs most frequently in the case of gelatinous cysts, and is often preceded by torsion of the pedicle. Erosion of the sac by papillary growths may be another cause of the rupture.

The perforation occurs into the peritoneal cavity or into some neighboring organ. The former is the more frequent. The fluid may be reabsorbed without causing much reaction, if it be but slightly irritating, as in serous cysts. Out of 127 cases the reports of which were collected by Nepveu, there were 43 recoveries after the lapse of some time, 21 cases of temporary disappearance, and 63 deaths. Death may be so rapid that it seems due to septic intoxication from absorption of the fluid; or it may be preceded by the symptoms of acute peritonitis.

Rapid disappearance of the tumor, change of form of the abdomen, with the signs of a free collection of fluid in the abdominal cavity, which has to be pushed aside by the hand in order to reach the remains of the cyst, are the pathognomonic symptoms of the accident, often ushered in besides by

swooning or sharp pain. If the patient survive, there may be signs later of peritoneal irritation with ascites. In rare cases the rupture may be latent and accompanied by no symptoms sufficiently marked to attract attention.

This fluid may, moreover, be imprisoned by false membranes, and form a new intra-peritoneal cyst.

Abundant diuresis and diaphoresis have been noticed in cases of intra-peritoneal rupture of ovarian cysts. Anasarca also has been seen. Küstner calls attention to a curious symptom, peptonuria. Rupture into the intestines usually occurs at the rectum or colon; if there have been suppuration of the cyst, relief is experienced at first, but a cure is rare; on the contrary, the intestinal contents are liable to infect the cystic cavity and bring about septic fever.

In a very few cases the stomach or small intestines have been the seat of evacuation. Severe vomiting was the first sign in a case of perforation of the stomach reported by Portal. Where the intestines are perforated, diarrhœa is the initial symptom. A rupture externally by fraying the abdominal walls below or at the umbilicus has been observed, and is rather favorable than otherwise. Rupture into the vagina or bladder is rare, and is characterized by an evacuation of the fluid through these organs.

Evacuation of these cysts through the tubes after the formation of tubo-ovarian cysts, as mentioned above, might be included under the head of rupture of cysts. The evacuation is usually intermittent.

Internal strangulation may occur during the development of ovarian cysts, from excessive pressure upon the intestines, by their twisting about the pedicle, which is often twisted itself, or finally from peritoneal adhesions becoming attached to the tumor; in the last case diminution in the volume of the cyst by puncture may have a fatal effect.

The occurrence of pleural complications has been so positively asserted that it deserves mention. According to Terrier, these complications may precede or follow surgical interference, and are by no means exceptional. Demons found them nine times out of fifty cases, and he contradicts the generally held opinion that pleural effusions indicate malignity of the neoplasm. He considers that the impeded lymphatic circulation of the abdomen reacts upon the pleura beyond and through the diaphragm.

Prognosis.—"When ovarian tumors," writes Spencer Wells, "attain such a size that the general health is affected, the length of life granted to the patient will probably not exceed two years, and these two years usually consist of a series of troubles, even of torture and despair.. The cases in which expectant treatment and successive punctures have been able to prolong life for several years are great exceptions to the foregoing rule." Yet we should recognize the fact that in some rare cases the course of the disease may be very slow. T. P. Frank speaks of a patient of eighty-eight years who had had a cyst since the age of thirteen. It was in all probability either a dermoid or a parovarian cyst. Olshausen observed a cyst, probably of the latter

variety, in a woman of forty-eight, which had been there for nineteen years. Hyaline parovarian cysts or unilocular cysts of the broad ligament may rupture into the peritoneum several times in succession, with quite a long respite after each rupture. On the other hand, proliferous cysts may, after remaining quiescent for a long time, suddenly take a rapid course. Hyaline parovarian cysts of the broad ligament develop very quickly. After their first appearance, the growth of papillary cysts may be arrested for a considerable period; but the appearance of ascites, showing that there has been a perforation of the sac by vegetations, indicates that a fatal issue is imminent.

An absolute or relative spontaneous cure is not an impossibility. Intraperitoneal rupture often brings about the cure of parovarian cysts. Gradual torsion of the pedicle may exceptionally cause atrophy of proliferous cysts by diminution of their walls and calcification.

Death is the ordinary result of cystic development unless there be surgical interference. Marasmus, peritonitis, embolus, are the three chief causes of death. Suppuration from repeated puncture or ill-timed treatment used to be frequent. What influence has ascites upon the prognosis? It is without doubt an unfavorable occurrence, since it is met with in papillary cysts when the vegetations have perforated the sac, and in glandular cysts when rupture occurs or when there is torsion of the pedicle. Still, the reports of numerous cases show that this complication is not necessarily fatal, and L. Championnière, who has never seen a case of recovery from ovarian tumor accompanied by ascites, has evidently happened to see a series of unfortunate cases.

Another question which is still shrouded in darkness is that of the benignity or malignity of papillary cysts. Many cases in which they have been removed have resulted in a cure. Eighteen years ago I operated upon double papilloma of the ovaries, accompanied by ascites, in a young girl, who is now completely restored to health. I mentioned other similar cases when speaking of metastasis. On the other hand, the fact of the frequent occurrence of metastasis or even of generalization of papillary cysts, which assume a malignant type, should make our prognosis very guarded. There is probably some element present which the microscope is unable to reveal. It would seem as if the histological instability of these neoplasms, the ready transformation of their columnar epithelium into metatypical or atypical epithelium, places these cysts in a state of constantly imminent malignity.

Cohn, out of fifty cases of papillary cyst, which were carefully followed after ovariotomy, found twenty which seemed to him to be anatomically malignant, and in fact a microscopic examination will never permit of our asserting that such growths are clinically benign. It is better always to expect the worst, and to be on the lookout for general peritoneal infection. Poupinel also advises this caution.

Glandular cysts may undergo cancerous degeneration. Hofmeier, Cohn, and Ruge have pointed out that a racemose appearance of the cystic masses

often indicates malignity. Certain clinical symptoms leave no doubt in such cases. These are: sudden development of a tumor which has already existed for some time; rapid emaciation and cachexia; multiple adhesions, especially in the pelvis; œdema of the lower limbs and abdominal walls out of proportion to the size of the tumor and the amount of ascites present; pleuritic complications, etc. Dermoid cysts also may undergo cancerous degeneration. The prognosis of operation for malignant tumors showing these symptoms is very unfavorable. Still, as cases of permanent cure have been known to follow where it seemed impossible, we should operate whenever there seems to be any chance of success. Leopold, in view of this possible degeneration, makes it a rule to remove any ovarian tumor as soon as it appears, especially if it be bilateral.

Diagnosis. A. *Pelvic Tumors.*—In the earliest stages of ovarian cysts, it is difficult to distinguish them from other tumors situated by the sides of the uterus. A sessile cyst of the broad ligament might be simulated by an inflammatory nodule of peri-metro-salpingitis. A remembrance of previous symptoms, the course of the disease, with the existence of inflammation of the tubes and ovaries, will prevent error. These tumors are, moreover, less sharply limited, more sensitive to pressure, and subject to more rapid changes of size. A small pelvic hæmatocele shows fluctuation at first, but does not give the sensation of an encapsulated tumor, especially laterally, where it always spreads ont more. Later it becomes hard, while the manner of its appearance, with the intense peritoneal reaction which marks the onset, are very diagnostic. The extra-peritoneal variety may be difficult to distinguish from a beginning cyst of the broad ligament, except by the course of the swelling, which shows a tendency to absorption. Tumors of the tubes, especially hydro-salpinx, may cause perplexity. A bilateral lesion would seem to indicate their presence; oftentimes laparatomy alone, which is indicated in either case, can decide the question. Extra-uterine pregnancy in the beginning has few distinctive symptoms, although it usually causes amenorrhœa and congestion of the genital mucous membrane; later it is characterized by special signs, which will be described in another chapter.

Retroflexion of the gravid uterus at the third and fourth months is to be suspected only when there are signs of beginning pregnancy, and when the tumor is situated in the posterior cul-de-sac and causes acute pressure symptoms [retention of urine, constipation]; finally, if it be of solid consistence and continuous with the cervix, which is far forward, attempts at reduction will settle all doubts upon the subject. The exact position of the uterus should always be determined before deciding that there is a tumor independent of this organ. I consider stercoraceous tumors worthy of mere mention only.

B. *Abdominal Tumors.*—Pregnancy deserves the first mention, for a mistake in regard to it would be the most fatal of any. An error is most likely to be committed when there is hydramnios, for then we can neither palpate

the fœtus nor hear the fœtal heart sounds. In order to avoid the opposite error—of mistaking a cyst for a gravid uterus—we should never be satisfied with probabili ies, but seek for absolutely certain signs; we must remember that amenorrhœa, swelling of the breasts, and even a delusory subjective sensation of fœtal movements (produced by borborygmus) may all exist in a case of ovarian tumor.

The diagnosis will be settled only by a perception of the movements and hearing of the fœtal heart sounds by the surgeon, positive identification of fœtal parts, sensation of contraction of the gravid uterus, ballottement, and,

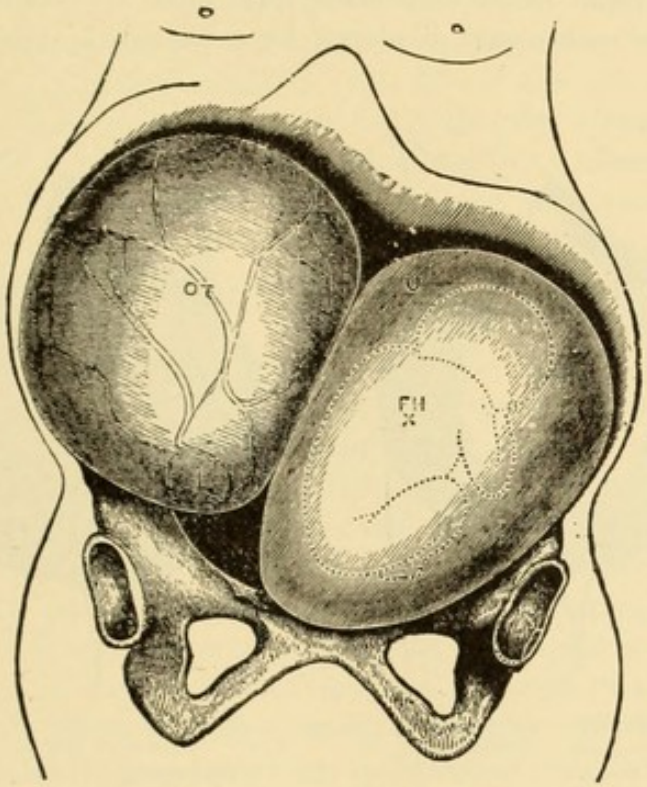


FIG. 436.—OVARIAN CYST COMPLICATED BY PREGNANCY. *O T*, Cyst pushed out of the pelvis by the uterus *U*, which is pushed against the pelvic walls; *F H*, auscultatory centre for the fœtal heart sounds.

toward the end of pregnancy, pelvic engagement of fœtal parts. The use of the sound is both dangerous and useless. We must not forget that pregnancy and a cyst may coexist, in which case the surgeon's task becomes complicated; the fluctuating mass and the exact situation of the positions of the fœtus should be carefully studied by the aid of auscultation and palpation. The error of thinking that there is a cyst where pregnancy exists is far more serious than the opposite blunder; and when in doubt we should always await developments. It is unnecessary to say that exploratory puncture is more dangerous than an exploratory incision.

Ascites may simulate a large cyst, which fills the abdomen and is indistinctly outlined. I will recall the signs of effusion of fluid within the peritoneal cavity; the abdomen is more spread out, less acuminated, than in cysts; flatness is found in the dependent portions, and limited superiorly

by a concave line (Fig. 437 and Fig. 438). In a position of lateral decubitus, it gravitates to the side and to the iliac fossæ, while the tympanic note appears upon the opposite side, where it did not previously exist; this displacement of the fluid is very characteristic if we can but find it, as is the fluctuating sensation transmitted from one side of the abdomen to the other. Some cases present greater difficulties of diagnosis, where, for instance, the ascites is of rapid development, the abdomen distended, the skin smooth, shining, and striated, non-depressible, giving a sensation of undulation and the returning shock rather than of clear fluctuation. Dulness may not be systematically present in the dependent portions; the contents are irregularly situated and not easily displaced by a change of position. But the

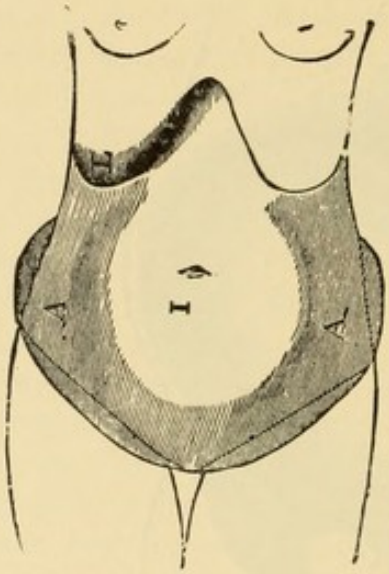


FIG. 437.—OUTLINE OF AREA OF DULNESS IN ASCITES. *I*, Intestinal resonance; *L*, hepatic dulness; *AA*, dulness of the flanks.

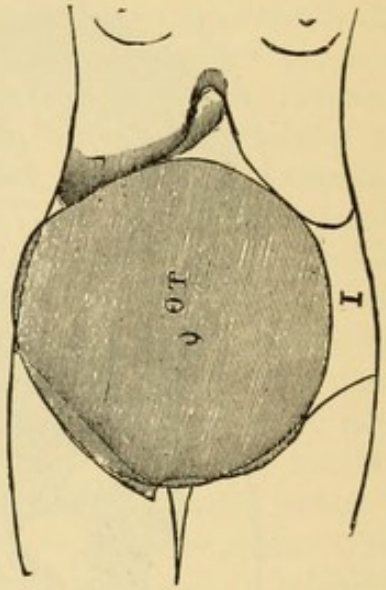


FIG. 438.—DULNESS IN A CASE OF OVARIAN CYST. *I*, Intestinal resonance; *L*, hepatic dulness; *OT*, dulness over the cyst.

rapid increase in size of the abdomen, œdema of the lower limbs, decline of the general health, and the absence of a previously existent tumor are all symptoms that will help the surgeon in making a correct diagnosis. Another sign to be looked for is the mobility of the uterus, which is present in ascites and absent in large cysts. Finally we must examine into the conditions of the viscera (liver, heart), disease of which usually gives rise to ascites.

Difficulties of diagnosis are the greatest in tubercular or cancerous peritonitis; for dropsy of the peritoneum may then be encysted by adhesions. In the first case, signs of intestinal and pulmonary tuberculosis, irregularities in the shape of the abdomen due to meteorism interfered with by adhesions, the *cri intestinal* caused by palpation, will clear the diagnosis. In the case of cancer we have the presence of irregular masses dependant from the epiploön or adherent to neighboring parts, and rapid cachexia.

Puncture may be of real service in these cases, to allow of an examination of the fluid and to facilitate palpation of the abdomen, which becomes more flaccid after its use. Yet at the present day we usually omit it, for we have learned its drawbacks. If we decide to perform it, the greatest precautions are to be taken; the trocar and canula are to be purified by flame; instruments of small calibre are to be used for aspiration, the wound carefully closed, and the abdomen immobilized. Puncture with total evacuation of the fluid is less grave with a large tumor than with a small one, for the retraction of the sac prevents effusion of the fluid into the peritoneal cavity. A cyst punctured with Potain's apparatus should be emptied very slowly. We may replace the vacuum by the use of a simple siphon made by attaching to the canula a long rubber tube. The size of the trocar should not be greater than that of the instrument used for hydrocele. The site chosen for the puncture is in the middle of a line going from the linea alba to the anterior superior spine of the ilium, or else the linea alba itself; the bladder is to be evacuated beforehand; we must carefully cleanse the abdominal walls with soap and bichloride, and be sure that the spot to be punctured is absolutely dull on percussion.

An examination of the fluid usually suffices to establish the diagnosis; viscidity and a brown, green, or black color are the characteristics of cystic fluid; a clear fluid non-coagulable by heat comes probably from a parovarian hyaline cyst of the broad ligament or from a hydatid cyst. In some cases examination of the fluid does not settle the question—where, for instance, it is tenacious, yellowish, amber-colored, or tinged with blood; both ascites and some kinds of cyst show these characters. The finding of paralbumin points to the probable existence of a cyst. If the liquid spontaneously coagulates, the chances are in favor of ascites—although this sign is not absolutely pathognomonic, any more than the foregoing. Klob, Martin, Westphalen, Scanzoni, Olshausen, have seen spontaneous coagulation in the fluid from an ovarian cyst. A proportion of solids greater than ℥ iij. ℥ ij. to the quart favors the diagnosis of cyst. Microscopical examination, to which Spiegelberg and Waldeyer attach great importance, demonstrates in the ascitic liquid the presence of amœboid cells, pavement epithelium, and blood-corpuscles, but never columnar epithelium, which is often found in glandular cysts; as to papillary cysts, the anatomical elements contained within their fluid contents are usually entirely destroyed.

Palpation of the abdomen after puncture, which must be cautiously performed, gives valuable information; by it we may recognize the ovarian tumor, and also determine other changes of the viscera which were hidden by the effusion of fluid. We must not forget that ascites may complicate a cyst which has ruptured or a papillary cyst with external vegetations; there will be symptoms of both lesions; we may have a peculiar sensation of ballottement, due to the floating of the cyst in the ascitic fluid, like a piece of ice in water.

Puncture of a cyst done with even the greatest precautions is by no means a harmless operation. Partial evacuation may be followed by an effusion of the fluid into the abdomen, and fatal peritonitis; the neglect of antiseptic precautions or some unknown influence may bring about suppuration of the cyst. This has been noticed particularly in connection with dermoid cysts; I have seen one case, which was followed by cure. Grave hemorrhages have been known to occur from wounding the large blood-vessels of the abdominal walls or of the tumor. Weakening of the cystic walls may result from the puncture and permit the exit therefrom of papillary vegetations, with consequent infection of the peritoneum.

Uterine fibroids have often been simulated by oligocystic tumors with gelatinous contents, which give them the same elastic consistence; this error is especially liable to occur if absence of a pedicle cause these tumors to move by movements imparted to the uterus, as though they formed a part of it. Anæsthesia will often permit the observation of fluctuation, which should be carefully felt for by bimanual palpation, and the connections between the tumor and the uterus accurately identified. Great increase in size of the uterine cavity, shown by the sound, points toward a fibroid; still, an elongation of an inch to an inch and a half may be produced by the ascension of and traction exerted by the ovarian tumor. Fibro-cystic tumors of the uterus are especially apt to cause an error of diagnosis. The first cases of hysterectomy, we remember, were done under the supposition that an ovariotomy was to be performed.

Hæmatometra is recognized by its situation and special etiology.

Vesical distention has been the source of numberless errors, which may be avoided if the surgeon himself will employ the catheter before examining. In one case, I saw a distended bladder which reached to the epigastrium; I had been called in to puncture this false cyst in a patient suffering from general paralysis. Spencer Wells, Atlee, and Emmet have all reported remarkable cases of this kind.

Renal tumors, hydronephrosis, hydatidiform cysts, etc., have given rise to mistakes. We should ascertain whether the tumor is fixed in the hypochondrium, and free inferiorly, permitting one to pass the hand beneath it quite far above the pubis; the existence of renal ballottement; also whether the intestines, especially the colon, are interposed between the tumor and the abdominal wall. When the tumor fills the abdomen, these signs will be absent; even then, however, the situation of the colon is of importance. It has been suggested that, in order to make this sign very marked, the tumor should first be partially emptied by puncture, and then effervescent enemata be administered in order to distend the large intestines with gas. Pawlik attaches great value to the persistence in the kidney of its characteristic shape, which can be felt after puncture. The development of a tumor dating from infancy points toward hydronephrosis and cancer of the kidney. Pus and blood are to be looked for in the urine. The exploration of the kidney

region by the introduction of the whole hand into the rectum has sometimes furnished valuable information, but may cause injury to the patient unless the surgeon's hand be exceptionally small and flexible. Examination of the fluid obtained by puncture sometimes settles all doubts, but may only increase them if the liquid be not very characteristic. Urea may be absent in hydronephrosis and present in ovarian cyst; the same may be said of uric acid; still, a large proportion of these products would decidedly point toward renal disease. Finally, sounding the ureters by means of Pawlik's or Simon's method should not be neglected as a last resort.

I will simply mention tumors of the liver and spleen (cyst, hypertrophy), as they are very rare; the diagnosis, when difficult, can be made only by a careful consideration of the relations, sometimes by exploratory incision. Tumors of the mesentery and of the omentum (cysts, lipomata) and echinococcus of the abdominal cavity are usually recognized by puncture or exploratory incision; the latter is to be preferred.

Tumors of the abdominal wall sometimes cause errors, which could be avoided by the use of anæsthetics.

Pseudo-cysts, phantom tumors, tympanites associated with partial contraction of the abdominal muscles and superabundance of fat in any particular spot, sometimes cause the most extraordinary and unheard-off errors, especially in hysterical patients. Oftentimes the abdomen has been opened in such cases, more often still one has been upon the point of doing so.

The best way to avoid error in doubtful cases is first to anæsthetize the patient and then carefully to palpate and percuss.

Exploratory Incision.—In the event of failure of all other methods of diagnosis, shall we open the the abdomen to ascertain the nature of the tumor, and operate, if possible, at the same time? Upon this point Lawson Tait has a positive system; he always prefers incision to exploratory puncture; out of ninety-four such cases he had but two deaths. He makes a very small incision, large enough for the introduction of two or three fingers only, and this undoubtedly accounts for the exceptionally good results obtained. Terrillon, in a more extended abstract of cases from many sources, found twenty-one deaths in a hundred, which seems to me too high a rate, in consideration of the great progress made in technique of late. We must remember that under the name of exploratory incision, used for the sake of euphemism, have been included many unfinished operations.

Now, it is not so long since mere incision of the abdomen was considered a very grave step; once done, operators were not content to close the wound without an attempt at extirpations, even under conditions before which we should hesitate at the present day; the statistics, while correct, may lead us to take too dark a view. For my part, I am a decided advocate of exploratory incision, when it seems to be the only method of establishing the diagnosis.

Diagnosis of the Variety of Cyst.—The previous considerations may

aid in deciding this point; I will simply give a *résumé* of the principal points.

A large and nodular tumor, with irregularities in the consistence of the nodules, is a glandular cyst. The presence of ascites (if there be no symptoms of rupture), irregular and papillary masses in the cul-de-sac of Douglas, and the presence of a tumor upon both sides point to a papillary cyst. Easily appreciated and superficial fluctuation throughout the whole extent of the tumor, slow course of the disease, an almost perfect general condition, even when the tumor is large, intimate connection between the tumor and the uterus, whether the cyst appear to be within the broad ligament or attached to a short pedicle, are characteristic of hyaline parovarian cyst. The possibility of feeling the ovary and tube upon the same side as the tumor has been considered pathognomonic. For the recognition of dermoid cysts we have the possibility of making an impression upon a tumor filled with fatty matter, or even of hearing the friction of the contained hairs. Küster lays emphasis upon the tendency of dermoid cysts to develop upon the median line, and to return to that position after they have been displaced during an exploratory operation.

Diagnosis of Adhesions. — For the recognition of parietal adhesions, Spencer Wells notes whether a change of position on the part of the patient, or respiratory movements, cause motion of the neoplasm. In moving the abdominal walls in front of the tumor, we notice whether the umbilicus glides easily over it, and we may hear a grating sound, or a sound like the creaking of new leather, which indicates some action of adhesive peritonitis. Any tumor which has long been of large size is usually adherent to the anterior abdominal wall or to the epiploön unless there be some ascites present. Adhesions to the viscera can be suspected only when there are external signs of acute peritonitis after puncture, torsion of the pedicle, or rupture of the cyst.

CHAPTER XXIX.

TREATMENT OF OVARIAN CYSTS.

I SHALL not dwell upon the medical treatment, which I consider responsible for the death of many patients, in having often prevented operations at the proper moment. Diuretics and diaphoretics, mercurial and iodized preparations, ergot of rye, etc., owe the success claimed for them to ignorance of the pauses often met with in these diseases. The only rational internal treatment consists in the administration of tonics, stomachics, and simple laxatives to support the digestive system. Electrolysis, of the use of which there has been an actual abuse in gynæcology, is both useless and dangerous in these cases. Every ovarian cyst should, if possible, be removed.

Puncture through the abdominal wall was also too frequently used as a palliative before ovariotomy came into general use. Some patients have had cysts evacuated an incredible number of times. Where there are symptoms of extreme pressure, or where the tumors absolutely cannot be operated upon, puncture is sometimes urgently called for. The trocar is then to be inserted by preference in the linea alba, or at some spot where there is dulness on percussion. Unnecessary puncture of a cyst which can be removed is bad practice. Peritonitis may result, or, at the very least, the formation of adhesions. Some authorities wish to make an exception in favor of cysts of the broad ligament, the unilocular cysts with thin walls and transparent contents, hyaline parovarian cysts. But against the few cases of recovery, well authenticated but not followed a sufficient length of time to judge of their permanent value, we must place the many cases of relapse. Moreover, puncture is really dangerous from the point of view of metastatic generalization of papillary cysts of the broad ligament, which it is almost impossible to differentiate beforehand from purely serous cysts. If, on the other hand, we consider the great benignity of ovariotomy in these cases, we cannot hesitate in giving it the preference over a method which can boast of a few successes, but has to acknowledge many untoward results.

Puncture has usually been practised through the abdominal walls; it has also been done through the vagina where the tumor was small and more easily accessible in that way. It is a hazardous practice because of the danger of consecutive infection and grave suppuration, especially in the case of a dermoid cyst. Tavignot does not hesitate to recommend puncture through the rectum; I consider this a detestable operation.

Injection of iodine, enthusiastically recommended by Boinet, has few ad-

vocates at present; a few surgeons still employ it in the case of unilocular thin-walled cysts. Even for these it is more dangerous than ovariotomy, and was of use only in the days when the latter operation was regarded as hazardous.

Drainage after puncture or incision was at the same date applied to cysts which could have been removed with ease; it was attended by a few good results, and by many deaths from septic infections. Drainage should no longer be used except for the remains of cyst sacs which it has not been possible to remove, or when a suppurating cyst non-amenable to operation has spontaneously opened externally.

Ovariotomy. *Historical Outline.*—Ephraim MacDowell of Kentucky, a pupil of John Bell of Edinburgh, was the first to do an ovariotomy for ovarian cyst, in 1809. The pedicle was left in the abdomen; a cure followed. Another American, Nathan Smith, of New Haven, Conn., was the second ovariotomist. Allan Smith was the third. His first successes date from 1827.

These were isolated cases of bold operation which found no imitators. J. L. Atlee, in 1843, performed the first double ovariotomy; and in the following year, Washington L. Atlee, who must not be confounded with him, began his remarkable series of operations, which in 1871 reached the number of 246. Ovariotomy was thoroughly established in America after the year 1863. In England, Lizars, inspired by the success of MacDowell's cases, made an abdominal opening in 1824 from an error of diagnosis, and the next year for ovarian cysts, of which he cured one out of three cases. Granville had two failures, which discouraged him, and until the year 1842 the operation fell into discredit. Walsh and Clay rehabilitated it by a remarkable series of successes. Then came the operations of Bird and Baker-Brown, and finally of Spencer Wells (1858).

In Germany, Chrysman, in 1823, made an unfortunate attempt. A few isolated operators, among whom we may mention Stilling, hazarded the operation, but it was not definitely adopted.

In France, Woyerskowsky (1844) was probably the first to perform ovariotomy. In 1856 the operation was condemned by the Academy, with only Cazeaux to protest. In 1862 Nélaton went to see Spencer Wells, and upon his return performed ovariotomy without success. But Koeberlé, in 1864, reported nine cures out of twelve cases; and then Péan demonstrated in a striking manner that the operation could be successfully performed in Paris. The adoption of ovariotomy in France is due to these two men.

At this juncture the introduction of antisepsis opened a new phase of existence for the operation, which passed from the hands of a few eminent specialists into those of all surgeons.

To recapitulate, ovariotomy has passed through three successive stages: 1st. A phase of groping, which came to an end first in America with W. L. Atlee, in England with Baker Brown and Spencer Wells, in France with

Koeberlé and Péan. 2d. A short period of excessive specialization, to which is attached the names of the initiators of the movement, already given. 3d. A phase of popular adoption, under the powerful impulse given by the introduction of antiseptics.

General Indications.—It is no longer necessary to dwell at great length upon this part of our subject, since many questions which were a subject of debate, even recently, have been settled. Some surgeons, basing their views upon the possibility of curing hyaline parovarian cysts after simple puncture, as shown by Terrillon's somewhat optimistic report of one cure in three cases, advise puncture, with an operation in the case of relapse. This procedure would assuredly be wise could we always be certain of never confounding a hyaline and papillary cyst. But inasmuch as such a distinction is often impossible before puncture, and as puncture is very dangerous in the second event, I cannot but feel that it is better to perform ovariotomy at once, the operation being in simple cases perfectly free from danger.

We can then no longer say that laparatomy should be reserved for cases in which the cyst is so large as seriously to inconvenience the patient or to threaten life. As soon as an ovarian cyst is large enough to be recognized, it should be removed: in the first place because the operation itself is less serious, since a small incision only need be made, and there are no adhesions to break down; in the second place because the patient is spared the dangers of inflammation, rupture of the cyst, or torsion of the pedicle; finally and above all, because any ovarian cyst is, if one may so express it, a neoplasm of unstable equilibrium between benignity and malignity. Out of 658 cysts removed by Schröder, Cohn found 100 degenerated into malignant tumors, or 15.1 per cent; Leopold counted 26 out of 116 (22.4 per cent); J. B. Schultze, out of a small series of 33 cases, found 9 malignant cases (21 per cent). This proportion may be somewhat high owing to the fact that only grave and difficult cases were brought to these great operators.

Yet, beyond doubt, they may be taken as an indication of the frequency of malignant degeneration of cysts. Poupinel reaches the same conclusions. Now, to remove a cyst which has already undergone degeneration is to perform a much more serious operation, and to grant a mere respite to the patient instead of a cure.

This neoplastic transformation is to be suspected when a tumor which has long been quiescent suddenly and rapidly develops within a few months. Yet, even though the diagnosis of this change be absolute, the operation had better be performed. Cohn found that out of 86 patients operated upon under these conditions, 19.5 per cent were still cured at the end of a year, and in 5 cases the cure was maintained for from three to four and a half years. Before such results there should be no hesitation. Freund has reached the same conclusions. One of the most remarkable cases of peritoneal metastasis of glandular cyst, followed by a cure by laparatomy, has been reported by Runge. The patient was forty years old; the tumor had devel-

oped in five months; the whole of the peritoneal cavity contained scattered masses of gelatinous matter, which also filled the cyst. This tumor was evidently malignant, yet six months after the operation the patient was still in good condition. We cannot, however, ignore the fact that the surgeon may meet with cruel disappointments, and a relapse with a rapid course carry off the patient in a few days. Hofmeier quotes two cases which he observed, in which the patients died, one seventeen and the other twenty-five days after ovariotomy. In the first case no trace of generalization in the peritoneal cavity could be found at the time of operation, but at the autopsy the whole of the peritoneum was covered with a carcinomatous layer as thick as the finger, the whole epiploön was changed to a thick, hard mass, so that it seemed actually incredible that it could have been in normal condition a few days previously. In the second case peritoneal metastasis had already begun at the time of operation.

As I said before, it is impossible to separate from papillary ovarian cysts those solid tumors erroneously called papillomata, which are usually nothing but papillary cysts which have ruptured into the peritoneal cavity. In this last stage of their development papillary cysts reduced to their solid portions, surrounded by ascites resulting from the irritation of the peritoneum caused by their falling epithelium, and scattering on every side débris that becomes grafted here and there upon the serous membrane, really take possession of the peritoneum and convert it into a cystic cavity. Even at this stage laparatomy may bring about a permanent cure of these cysts, which were considered not so very long ago by ovariotomists as veritable *noli me tangere;* unexpected success in certain cases may be compared to that given by laparatomy in some cases of tubercular peritonitis. Knowsley Thornton quotes a case of cure of this kind which had lasted nine years; Leopold, one of two years' standing; Cohn, a case of Schröder's of two and a half years; French, also, has had some permanent cures. Lomer reports a remarkable case; small papillomatous excrescences were scattered upon the epiploön, from which they could be detached, and upon the intestines and the parietal peritoneum, from which they could not be detached; the cure was still perfect five years after the operation. I operated upon an exactly similar case eleven years ago, with Terrier's assistance, and the patient is still in perfect health. These lesions, therefore, should not be considered beyond the aid of surgical science, although their prognosis is always uncertain, and influenced by factors as yet unknown.

The age of the patient should not form a contra-indication. Quite young children have been successfully operated upon: de Santa Anna extirpated a dermoid cyst in a child one year old, Roehmer in a child of twenty months, Schwartz in a little girl of four years. Mears, Barker, and Rein have operated for ovarian tumors in children of six and six and a half years. Thornton, Lucas, Hamaker, Cupples, and Chenoweth in those of seven and seven and a half years. Spencer Wells, Mackenzie, and Duchamp performed ovari-

otomy in little girls of eight and eight and a half years; Polotnoff in a girl of nine years, and Wagner in one of ten. Patients operated upon by Barlow and Marsh, Jonou, Heinricius, and MacGraw were twelve years old; those of Bolling, Carafy, Bell, and Cameron thirteen years. Bryant some time ago reported an ovariotomy in a girl of fourteen years.

On the other hand, some very aged women have been cured by the operation; we must, however, in these cases be on our guard against the evil effects of prolonged decubitus (hypostatic pulmonary congestion, eschars on the sacrum) and have the patients leave their beds and take a sitting posture soon after the operation, as F. Barnes advises. Johnson cured a woman of sixty-four years by operation; Davis records a successful operation at sixty-five years, Pinnock at sixty-seven, Spencer Wells and J. Boeckel at seventy-three years, Josephson at seventy-six, Terrier at seventy-seven, Owen at eighty, and Homans at eighty-two years and four months.

Technique of Ovariotomy. Cysts with Pedicles.—It seems to me that the frequent use of laxatives both before and after the operation is sufficient to assure antisepsis of the digestive tract, so strongly insisted upon by Terrier; it is only in exceptional cases, especially where there has been evacuation of purulent matter through the rectum, that I administer β naphthol and salicylate of bismuth to thoroughly disinfect the intestines.

Many surgeons will not undertake ovariotomy unless they are surrounded by a complete armamentarium of instruments—forceps of every shape and size, bistouries, scissors, retractors, needle-holders, etc. It seems to me advisable to reduce the number of instruments used to those which are absolutely necessary, in order as far as possible to avoid infection. It will be quite sufficient to have good bistouries; dissecting forceps; a female and a male catheter; a grooved director; scissors, one pair curved laterally; a few ordinary hæmostatic forceps; long forceps, straight and curved, for adhesions; two of Nélaton's cyst forceps; one Museux forceps; one trocar; one pair of needle-holder forceps; needles, and one blunt mounted needle; silk, catgut, and gauze compresses. All of these instruments should be absolutely reserved for laparatomies, and, as I have already said, have been kept for an hour in an oven at 248° F. They are to be placed within reach of the operator's hand in a flat dish filled with a two-per-cent carbolized solution. It will be well to keep upon a neighboring table a relay of instruments—forceps, bistouries, etc.—for emergencies. [It is better to keep the instruments and ligature material either dry or in sterilized water, and so avoid the contamination of the peritoneum by any antiseptic.]

Surgeons who use sponges advise that they be counted before and after the operation, because of the danger of small sponges being lost in the abdominal cavity; this may happen even when they are held by forceps, as the latter sometimes relax. For my part, I have entirely given up the use of sponges, and I do not fear any such accident with the gauze compresses I use, whose end always protrudes through the abdominal wound. It is well,

however, to place a pair of forceps on them, one with gilded handles if possible. It may be well to count the number of forceps, remembering the case of Spencer Wells, who, owing to this precaution, reopened the abdomen and found the missing instrument. But the opposite error might be committed if a pair of forceps had slipped under a basin or had been carried off attached to the tumor or to a sponge. I think it will be quite sufficient to keep a careful watch over the instruments.

The number of assistants should be limited to as few as possible: one for the chloroform, one to thread and pass the needles or the ligatures (which should be already cut and kept in a carbolized or weak bichloride solution); a third skilled assistant will suffice to help the surgeon; he should be on the left of the patient, while the one in charge of the sutures is on her right and consequently on the surgeon's left, and near enough to hand the sutures readily to him. If there is not a skilled assistant obtainable, there must be two assistants, one to the right and one to the left. No one but the assistants are to touch an instrument or any article used in the operation. If an instrument falls to the ground, it must be left there.

The operation of ovariotomy may be divided into four stages:

First Stage. Opening of the Abdomen.—It is best to begin with a small opening, which can be subsequently enlarged if necessary. While the assistant places his index finger on the umbilicus as a guide, making slight traction on the skin, the surgeon with a strong convex bistoury makes an incision three and a half inches long in the linea alba, reaching inferiorly almost to the symphysis.

The skin and cellular tissue are rapidly cut through, and we then attempt to penetrate in the space between the recti muscles, which is first to be sought at the upper part of the wound. If their sheath should be opened it is of no great importance. Next we come to the fascia transversalis and the subperitoneal fat, which is not to be mistaken for the great omentum. The fatty masses, which are often numerous, are to be incised, and even excised if necessary, and we then reach the serous membrane. Before opening it, we must assure complete hæmostasis by placing two or three forceps upon bleeding points. The peritoneum is grasped with the dissecting forceps at the upper part of the wound, and a small buttonhole cut in the uplifted portion; a grooved director is introduced from above downward in the median line, and the peritoneum is freely incised, either with a bistoury or the scissors. We must now lift up the peritoneum with the sound, and, if necessary, examine it by transmitted light, to be perfectly sure that we are not wounding an abnormally developed bladder.

Wounding of the bladder is an accident which has happened, even to experienced operators, in cases in which a subperitoneal tumor has by traction elongated the bladder, which, when emptied, is unrecognizable and might easily be taken for a thickened false membrane. I myself had to render assistance in a case of the kind in which the wound was eight inches long and

included both the extra- and intra-peritoneal surfaces of the urinary reservoir. In this case I sutured the whole bladder, with the exception of a small anterior buttonhole, in which I placed a siphon; after the recovery of the patient this orifice was easily obliterated. Newly published works by Reverdin and Sänger advise the trial of a complete suture. In a case in which he had taken away a portion of the bladder, Sänger sutured it with silk, and fixed it to the lower part of the wound, drawing the peritoneum down in front of it; next came pre-vesical drainage and suture of the abdominal walls above the vesical stump; a cure resulted. Leopold, having removed the top of the bladder in the course of a hysterectomy, made complete sero-serous sutures, and cured his patient. I believe that it would be a good plan to make two layers of sutures, either with separate stitches as in Czerny's process for intestinal suture, or by continuous suture. By this method I had a very successful result. Silk is to be preferred in ovariotomy where the pedicle is dropped, because there is no danger of its secondary infection.

In some rare cases the peritoneum may be so adherent to the anterior wall of the cyst that it is impossible to tell them apart. We must in that case prolong the incision above until we reach a point where the serous membrane is free, and then proceed to detach it from above downward. This is much better than cutting directly into the cyst and detaching it by traction upon its internal surface.

Second Stage. Rupture of Adhesions; Evacuation—A. Adhesions to the Abdominal Wall.—The right hand is introduced flatly into the wound upon the surface of the cyst, and by working about with its ulnar edge loosens the adhesions to the right and to the left as far as it can. We can perfectly recognize any adhesions which are too strong to be broken down by simple pressure, and we do not expend any unnecessary force upon them, as we can break them later after evacuation of the cyst.

B. Adhesions to the Omentum.—These are loosened in the same way, using both hands if necessary. Catgut ligatures are to be immediately placed upon bleeding points. If certain adhesions are too resistant, they may be grasped by two pairs of forceps in juxtaposition, and an incision made between the forceps, after which they are ligated with catgut. This method should be substituted for Hegar's process of elastic ligature *en masse*.

C. Adhesions to the Intestines.—Loose adhesions may be detached as described above; those which are moderately firm yield to tension and pressure combined brought to bear alternately upon the cystic and the intestinal wall, and always done with the fingers well covered by gauze compresses. Should the intestine bleed at any special point, a few separate catgut stitches may be taken with a fine needle. Should the hemorrhage come from an extended surface, we must endeavor to overome it by somewhat prolonged pressure; and if that be not sufficient, we must apply a strong carbolic

solution. Hegar recommends radiated heat from a thermo-cautery held at some distance. Finally, if separation of the intestine seem to threaten danger, we would better abandon our attempts to detach it, and proceed in the manner described under myomectomy, leaving a thin layer of the cystic wall adherent to the intestine, which is freed by minute dissection. But we shall have to cauterize this layer in order to destroy any epithelial elements originating from the cyst wall. Moreover, before beginning to detach intestinal adhesions of any extent, we must always ascertain their number and importance, and, if there are too many of them, abandon the attempt and limit our operation to an exploratory incision, or treat the cyst by sewing its edges to the wound and stuffing it with gauze (marsupialization, see below), according to circumstances.

D. Pelvic Adhesions.—In the case of small tumors, we must look for adhesions before puncturing; in the case of large tumors, we shall first be obliged to diminish their volume in order to glide the hand into the pelvic cavity; at the same time, we must draw them forward with Nélaton's forceps. An error to be avoided is the mistaking of an intra-ligamentous tumor for a cyst bound down by large adhesions; a cyst of this kind could only be detached by opening its peritoneal covering, as I shall describe later.

Pelvic adhesions may be broken with the hand; and if we are obliged to use the scissors, we must always cut between two forceps or two ligatures. The pelvic portion of the pouch may be so adherent that it cannot be removed; in that case we must content ourselves with a partial or incomplete operation, whose technique I will point out later.

It is essential that small cysts should not be evacuated before all adhesions which can be loosened by the hand are broken down; the pressure is much more efficacious against a tense cyst than against a flaccid one, but incision of unyielding adhesions should be reserved until puncture of the cyst and its collapse permit us to see what we are doing.

The cyst may be evacuated with the bistoury, as is the custom in England; but although this method is expeditious, it exposes the wound to the danger of infection so soon as the flow of the liquid becomes slackened; the trocar seems to me preferable.

It may be necessary to puncture several cavities—which can sometimes be done without removing the trocar, by pushing it in more deeply or changing its direction. For very large cysts, it is well to have the trocar connected with a large receiver, in which a vacuum has been previously created.

If the tumor is microcystic and areolar, and non-reducible by puncture, we must not hesitate to enlarge the abdominal opening with the scissors as far as the umbilicus, cutting through all the layers with one stroke; whatever may have been said to the contrary, there is really no special object gained by cutting around the umbilicus if the incision has to go beyond it.

Third Stage. Extraction of the Cyst and Ligation of the Pedicle.—The trocar is removed with a quick motion, while the assistant presses down the

edges of the wound. Nélaton's forceps are placed over the puncture to obliterate it and facilitate traction. A second pair of similar forceps or of Museux's forceps are placed on a suitable spot, and the delivery of the cyst is begun by gentle traction alternating with a sidewise motion. As the cyst becomes freed, an assistant presses upon the abdominal walls and approximates the lips of the wound, so that when the cyst is entirely freed the edges are closed over the pedicle, thus preventing escape of the intestines. If during the extraction firm adhesions have to be broken down, the assistant must lift up the intestines with a warm gauze compress, and if necessary the edges of the wound can be held apart by retractors, and the adhesions, which are rarely vascular, cut with the scissors between two ligatures.

The pedicle is now to be tied, separated from the tumor, and left in the abdomen. This intra-peritoneal method was the one adopted by the earlier operators, and was abandoned later for the extra-peritoneal treatment of the

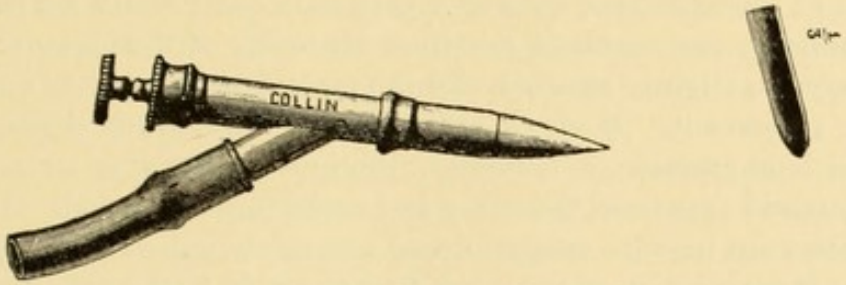


FIG. 439.—TROCAR WITH ROUNDED POINT AND LATERAL DISCHARGE TUBE.

pedicle, which remained in use until 1880, when the intra-peritoneal method again came into general use. In 1841 Stilling was the one to re-introduce the intra-peritoneal method in Germany; in England, Duffin gave it a place of honor in 1850, but its general adoption was due to Spencer Wells. Previous to this, the pedicle was simply fastened into the abdominal wound, being held by needles or points of suture.

The chief objections to extra-peritoneal treatment of the pedicle are: its sloughing, which is usually quite extensive and may cause infection of the wound; and weakening of the abdominal cicatrix, creating a predisposition to hernia. Still, this method may be used where, besides the ovarian cyst, we have to overcome either a prolapsus or pronounced retroflexion of the uterus, in which case it additionally performs a gastro-hysteropexy.

It is quite exceptional to find a pedicle so slender as merely to require the passing around and tying of a silken ligature. It is always best to transfix it and tie it with Tait's or Bantock's knot, either one of which can be tightly drawn. If necessary, a chain ligature can be applied. When the pedicle is short, it is well to have all the sutures in place before detaching the tumor, and to have the incision at least half an inch above the threads; or successive portions may be tied and cut. We shall thus avoid the retraction of the pedicle, which is apt to occur when it is prematurely cut across, and when it is deeply situated in the pelvis. If it is very thick and fleshy,

and not easily distinguishable from the rest of the tumor, it will be advisable to squeeze it tightly with strong forceps; at the end of a few minutes we shall have a groove which will hold the ligature, and hæmostasis will be already partly accomplished by the crushing of the tissues.

After detaching the tumor, all the ligatures are cut a quarter of an inch above the knot. In the first place, however, we look upon the cut surface for the lumina of large vessels, and tie them separately with fine silk or catgut. If the pedicle be exceptionally fleshy and soft, or if the surface of the section contain tissue open to suspicion, or if there be any signs of tubal inflammation, we must employ the thermo-cautery. Neighboring parts are to be carefully protected with moist gauze compresses. Some authorities, with a view to avoiding future adhesions to the intestines and the production of internal strangulation, advise suturing the two edges of the peritoneal wound above the pedicle; this seems to be an unnecessary complication of the operation, as adventitious membranes very soon encapsulate the pedicle.

The surgeon now carefully examines the ovary of the opposite side, and if it be ever so slightly affected, and the patient drawing near to the menopause, he removes it. If she is still young and the lesion slight, he might follow the bold example of Schröder, who in a similar case merely removed a small dermoid cyst from the ovary and sewed up the wound. The woman shortly afterward became pregnant, and was safely delivered. Schröder has performed this resection of the ovary four times in young women. A. Martin has since followed his example; of which I heartily approve. The uterus likewise should be carefully examined, and any fibroids enucleated if the patient is young and the situation of the tumors favorable; if the patient be approaching the menopause or if myomotomy for any reason be difficult of execution, the removal of the second ovary is preferable.

Fourth Stage. Toilet of the Peritoneum and Closure of the Abdomen.— When the operation has been a simple one, without any effusion of irritating fluid, it is unnecessary to sponge off the small amount of blood which there may be in the pelvis, and which will be rapidly absorbed, as the friction of the compresses unavoidably rubs off some of the endothelium from the surface of the peritoneum, and detaches some of the small clots which plug the vascular orifices; fresh hemorrhage may result from their use. But when the cystic fluid or pus has contaminated the operation field, the surgeon's behavior must be radically different. In the first case, the use of gauze compresses will be sufficient; the finger is covered by one and pushed into every dependent portion of the pelvis; to reach the cul-de-sac of Douglas, the gauze is wrapped around the forceps. When there has been effusion of pus or of very septic cystic fluid, irrigation of the peritoneum is indicated. I have previously stated the conditions which call for drainage or tamponade. There remains merely the closure of the abdomen; having fully described the process, I shall not repeat. My method of suture (a continuous suture in two layers for the peritoneum and aponeuroses, and the interrupted suture

for the skin) avoids all danger of hernia, or eventration, so frequent after the suture *en masse* in general use.

If there be oozing from an extended surface of the internal abdominal wall because of the tearing away of large adhesions, causing us to fear capillary hemorrhage after closure of the wound, we can insert a series of quilled sutures (using little rolls of iodoform gauze instead of quills) through the abdominal wall, over the area of these excoriations of the serous membrane, and in this way approximate the bleeding surfaces, lifting them up into a ridge, and keeping them pressed against each other. The accessory sutures are to be left in place for two or three days.

The operation which I have just described is the one most generally used for the removal of cysts. I will now mention two important operative conditions sometimes met with, one relating to the absence of a pedicle, the other to the impossibility of forming one.

Enucleation of Cysts Contained within the Broad Ligaments, or of Retro-peritoneal Cysts.—I will at once eliminate from this category metastatic subperitoneal masses found in the cul-de-sac of Douglas or in the iliac fossæ, as well as pediculated tumors of one or both ovaries. To attempt the removal of these microcystic and colloid formations, which may be said to be infiltrated beneath the serous membrane rather than to be included in it, is to meet with almost certain failure; it is rarely possible to remove them completely, and the enormous amount of tearing away that has to be done, combined with the portions of the neoplasms which have to be left in place, is quite sufficient to cause septic infection. In such cases we have to content ourselves with a removal of the pediculated ovarian tumor, leaving the secondary growths where they are, or we may even have to close the wound again, without removing anything, if we find that there are too many adhesions to allow of a successful result.

Parovarian Hyaline Cysts.—These thin-walled cysts with limpid contents, originating within the folds of the broad ligament, may travel under the peritoneum as far as the mesocolon and the mesentery. They are easily separated from the serous membrane, which does not adhere to them unless there have been previous inflammation. When they are fully identified, a little fold is to be taken in the peritoneum covering them, a small opening made in it, and the finger introduced through this opening to loosen the membrane over a small surface. The trocar is then inserted into this freed space, and the fluid taken out. When the trocar has been removed, and the opening closed by means of forceps, the peritoneum is disengaged from a larger extent of surface, and by a series of tractions, aided by movements of the fingers which break down any cellular adhesions, the whole cystic sac is removed. Hæmostatic forceps are at once placed upon any bleeding points. The cavity left by the enucleation will close of itself.

The operation is much more difficult when there are adhesions resulting from the inflammation which often follows intra-cystic hemorrhages: this

occurrence is recognized by the color of the fluid and brownish deposits on the cyst wall. I twice found myself in a predicament of this kind, and only managed to extricate myself by recourse to the following procedure: extensive incision of the sac; fixation of the edges of the wound with a series of forceps, held by an assistant; introduction of the left hand into the interior of the cyst to determine its relations and assist in its enucleation. It is of the utmost importance that all this be done methodically, and not by a series of scattered efforts, and that the ovary, if normal, be spared.

Large Papillary and Glandular Cysts of the Broad Ligament.—Whatever may be the anatomical differences between these cysts, I have chosen to describe them together, because of the similarity of the operative procedures necessary. I have already said that papillary cysts of the broad ligament, although doubtless originating from the parovarium (either from its intraligamental portion or from the part which penetrates into the hilum of the ovary), are not the ones usually called parovarian cysts by clinicians. They apply the term to the hyaline parovarian cyst alone, which is indeed the more frequent of the two. The sac of the papillary parovarian cysts is thick and often contains unstriped muscle fibres which seem to unite it to the uterus; the fluid contents are turbid or milky, and they contain cauliflower growths. In the thickness and vascularity of their walls they resemble the glandular or papillary ovarian cysts. The latter, either because of their origin from the hilum (papillary cysts), or because of a semi-heterotopic development, or from congenital predisposition (glandular cysts), may, instead of becoming pediculated, push in between the folds of the broad ligament. The intimate relations with the peritoneum, uterus, pelvic floor, and walls constitute additional points of resemblance. The cardinal difference, from the point of view of these anatomical relations, consists in the freedom of the ovary in the case of parovarian cysts, and its fusion with the tumor in the case of ovarian cysts. Important as this distinction may be anatomically, it is of little value from an operative standpoint.

The separation of all cysts situated within the broad ligament is very difficult on account of the adhesion of the peritoneal membrane, which often can only be removed in shreds; the presence of deeply situated blood-vessels is a further complication; and there is always danger of pulling out or wounding the ureter, with which the cyst has close relations.

(There is a difference between the immediate treatment demanded when the ureter has been wounded and that called for at a later stage, when the patient has made a good recovery, but has a persistent uretero-abdominal or uretero-vaginal fistula. The second case comes under the head of urinary fistulæ, and I will simply remind you of the fact that Simon was the first to perform nephrectomy for a case of this kind.

The immediate treatment differs according to whether there is only a small wound or a complete tearing away. In the first case it is best to suture the wound and catheterize, first through the bladder and then through

the abdominal wound. I think that it would be prudent to have an antiseptic tamponade of the peritoneum above the wounded organ, for union may not occur, and the urine must be given a chance to escape. Our hopes will then rest upon the formation of protective adhesions. Schopf, in a case of ovariotomy for intra-ligamental cyst where the ureter was wounded, first placed forceps temporarily upon the two ends, and then united the ends by eight stitches of silk, which did not include the mucous membrane. There was a temporary cure of four weeks' duration, and then various supervening accidents caused the death of the patient. At the autopsy, amyloid degeneration of the kidneys and plastic peritonitis were found. In another case the same operator preferred to unite the wound over an English rubber catheter, which was passed in through the urethra in such a way as not to take up the whole canal and obstruct the flow of urine from the other kidney. Gusserow tied the ureter under the following conditions: During the course of an enucleation of a malignant intra-ligamental cyst, a small flap of the tumor which could not be removed was ligated to the lower part of the wound; the ureter must have been caught in the ligature, for on the ninth day a large abscess formed, and septic peritonitis supervened, the patient dying on the fifteenth day. Under such circumstances Gusserow advises opening the purulent mass through the posterior cul-de-sac of the vagina, in order to form a uretero-vaginal fistula. I should prefer antiseptic tamponade of the peritoneum. In a case of enucleation of retro-peritoneal parovarian cyst, I pulled out the right ureter which was adherent to the cyst, and which broke about 10 cm. below the renal pelvis; the rest of the ureter was entirely detached and hung out of the abdomen. Instead of attempting a suture which would certainly have been a failure, I decided to make a ureteral fistula in the right lumbar region, and then to resect the vesical end of the ureter after having tied it and sutured it to the wound. I performed a secondary nephrectomy, and the patient made a good recovery. More recently, during a very difficult operation for the extirpation of a cyst of the left broad ligament, which was everywhere adherent, and had to be dissected from its deeply seated adhesions, the left ureter was divided near its vesical insertion. I was unable to find its lower extremity, but I found by means of an injection into the bladder that it was not permeable. I then decided to insert the renal extremity of the ureter into a neighboring point on the bladder. To this end I made a buttonhole opening about 1 cm. long at the middle of the posterior surface of the bladder, and fastened the end of the ureter to it by means of two rows of silk sutures, the first row taking in the mucous membranes, and the second the serous and muscular tissues. The results of the operation were normal and the cure a complete one. During the course of a recent laparatomy upon the same patient for the removal of the appendages of the right side because of a hydro-salpingitis, I found that the engrafted ureter was slightly dilated; this may possibly be due to a reflux of urine whenever the bladder is distended.)

The cyst having been emptied, the first thing; the most prominent part of its wall is then grasped with Nélaton's forceps and drawn out through the abdominal wound; with a bistoury a large ellipse is traced around as much of the sac as has been drawn through the opening. The incision goes through the peritoneal covering only if possible, which is then detached by the help of forceps, spatula, and the finger, so as to dissect out a circular flap which is deeper at the sides than in the middle, as it follows the shape of the cyst. This process of detaching had better be begun at the more vascular portion, and the large vessels supplying the secondary branches can be tied at once. An assistant should hold a sound in the uterus as a guide to its position, for it is often so displaced or hidden by the tumor that we can only find it with great difficulty. To detach the uterine adhesions, the organ should be lifted out of the abdomen and laid upon gauze compresses. In some cases we may have to perform hysterectomy to simplify matters and terminate an operation of long duration.

Permanent hæmostasis is to be obtained either by ligatures or by a continuous catgut suture, applied superficially to the whole of the bleeding surface, to avoid wounding deep vessels. Temporary pressure with gauze compresses and application of the thermo-cautery may be needed for persistent capillary hemorrhages.

If these methods fail, I would suggest tamponade of the peritoneum by means of iodoform gauze, and forcipressure, bringing the handles of the forceps together at the lower end of the wound.

When the operation is finished, the size of the intra-abdominal wound is to be diminished as much as possible by approximating the flaps of peritoneum, at the same time paring off any ragged edges. If the cavity is too deep to be filled up by a continuous catgut suture of the broad ligament, then we must contrive a way to isolate it from the rest of the abdominal cavity. According to circumstances, we may either suture the edges of the sac to the abdominal wound and tampon it with iodoform gauze, or introduce a T-tube through the bottom of the sac into the posterior vaginal cul-de-sac, and then sew up the side of the sac toward the peritoneum with catgut. This tube may be most readily introduced through the vagina from below upward, according to the rules already given.

Incomplete Operations. Marsupialization of the Cyst.—When the tenacity of adhesions to the pelvic walls or to the folds of the broad ligaments prevents either the formation of a pedicle or enucleation of the tumor, there is still one resource left to the surgeon. This consists in fastening the edges of the pouch to the lips of the abdominal wall, filling up the cavity with tampons, or draining it as one would an abscess cavity, leaving to nature the care of obliterating or eliminating it. Before fixing it to the abdominal wall, we must close the upper part of the wound, leaving only the length necessary to the accomplishment of our purpose. The edges of the open sac are held outside of the wound by an assistant; if necessary, we

can take folds in them by the aid of forceps and the insertion of a stitch. Then the circumference of the sac is fastened by means of a series of sutures with heavy silk, which traverses the whole thickness of the sac and of the abdominal walls an inch from the edge. The stitches are to be closely set together. A second row of superficial sutures fastens the skin alone to the sac. The interior of the cyst is carefully cleansed by removing all vegetations and secreting membrane and washing it with a sublimate solution; then a large drainage tube with only two holes at its inferior end is inserted, and iodoform gauze is loosely packed around it.

This method, recommended in outline by Clay, Spencer Wells, and Péan, and adopted by other operators, is of course only a *pis aller*. It may give good results in the case of unilocular thin-walled cysts like the par-ovarian hyaline cysts, when they are surrounded by inflammatory adhesions; but we rarely have occasion to apply it in such cases. We usually have to use it for proliferous cysts, and then, especially if there are vegetations on the walls, the results are not brilliant. There is always a tendency to a return of the tumor, the abdominal fistula persists an indefinite length of time, and endless suppuration exposes the patient to the dangers of septicæmia and exhaustion. Malignant degeneration has been known to occur in the wound. A careful cleansing of the interior of the sac with the fingers or the blunt curette, to remove all glandular elements, will do much to diminish the chances of these bad results. Rheinstädter, who strongly recommends this method, obtained seven permanent cures by its use, four of which had lasted for over two years. In the most fortunate cases the sloughs are entirely eliminated.

This process, because of its forming a pouch in front of the pubis something like the pouch of an opossum, has been given the name of marsupialization by some American writers.

In cases uncomplicated by large adhesions, an ovariotomy should always be very rapidly performed; the average length of the operation, including the suture of the abdominal walls, need not take longer than twenty minutes, as I know by personal experience. Every operation involving the peritoneum which lasts longer than an hour is rendered grave by that fact. There are some precautions to be observed which will tend to obviate danger: The assistant should keep the abdominal wound open to the least extent possible, and not expose the intestines or omentum, which should always be covered with warm, moist compresses; the operator should do as much of the operation as possible outside of the abdominal cavity, and must constantly dip his hands in the normal salt solution which is beside him. Evisceration or temporary extraction of the intestines, which are placed upon the abdomen, and wrapped in warm compresses, certainly gives the operator a clear field to work in, but the procedure should be an exceptional one. It may be replaced by having the assistant forcibly push and maintain the intestines high in the abdomen, his hand being covered

with a gauze compress, or the patient may be placed in the Trendelenburg position.

Dressing the wound is a very simple matter; in fact, when the edges of the wound are approximated, if the operation has been aseptic, we may say that there is theoretically no need of dressing, and that immobilization and compression are all-sufficient. I have had cases of perfect union when only cotton-batting was used. Still, it is best to guard against possible infection by the use of antisepsis for all that is not contained within the peritoneal cavity. I usually wash the abdomen with a bichloride solution, dust the line of suture lightly with iodoform, apply a compress of iodoform gauze torn into strips and loosely tossed over the wound, over that a layer of absorbent cotton, and finally a flannel bandage going all around the body. There should not be too much wadding nor too heavy a pressure.

Vaginal Ovariotomy.—Vaginal incision, to which I referred in connection with the treatment of oöphoro-salpingitis, sometimes allows of the extirpation of ovarian cysts. In spite of the efforts made to produce a reaction in favor of the vaginal method, I hold that laparatomy remains the operation to be preferred for ovarian cysts. In exceptional cases when the cyst is unilateral, freely movable, small, and projects frankly into either the anterior or the posterior cul-de-sac of the vagina, preference might be given to vaginal incision. The operatory technique is simple: the vaginal mucosa and parietal peritoneum are successively incised; the cyst appearing between the lips of the incision is punctured with a trocar, or, more simply still, with a bistoury. The empty sac is then easily drawn out with the fingers or by the help of a flat-bitted forceps; the pedicle is tied with silk thread as closely as possible to the uterus, and returned to the abdominal cavity. The vaginal wound may be completely sutured, or a small piece of sterilized gauze may be inserted for drainage and removed in forty-eight hours. Should ligature of the pedicle be impossible or too difficult, a pair of forceps may be left in for forty-eight hours. In the case of bilateral and voluminous cystic tumors of the ovary, if the vaginal method is chosen, hysterectomy must be the first step in order to give free access to the cysts which are successively removed after evacuation of their contents.

After-treatment. Accidents.—The catheter should be passed every three hours for two days at least, and longer if necessary. The bed upon which the patient is placed must have been previously warmed; her thighs should be slightly elevated by a cushion placed under the knees. If she be much weakened, and if syncope occur, she should be wrapped in hot cloths and given subcutaneous injections of ether.

Internal hemorrhage shortly after the operation sometimes occurs, and is manifested by sudden anguish, fainting, chills, cold sweats, and a feeble pulse; the face becomes pale, the extremities cold; if a drainage tube have been inserted, the blood will flow through it. In one case of this kind Hofmeier, suspecting this accident in a patient upon whom Schröder had oper-

ated, took out two of the stitches eight hours after ovariotomy, and found that the abdomen was full of clots, and that the ligature had slipped off the pedicle; he was able to save the patient. We should never hesitate to follow his example. Any anæmia is to be combated by subcutaneous or intravenous injections of salt water. The solution must be tepid, and in strength 10 : 1,000. According to the extent of the hemorrhage we may inject doses varying from 200 to 1,500 gm. (6½ to 50 oz.) in the twenty-four hours.

The food of the patient on the first day after the operation must consist of a few pieces of ice, a little cold grog or some champagne *frappé* only, nor should these be given in large amount, for the best preventive of vomiting is an empty stomach. Vomiting due to chloroform has no prognostic importance. On the second day a little milk and Vichy water may be given. Some physicians administer opium to quiet the pain and give sleep; it is bad practice, and its chief effect is to paralyze the intestines.

On the third day, if the vomiting still continue, or if it reappear, and the matter vomited be of a greenish color, if the abdomen be painful and swollen, and the pulse frequent even though the temperature remain low, there is almost a certainty of septic peritonitis. It is well to remember that the pulse has a greater diagnostic value than the temperature. In fact, in surgical inflammations of the peritoneum the temperature is often subnormal. Before death the vomiting (at least at first) becomes almost incessant; the patient dies without great suffering, but with a little sub-delirium. Olshausen long ago pointed out the septic nature of these symptoms. Peritonitis is rather a result than a cause of septicæmia. At the autopsy, besides meteorism, we find only a little turbid serum in the pelvis. Olshausen attaches great importance to paralysis of the intestines, and the absorption of the toxic substances which they contain. Verchère, as well as Sänger, further developed this theory. We must be careful not to mistake this group of symptoms for intestinal obstruction, which it often simulates. It is probably true toxæmia caused by leucomaines and ptomaines originating either from the fluids in the abdomen or from the gas and imprisoned matter in the paralyzed intestine. As to the starting-point of septic peritonitis, it has been said to be caused by the cessation of peristalsis due to exposure to the air, either from direct action of the air upon the muscular fibre or indirectly upon the nerves. It is more often due to an infection of external operative origin, the paralysis and dilatation of the intestines being not the cause but the immediate results of the peritoneal septicæmia.

However that may be, one of the chief symptoms of the onset of peritonitis is intestinal paralysis, which is recognized not only by meteorism, but by the absence of evacuation of gases. It is of the utmost importance to treat this paralysis, which rapidly becomes complicated by intestinal septicæmia, from the start. On the second day I usually administer an enema of six teaspoonfuls of Bordeaux wine and three teaspoonfuls of glycerin, in order to provoke slight peristalsis; if this does not cause any evacuation of

gas, I repeat it on the following day, adding one or two teaspoonfuls of honey of mercury, and I introduce into the anus a No. 20 rubber catheter, which should penetrate five inches, in order to allow of the issue of gases in spite of the tonicity of the sphincter. I think this preferable to the administration, by the mouth, of purgatives, which are often rejected by the stomach.

[Calomel, given in doses of $\frac{1}{10}$ to $\frac{1}{6}$ gr. every half-hour for ten to eighteen doses, is usually well borne by the stomach and is effective. If necessary it may be followed by tablespoonful doses of magnesia citrate in saturated solution, given at the same intervals. A somewhat more active enema than that recommended by the author is composed of two ounces of glycerite of oxgall, a drachm of spirits of turpentine, and a pint of strong peppermint water.]

After the fourth day, if everything be favorable, the patient may take a little solid nourishment.

On the eighth day the silk sutures are removed (the buried sutures remaining); union is usually complete by that time except in the vicinity of any folds which may overlap. The dressing is now changed for the first time if there have been no drainage, and another one put on after washing the abdomen with bichloride solution. From the fifteenth to the twenty-first day the patient may sit in an armchair, and a week later may walk a few steps.

After removal of the sutures, an attack of coughing or vomiting has been known to cause secondary disunion of the wound, with the production of intestinal hernia; there have been numerous cases in which this accident was without serious results if the viscera were cleaned and replaced, even after a lapse of several hours; I myself witnessed an example of this in one of my patients, in whom the hernia occurred at the point of insertion of a drainage tube; a perfect cure followed.

An accident of rare occurrence is the production of emphysema of the abdominal walls, caused by retching; it is not especially grave in itself, but may lead to suppuration.

Superficial abscesses may form at the point of suture when antisepsis has been imperfect or when the wound has been secondarily infected by a deeply placed drainage tube whose lower end was in contact with pus. As soon as there is induration and localized pain, we must hasten to reopen a small portion of the wound with a canulated sound, wash it with a strong antiseptic solution, and introduce two small drainage tubes.

Deep abscesses near the pedicle or sutures buried in the abdomen are more difficult to recognize. If there be great elevation of temperature, and if by bimanual palpation we feel puffiness of a localized area, we should not hesitate to reopen the abdomen, evacuate the pus, clean the cavity, and establish drainage.

Parotiditis has been mentioned as one of the accidents liable to occur

during convalescence; it is rare, and also grave, since it indicates a certain amount of septicæmia; the prognosis is serious.

Subacute peritonitis may be present from the first, or it may not appear until the tenth or fifteenth day, originating doubtless in the septic mortification of the pedicle, or any other ligatures *en masse* that may have been left in the abdomen; I saw one case which evidently started from some ligatures of the omentum which had been made with poor catgut. Its onset is more insidious than that of the peritonitis which occurs at an earlier stage, and it assumes the form rather of peritoneal septicæmia. Elevation of temperature is rare; meteorism is observed, also vomiting of bilious and then of stercoraceous matter.

Any treatment of the peritonitis is almost powerless to arrest it. As soon as it is apprehended, cold applications may be made to the abdomen, either by means of a bladder filled with ice, or, better yet, by means of Galante's ice coil through which constantly passes a stream of iced water. Small pieces of ice may be given by the mouth to relieve the nausea. I consider gaseous drinks, like Rivière's potion, more injurious than beneficial. As to morphine injections, I order them only when the case seems desperate. In these cases reopening of the abdomen has given only bad results. Schröder, Hofmeier, Hegar, and Kaltenbach are unanimous in its condemnation. I tried it once without success, but my one experience did not seem to me conclusive.

I much prefer to combat the phenomena of infection by means of subcutaneous or intra-venous injections of artificial serum (salt solution 10: 1,000). At least one litre (one quart) should be injected every twenty-four hours, but one may go much beyond that. Lejars did not hesitate to inject 25 litres (25 quarts) in five days. This veritable *washing of the blood*, which acts by diluting the toxins and facilitating their elimination, is of value only if the renal functions are unimpaired. In one grave case of peritoneal septicæmia consecutive to vaginal hysterectomy, I have used with success subcutaneous injections of Mannorek's anti-streptococcus serum.

Among the more rare accidents I will mention intestinal occlusion, which has been attributed to adhesions near the buried ligatures or cut surfaces; it may even be favored by the destruction of the peritoneal endothelium caused by the use of sponges or compresses which have been soaked in too strong an antiseptic solution; hence the advice to wash them in boiling water before using them, and in general to be aseptic rather than antiseptic in the peritoneal cavity. Out of one thousand ovariotomies, Spencer Wells observed eleven deaths from intestinal occlusion. As treatment of this accident Bode and Leopold recommend forced injections of hot chamomile infusion with oil and soap; several quarts should be injected, after which the patient is laid on her side. This method, in which Leopold has great faith, may be tried, but there must be no delay in reopening the wound and searching for the obstacle, which is usually an adhesion to the pedicle or to the

abdominal wound. In view of the latter possibility, we should proceed with great caution.

Other exceptional causes of death are tetanus, phlebitis, and embolus.

Acute or chronic uræmia has been observed, due to the congestion of already diseased kidneys, by prolonged anæsthesia and traumatism.

Shock is a vague term applied to an accident of varied pathogenesis, which may be from unrecognized embolus and fatal uræmia, or paralysis of a heart already impaired by general marasmus.

Gravity of the Operation.—The prognosis of ovariotomy, like that of all major operations, depends largely upon whether the case be a simple or a complicated one. Unfortunately there is no existing classification of cases made with the object of bringing out this point, neither would it be easy to make one. Yet, from the more recently published statistics, we may safely come to the conclusion that the extirpation of a cyst without extensive adhesions is at the present day a safe operation. The statistics are also very deficient in the causes of death, nevertheless it may be confidently stated that the greater number are due to septic peritonitis. The malignant tumors with large adhesions are the ones which raise the death-rate. A few operators will not undertake any but favorable cases. The following tables are borrowed from Olshausen:

Spencer Wells	1,000 cases.	768 cures.
Keith	381 "	340 "
Koeberlé	306 "	231 "
Thornton	423 "	385 "
Tait	405 "	372 "
Olshausen	293 "	266 "
Schröder	658 "	575 "

It would be interesting to analyze these reports in order to ascertain the diminution of the death-rate following a greater perfection of technique on the part of the surgeon. Hofmeier did this in the case of his instructor, Schröder, with the following result:

From 1 to 100	17 deaths.
" 100 " 200	18 "
" 200 " 300	7 "
" 300 " 400	16 "
" 400 " 500	7 "
" 500 " 600	7 "
" 600 " 658	11 "
658	83 deaths = 12.6 per cent.

Hofmeier remarks that of these deaths a very few were due to infection, and that the majority are due to grave accidents following the removal of malign tumors. Thus may be explained the high rate of 11 deaths out of the last 58 cases. In the fifth and sixth hundred, there were two series of 20 and 40 consecutive cures. Lawson Tait, who in his first series of 1,000 operations had only 9.2 per cent of deaths, and in a second similar series 3.3 per cent, gives the following figures for his latest ovari-

otomies: Parovarian cysts, 1 death in 24; unilateral ovarian cysts, 6 deaths in 158; bilateral ovarian cysts, 2 in 78; cysts within the broad ligament, 12 cases without a death.

C. Braun, in his second series of 100 ovariotomies representing operations performed between the years 1884 to 1887, had 13 deaths, or 93.5 per cent of cures. But in this series he does not include 7 deaths which occurred after exploratory incision. From 1888 to 1890 there were 2 deaths out of 52 ovariotomies, or 3.8 per cent. Freund, out of 191 operations, had 17 deaths. G. Granville Bantock, in his fourth hundred series of ovariotomies performed with simple aseptic precautions, had only 4 deaths as against 19 deaths in the first hundred by the Listerian method. Dohrn, out of 100 ovariotomies performed between May, 1883, and April, 1889, had only 4 deaths. Terrier reports 200 ovariotomies from July, 1874, to July, 1889, with 37 deaths, or 18.5 per cent. Terrillon, out of 278 ovariotomies, from September, 1880, to 1892, had 24 deaths, or 8.6 per cent.

I am not able to give any later statistics, as for a few years surgeons appear to have given up the publishing of their special statistics of ovariotomies, letting them be included in the series of laparatomies for lesions of the appendages.

Results of the Operation.—In the case of benign tumors the patient usually makes a good recovery; although there is always a liability to a protrusion of the bowels through relaxation of the suture, unless it has been done with the special care I have described. Even then it is well to have the patient wear an abdominal belt to give slight compression; but it need not be of any special design as is needed when the cicatrix is of doubtful strength owing to there having been but one row of sutures.

A cyst of the other ovary or broad ligament may form later and necessitate reopening of the abdomen. The surgeon when called to do a second operation should remember that there is a tendency on the part of the intestines to adhere to the first cicatrix; it is therefore more prudent to begin the new incision a trifle above the upper end of the previous one, and to insert a finger into the opening thus made and use it as a guide in finishing the incision from above downward. Thanks to this precaution, I have been able to avoid wounding intestines which were adherent over a large area, in a case upon which I performed a second laparatomy. On the other hand, I knew of a second laparatomy performed by a surgeon of large experience, in which the small intestine was cut through when the cicatrix was incised; the patient died. I have already spoken of the question of a return of malignant tumors, and of generalization. You will remember that they are usually confined to the peritoneum, rarely invading the abdominal viscera and walls, still more rarely the lungs and mediastinal glands.

Ségond has even noted secondary degeneration of the axillary glands. Secondary tumors may be of an epithelial, sarcomatous, or mixed type. They develop rapidly and cause death in the same way as cancers. Is Ter-

rillon correct in holding that a small-sized pedicle implies a benign tumor? I believe this to be purely theoretical. The occurrence of carcinomatous infection mentioned by Nicaise as following puncture of a malignant ovarian cyst seems to me to be simply an error of interpretation; he probably saw the formation of a nodule near the cicatrix and attributed it to the engrafting of cells brought there by the trocar. A simpler interpretation is that of a metastatic neoplasm developed at the *locus minoris resistentiæ.*

Menstruation and Pregnancy after Operation.—Patients from whom only one ovary has been removed continue to menstruate and may become pregnant. If both ovaries are completely removed, premature menopause will follow, but it may be delayed for several months. The fact that pregnancy has been known to follow the intentional resection of a portion only of one ovary after removal of the other (Schröder), as well as the persistence of menstruation after cases of so-called double ovariotomy which were evidently incomplete, prove that only a very small portion of ovarian tissue is needed to maintain the reflex influence causing menstruation. It is difficult to be certain that no trace of the ovary is left behind when removing an ovarian tumor with a short pedicle, especially if it be a papillary tumor. I discussed this question more in detail in the chapter upon Amenorrhœa.

Insanity following Operation.—Acute mania and melancholia are more apt to follow ovariotomy than any other operation upon the female genital organs. This occurs particularly where there is hereditary predisposition to insanity, but in exceptional cases there may be no known cause. We should always try to ascertain whether alcoholism or the absorption of iodoform could account for the cerebral derangement, which, it is true, is often merely temporary (as I once witnessed in a remarkable case), but yet which may persist.

Similar occurrences have been noticed after abdominal hysterectomy, and even after operations on the vulva, perineum, cervix, and mammary gland. In this last case, it would seem that there must be a neuropathic tendency which some determining cause would surely sooner or later develop into insanity. The surgeon, however, must bear in mind the possibility of this complication, though it be rare, and even count it as a factor in the prognosis, if he is dealing with a patient with hereditary predisposition to insanity or simply with a neurotic taint.

Cysts Complicated by Pregnancy. Ovariotomy during Pregnancy.—Under these circumstances, pregnancy and labor have sometimes been successfully terminated without surgical interference, but only in exceptional cases. As a rule, small pelvic cysts, if they do not interfere with pregnancy, are a formidable complication of labor; large abdominal cysts are almost sure to cause abortion, and run a great chance of torsion of the pedicle, rupture, or suppuration causing peritonitis. A comparison of the dangers of expectant treatment and the relative innocuousness of timely ovariotomy will cause no hesitancy in a choice. Yet the advisability of operation has been con-

tested by some authorities; some prefer induced abortion, premature labor, or even puncture of the tumor. In the first two cases the obstacle interposed to the retraction of the uterus may be a cause of hemorrhage or puerperal accidents; in the last case there is danger of wounding the uterus, and abortion usually follows under unfortunate conditions.

The question assumes a different character according to whether we are called to the patient before or during labor. Before labor I do not think that there should be any hesitation in performing ovariotomy. The old statistics given by Remy show that out of 67 ovariotomies performed during pregnancy there were 13 cases of interrupted gestation and death of the patient, 22 cases of abortion followed by cure, 32 cases of labor at term with cure; in other terms, 19.4 per cent of death of the mother, and 52 per cent of death of the child. But the results at the present day are far more encouraging. Out of 36 cases operated upon by L. Tait, Spencer Wells, and Shröder, there was but 1 death. In the great majority of cases the life of the fœtus is protected and pregnancy continues. Olshausen mentions seven cases where the gravid uterus was taken for a cyst and punctured. The majority of the operators at once performed Cæsarean section, and five of the patients recovered. Before the fifth month of pregnancy, the operation is far less serious than it is later. According to Schröder, the reason for this is that the pedicle becomes shortened by the opening out of the broad ligaments. However that may be, out of twenty-one cases operated upon after that time there was only one death.

Puncture is only to be resorted to when it is absolutely impossible to operate on the cyst.

During labor, forceps, version, craniotomy, and even Cæsarean section have all been tried. First of all, we must make the attempt to push the tumor above the promontory by introducing the fingers into the rectum, the patient being in the genu-pectoral position. If we do not succeed in this, the cyst must be punctured through the posterior vaginal cul-de-sac. If its contents are too thick to be evacuated by this means, it has been advised to make a large incision in the same place, to remove the irreducible cyst (usually dermoid). Forceps are likely to tear the parts; version can rarely be performed. The choice remains between craniotomy if the fœtus is dead, and Cæsarean section if it is alive.

For my part, I should not hesitate to perform laparatomy in order to ascertain whether removal of the cyst were possible; by ovariotomy we could then remove the obstacle, and labor could go on successfully. Even if this were not possible, I do not think that Cæsarean section or Porro's operation offers greater danger to the mother than the blind and excessive violence often exerted through the natural paths, and they possess the additional advantage of saving the life of the child.

CHAPTER XXX.

SOLID TUMORS OF THE OVARY.

As a rule, we include, under the head of solid tumors of the ovary, fibroma, sarcoma, and epithelioma or carcinoma. A few writers add papilloma, enchondroma, and tubercle. I shall not follow their example. In fact I have already described the first with the papillary cysts, of which it is in reality only an appendage. Enchondroma has no real clinical existence; it is an exceedingly rare anatomical lesion. As to tubercles, they are very rarely situated in the ovary, and the symptoms to which they give rise are tubercular peritonitis or pyo-salpingitis, in which the microscope reveals giant cells and bacilli; their symptomatology is easily confounded with that of other suppurative processes of the appendages, of which I have already spoken in the chapter on Cystic Oöphoro-salpingitis.

Fibroma. *Pathological Anatomy.*—Fibroids of the ovary are rare. These do not form circumscribed new growths, like fibroids of the uterus, but seem rather to be a kind of fibroid degeneration of the organ which is so uniformly hypertrophied that its shape and relations are not altered. Leopold pointed out the fact that the tube remains free instead of becoming a part of the ovarian tumor, as is the case with cysts. Yet if the tumor opens out the broad ligament and becomes enclosed within it, this distinction disappears. We may then have great difficulty in distinguishing a fibroma originating in the ovary from one originating in the uterus which acquires the same relations. Simple fibromata are usually small. It is the fibro-sarcomata and fibro-myxomata which attain such enormous proportions. Still, Alban Doran removed a fibroid of the ovarian ligament which weighed no less than 17 pounds, and Picqué a fibroma weighing 4 kgm. 800 gm. Simple fibroids are hard in consistence, and have a mammillated surface; they usually have a pedicle and are free from adhesions; ascites has sometimes been noted. An interesting variety of fibroid, from an anatomical standpoint merely, is the fibroid of the corpus luteum described by Rokitansky; it is always very small; still, Klob has seen one as large as a child's head. On the section we see the denticulated folds of the corpus luteum, whose structure can be recognized by the microscope. Ovarian fibromata are usually hollowed out into little geodes containing fluid; it is difficult to decide whether these cavities come from the Graafian follicles, from limited points of molecular disintegration, or from the dilatations of lymphatics. Calcification and even ossification of ovarian fibroids has been met with. The structure of these tumors is chiefly fibrous in the true sense of the word; there

are many connective-tissue fibres and few or no unstriped muscle fibres; if these are present to any extent, it is probable that the origin of the tumor has been misconceived, and that it is derived from the uterus. Exceptionally the vessels may be of unusual size, as in the cavernous fibromata of Spiegelberg; but in these very vascular tumors there is usually an admixture of sarcomatous tissue.

Fibroids of the ovary are met with relative frequency in young women. Leopold mentions thirteen cases at from five to thirty years of age, and only four at thirty to forty years. They are also seen in aged women. Terrier removed one by laparatomy from a woman of seventy-seven years.

Symptoms.—Ascites is what usually attracts notice at first; it is caused by the exceeding mobility of the tumor, thus resembling ascites caused by

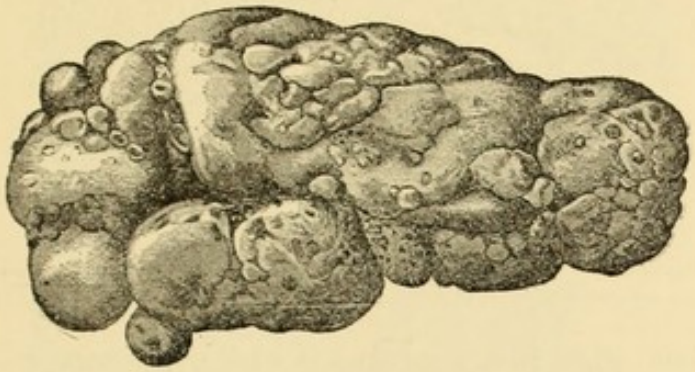


FIG. 440.—FIBRO-SARCOMA OF THE OVARY.

certain pediculated fibroids of the uterus. When this symptom is absent, the tumor may escape notice, or be discovered by chance if bimanual exploration be performed or if laparatomy be done for any other reason.

Their course is slow. Peritonitis from torsion of the pedicle has been noticed, as well as some cases of inflammation.

Diagnosis.—It is almost impossible to distinguish fibroma of the ovary from a pediculated fibroid of the uterus; the ascites might also cause us to think there was a malignant tumor. Exploratory incision alone can decide the question. This is the more legitimate since the tumor must be removed in any case. The prognosis is favorable in the case of a pure fibroma, which is a benign tumor. It should, however, be removed by laparatomy as soon as it gives rise to pain, and even as soon as it is recognized, for we can never be certain that it is not a sarcoma.

SARCOMA.—*Pathological Anatomy.*—This neoplasm is of rare occurrence; according to valuable calculations based upon Schröder's ovariotomies, Cohn estimates the frequency as about one per cent in relation to cysts. Out of fifteen solid tumors of the ovary Heim found seven cases of sarcoma. It is usually bilateral. The spindle-celled or fibroplastic variety is more frequent than the round-celled or embryoplastic; the first has a lardaceous consistence, the second is much softer. Cystic cavities and foci of fatty degenera-

tion are numerous in the substance of the tissue. They contain many blood-vessels. Although usually medium-sized, they may attain an enormous volume. According to de Sinéty, proliferous cysts in which the solid element

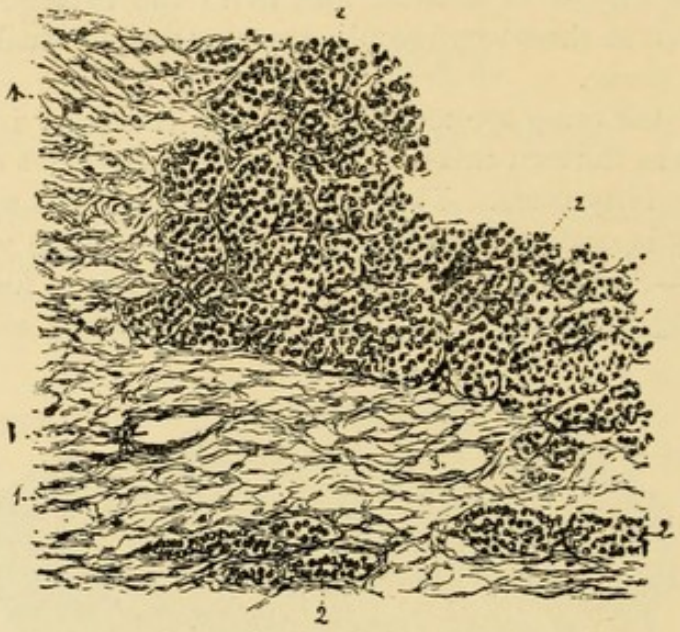


FIG. 441.—ENDOTHELIOMA OF THE OVARY. Showing alveolar appearance (150 diameters). 1, Ovarian tissue in reticular bundles, cells in the open spaces; 2, these spaces dilated and changed into alveoli full of cells; 3, lymphatics.

predominates have often been confounded with the sarcomata. Possibly the description of a mixed variety analogous to adenoma and carcinoma may be due to this confusion.

While on this subject, I will speak of some researches to which the novelty of the results obtained lends interest. There has lately been described

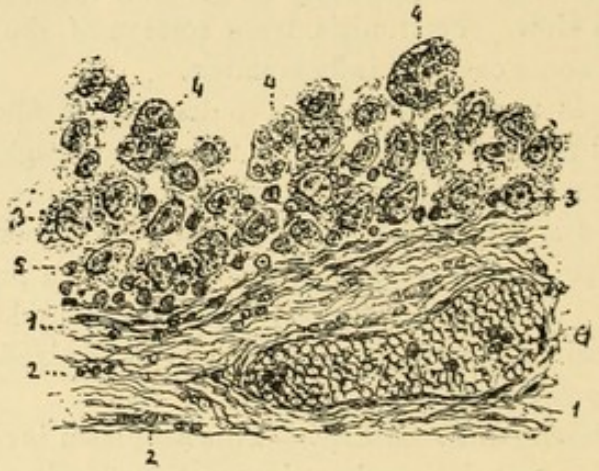


FIG. 442.—ENDOTHELIOMA OF THE OVARY. Giant cells with many nuclei. 1, Loose connective tissue with long cells; 2, cellular proliferation between its bundles of fibres; 3, epithelioid cells derived from the preceding cells; 4, cells with multiple nuclei; 5, unchanged cells; 6, vessel filled with blood.

a variety of ovarian neoplasm, histologically intermediate between epithelioma and sarcoma, found in certain degenerated dermoid cysts, in papillary cysts, and in those solid tumors riddled with small cavities, which have

hitherto been classed with the sarcomata. Eckhardt and Pomorski called them endotheliomata to indicate their origin from the endothelium of the

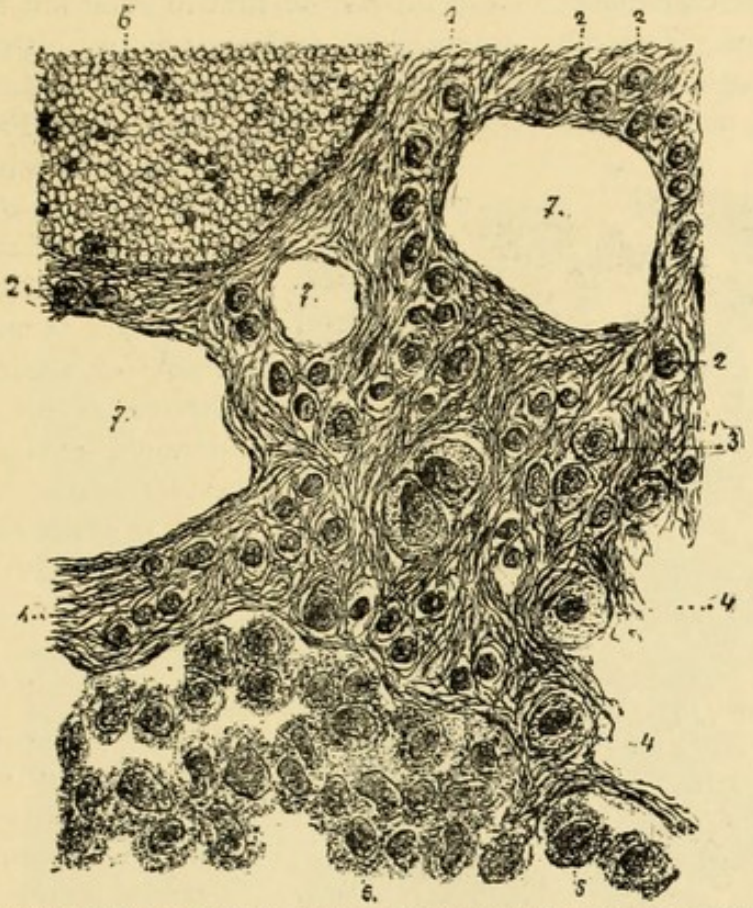


FIG. 443.—ENDOTHELIOMA OF THE OVARY.—Gradual transformation of proliferated cells into epithelioid cells. 1, Loose connective tissue ; 2, round proliferated cells with shining nucleolus ; 3, same, swollen and increased in size ; 4, same, still more developed ; 5, cells which have completely changed and are loosely united to each other in large alveolar cavity ; 6, large vessel filled with blood ; 7, lymph spaces.

lymphatic spaces or capillaries, or even of the capillary blood-vessels. They were able to follow step by step on the one hand the transformation of the

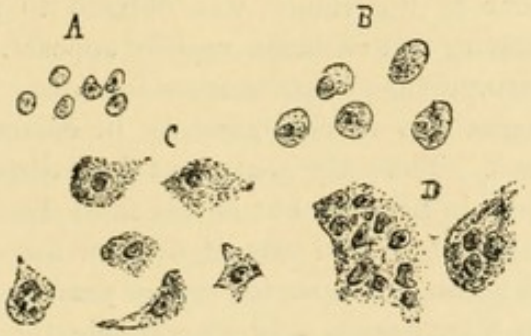


FIG. 444.—ENDOTHELIOMA OF THE OVARY. Individual elements at different periods of development (800 diameters). *A*, Small round cells with nucleolus derived from connective-tissue cells in lymph spaces ; *B*, same, swollen and becoming epithelioid ; *C*, cells more or less angular and of various forms; karyokinesis shown in that on the left; *D*, multinucleated giant cells.

connective-tissue elements into epithelioid cells, on the other the abundant proliferation of the endothelium of the lymphatic spaces of the connective

tissue. This neoplasm is therefore a mixed variety, and shares the structure of tumors of connective-tissue origin or sarcoma, and tumors of epithelial origin or carcinoma. Leopold was the first to point out this variety of ovarian tumor. Two other observations, analogous from a histological standpoint, although differing widely from the standpoint of the macroscopic pathological anatomy, had been published by Marchand. From the facts known, we can see that we have here to do with a curious variety of sarcoma, either primary (papillary tumor of the ovary or microcystic sarcoma) or secondary (degeneration of the walls of a dermoid cyst). The interest attaching to these theories is great, but purely histological. From a clinical point of view, it would seem that these tumors are of great malignity. The symptoms are those of a rapidly developing malign tumor.

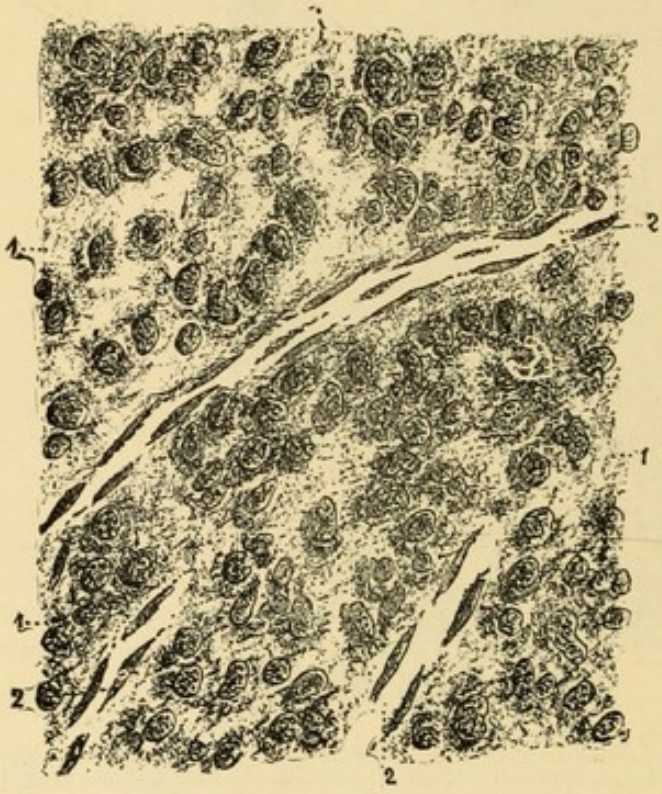


FIG. 445.—ENDOTHELIOMA OF THE OVARY. Area resembling sarcoma (800 diameters). 1, Homogeneous granular tissue composed entirely of cells varying greatly in size and shape, a large number showing karyokinetic changes; 2, tissue traversed by large number of capillaries with embryonal walls.

Their surface is smooth, and the general form of the ovary is retained; the lesion is sometimes bilateral. Pregnancy sometimes stimulates it to rapid development. Münchmeyer, in a case in which pregnancy caused an enormous development of the tumor, was obliged to perform craniotomy. Ascites is always present, and cachexia rapidly appears. This rapid course is what clinically distinguishes sarcoma from fibroma. It is most often seen in the young and sometimes in childhood, as in epithelioma age furnishes no data for diagnosis. The only treatment is extirpation. A relapse is more to be feared than in fibroma, but is less fatal than in epithelioma. C. Braun reports a well-authenticated case of ovarian sarcoma in which a cure had been maintained without relapse for eleven years.

EPITHELIOMA OR CARCINOMA.—If we exclude the secondary cancerous degeneration of cysts, primary cancer of the ovary is rare. Yet it has been noted at all ages, even in infancy.

Pathological Anatomy.—Two principal anatomical forms are described; one diffuse and medullary, the other superficial and papillary.

There is great confusion upon this last point, and many cases of ruptured

papillary cysts have been given the name of cancer or of cancerous papilloma. We must, with Cohn, be careful to discriminate between the vegetations distinctive of the two morbid growths, which, although they may look alike to the naked eye, are seen under the microscope to possess a structure characteristic of either carcinoma or papilloma. The diagnosis is complicated by the fact that the transition from one of these forms to the other may be clinically and anatomically indistinguishable. Epithelioma or medullary carcinoma should also, at least theoretically, be clearly distinguished from

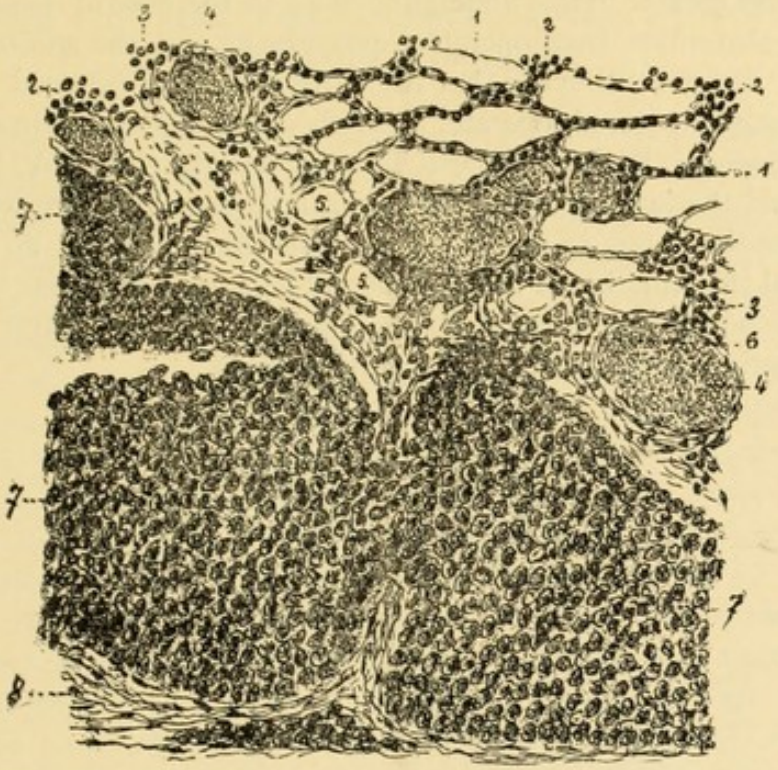


FIG. 446.—ENDOTHELIOMA OF THE OVARY. Metastasis in omentum (350 diameters). 1, Adipose tissue; 2, proliferated connective-tissue cells in its meshes; 3, proliferation especially active in vicinity of vessels; 4, vessels filled with blood; 5, lymph spaces; 6, preceding cells changing gradually into epithelioid cells, forming large compact masses (7); 8, connective tissue surrounding these.

the proliferous glandular cysts with colloid and gelatiniform contents and with small cavities, which may have the same general appearance to the naked eye. Even under the microscope, an exact distinction is often difficult, because of carcinomatous degeneration of the cyst walls. In fact, we have to confess, with De Sinéty, that "at this date it seems impossible for us to trace a clear line of demarcation between cysts and cancer of the ovary." But although this is absolutely true as regards a large number of cases doubtful from an anatomical point of view, yet from a clinical standpoint we can usually make a distinction, though even here we may fall into many errors. Winter has seen the Fallopian tube perforated and invaded by a cancer originating in the ovary, which distended it in such a manner as to simulate a hydro-salpinx.

The symptoms are in no wise characteristic at the onset. But before

long the development of ascites, the fluid of which is often tinged with blood, the general wasting, and the extraordinarily rapid progress of the tumor emphasize its malignant character. We may see œdema of the lower limbs, thrombosis, and finally a metastatic generalization. The diagnosis is doubtful only in the first stages, when we may think that there is a fibroma or a sarcoma. The course of the disease soon settles all doubts.

As to treatment, there are two methods advocated. Some, among whom is found Schröder, in view of the small chance of recovery held out by operation, and the greater risks undergone than in the case of benign tumors, recommend abstention from operative procedures and the administration of palliatives. Others, believing that the patient may be relieved for a while, or even temporarily cured, operate, even though complete extirpation be not possible. Spencer Wells, Gaillard Thomas, Ruge, Cohn, A. Martin, and Duvelinx hold the latter opinion, in which I share. I believe with the last-named writer that when in doubt we are justified in making an exploratory incision, and that this is not as harmful as Olshausen believes. In the only two cases in which I performed it, the patients, on the contrary, had a decided diminution of the ascites for several months.

CHAPTER XXXI.

TUMORS OF THE FALLOPIAN TUBES, BROAD AND ROUND LIGAMENTS.

Tumors of the Fallopian Tubes.—Fibroids, or, to be more exact, fibro-myomata, are rare and of small size; Sänger and Barth have been able to find the reports of only five cases. They develop toward the exterior, and do not as a rule diminish the calibre of the oviduct. Epithelioma or carcinoma, as a rule, is derived from cancer of the ovary or of the uterus. We may at times see advanced cancer of the ovary with a perfectly healthy tube. This remarkable fact is perhaps due to the direction of the lymph stream. Out of 73 cases of cancerous uteri, Kiwisch noted cancer of the tubes 18 times, and Dittrich out of 94 cases of various kinds of cancer, found malignant degeneration of the oviduct 4 times only. This affection is therefore infrequent. Orthmann collected the reports of 13 cases, in which the uterus was 9 times the starting point of the disease and the ovary 4 times. In a case in A. Martins' clinic, the carcinoma of the tube was primary; it was a cancer of papillary vegetative form in a woman of fifty-one years. In the first edition of this work I was able to find but few records of authentic primary tubal cancer; since then a number of new facts have been observed, and Sanger and Barth, basing themselves upon seventeen accurate observations of primary cancer of the tube, have been enabled to outline the clinical history of this affection. It would appear from the cases published that primary carcinoma of the tube appears almost exclusively at the time of the menopause, the age of the patients ranging from forty-three to sixty years. Doran and Fearn hold that it is always the result of the malignant degeneration of a pre-existent benign papilloma. Sänger and Barth share this opinion up to a certain point, since they hold that primary cancer of the tube always develops from an old chronic purulent salpingitis, at a late date when there is no longer any pus, most frequently at the time of the menopause.

From an anatomical standpoint we may distinguish two varieties: a nodular form, which is the more frequent, and a diffuse form. Two varieties are also revealed by microscopic examination: the first having a purely papillary structure, while in the second an alveolar structure predominates.

The symptoms caused by this affection are not specially characteristic. Pains in the region of the diseased tube radiate towards the thigh, there are disorders of menstruation, a bloody vaginal discharge with a healthy uterus,

a tumefaction of the abdomen, and often ascites. Tuffier observed a case which simulated retro-uterine hæmatocele.

Sarcomata of the tubes are extremely rare, there being only three recorded cases of sarcoma of the mucosa. These are the cases of Senger, Landau, and Sänger. There is only one case of sarcoma of the muscular

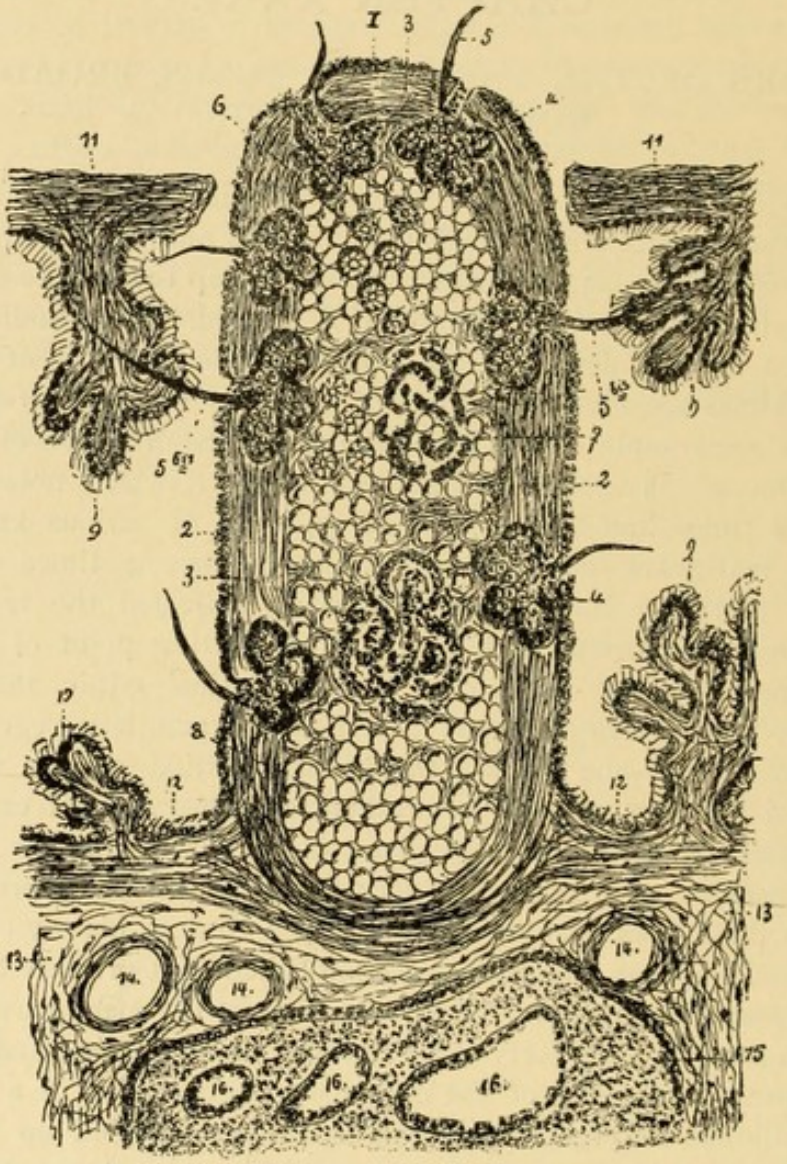


FIG. 447.—INTRA-TUBAL DERMOID. Longitudinal section of tube and tumor showing their relations to each other (diagrammatic). 1, Portion of tumor which has passed through upper wall of tube; 2, epithelium; 3, connective tissue; 4, sebaceous glands; 5, hair; 5 bis, hair which has passed through villosities; 6, racemose glands; 7, sudoriparous glands; 8, adipose tissue; 9, tubal villosities; 10, atrophied villosity; 11, upper wall of tube; 12, floor of tube; 13, connective tissue between tubes and ovary; 14, vessels; 15, ovary; 16, cysts.

layer, that of Janvrin. Ahlfeld and Martin report a case of malignant deciduoma of the tube, following tubal pregnancy. A. Doran describes a papilloma of the tubes which he considers benignant, and which he compares to condyloma of the vulva and vagina. He thinks that these growths are not neoplasms, but simply hyperplasiæ due to chronic inflammation of the organ. He reports two interesting cases, which, however, do not suffice

to prove that these lesions form any definite clinical type. It is very probable that in this case, as in the case of ovarian papilloma, an anatomical form of identical appearance may from some unknown cause develop into either a benignant or malignant tumor. Bland Sutton, who also considers papilloma of the tube to be a special and benign anatomical form of tumor, attaches great importance to gonorrhœa as a predisposing cause. If this theory be true, it would be difficult to account for the rarity of the affection.

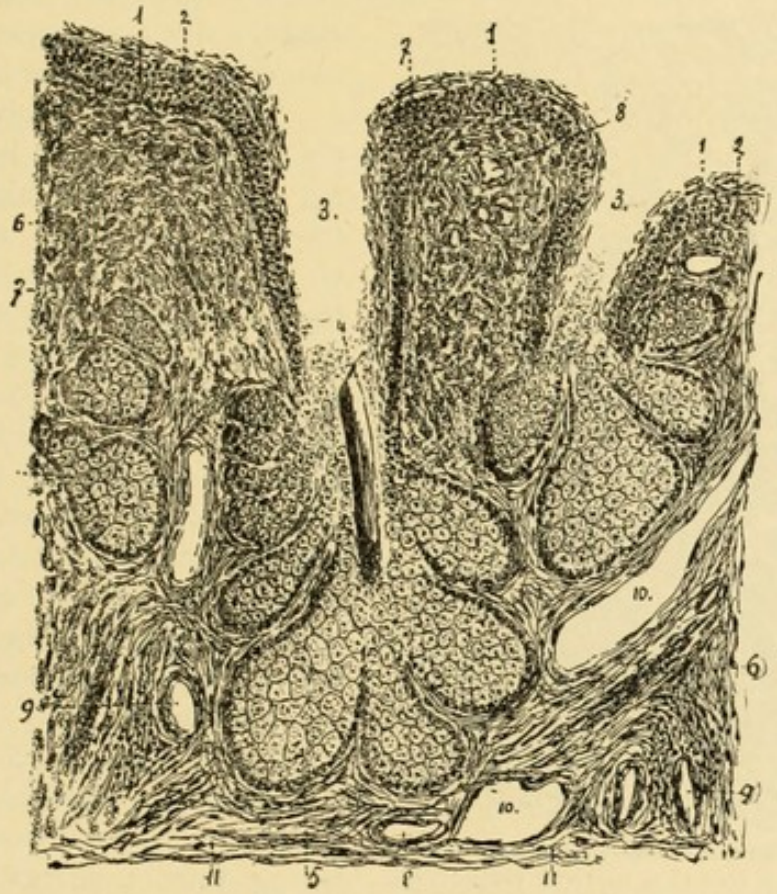


FIG. 448.—INTRA-TUBAL DERMOID. Section perpendicular to surface showing epithelial layer and sebaceous glands with their hairs. 1, Corneous layer; 2, layer of stratified squamous epithelium; 3, mouth of sebaceous gland; 4, hair; 5, sebaceous gland; 6, bundle of smooth muscle fibres; 7, dense connective tissue in periphery of tumor; 8, openings of capillaries; 9, capillaries surrounded by embryonal cells; 10, openings of lymphatics; 11, loose connective tissue.

We must be careful not to confound papilloma with foliaceous hypertrophy of the folds of tubal mucous membrane in some cases of salpingitis. Doléris has recently reported a case of double salpingitis with echinococci. The right tube was 23 inches long, the left one 21, and both together weighed about 4½ pounds. I observed an interesting case of dermoid tumor of the tube (Figs. 447 and 448). These are very exceptional occurrences, and it is impossible to diagnose them; they are usually taken for ovarian cysts, oöphoro-salpingitis, or uterine fibroids.

TUMORS OF THE BROAD LIGAMENTS.—The cysts have been studied with ovarian cysts, to which they belong clinically. Fibroid bodies independent

of the uterus have been observed in the broad ligament. It is impossible to determine whether they are primarily developed at the expense of the prolongations of connective tissue and muscular tissue belonging to these folds, or whether they are due to a migration of fibroid bodies from the uterus.

Tédenat observed an enormous fibro-cystic tumor accompanied by other purely fibroid tumors of the broad ligament. We must not mistake for small fibroids the accessory ovaries whose possible existence has been pointed out by Waldeyer and Beigel; they are rarely as large as a cherry, and never larger.

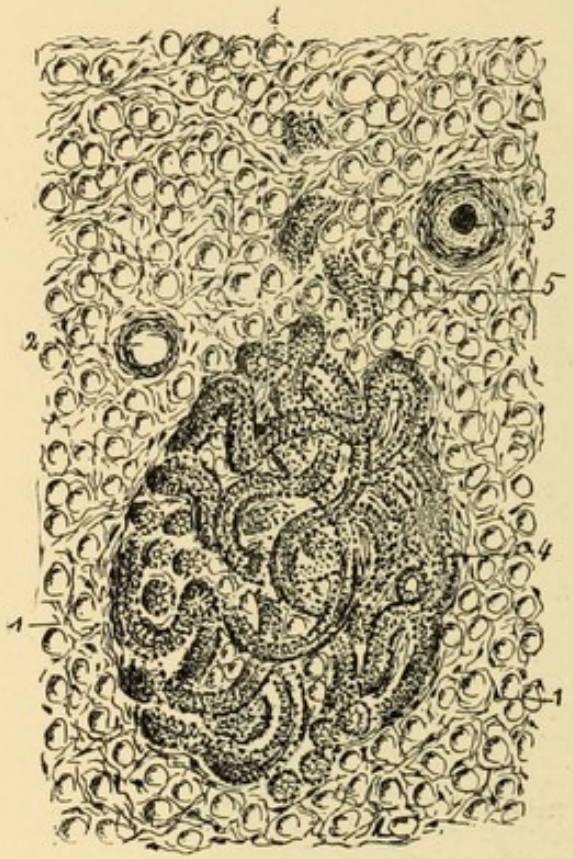


FIG. 449.—INTRA-TUBAL DERMOID. 1, Adipose tissue of centre of tumor; 2, vessels; 3, transverse section of hair with sheath; 4, sudoriparous gland; 5, excretory duct.

Lipoma has rarely been observed in the broad ligament. I saw one case which had been mistaken for an ovarian cyst because of the misleading sense of fluctuation. The patient suddenly died of embolus three days after an exploratory puncture. Terrillon operated upon a case in which an enormous tumor weighing sixty pounds sprang from the mesentery. The enucleation of these subserous tumors leaves a large cavity which must be treated in the manner described for intra-ligamental fibrous bodies of the uterus.

Epithelioma and Sarcoma.—In this situation these neoplasms result from an extension of neighboring tumors situated either in the peritoneum, the ovary, or the uterus. Bandl has seen some cases in which they came from the pelvic ganglia.

Parovarian Varicocele. Phleboliths.—Varicose dilatation of the utero-ovarian veins, which was pointed out by Richet and his pupil Devalz, was found no less than ten times out of three hundred autopsies performed by Winckel. Their size must certainly be greater in the living subject than in the cadaver. Winckel has found thrombi, and Klob and Bandl phleboliths.

Echinococci.—Freund devotes an important monograph to the study of these parasites in the female pelvis; they travel about in all the cellular interstices communicating with the superior pelvi-rectal space, which seems to be their point of entrance, and may thus reach the broad ligament, pass into the iliac fossa, and pass out of the pelvis either below or above the crural arch. They cause chronic inflammation with induration of the con-

nective tissue round about them. There may be no local symptoms outside of the pressure phenomena, and the general health is not affected. The tumors are round and elastic, situated as a usual thing near the rectum in the posterior part of the pelvis, slightly movable, not painful. With bimanual palpation we recognize the fact that they are not continuous with the uterus or ovaries. There is danger that an exploratory puncture might be followed by inflammation.

The diagnosis can only be made by exclusion and by the aid of medical geography, which teaches us the relative frequency of echinococci in certain countries, Iceland, Mecklenburg, etc. The treatment varies according to the seat of the tumor. If it be quite large and protrude into the abdomen, laparatomy will permit us either to completely enucleate the sac or to suture it to the abdominal wound, tampon and drain it. In the case of small pelvic tumors interference will be necessary only when there are accidents due to compression; then we make an incision through the posterior vaginal cul-de-sac to the tumor, or else we reach it by perineotomy or para-sacral incision, according to circumstances. If we have had to cut the peritoneum, we must, as soon as we reach the sac and before opening it, use a támponade of iodoform gauze for twenty-four or forty-eight hours, in order to assure hæmostasis and the formation of protective adhesions; at a second *séance* we can open the sac under antiseptic precautions.

Tumors of the Round Ligaments.—*Cysts or Hydrocele.*—An accumulation of encysted serum may sometimes be seen in the interior of the inguinal canal, or at its external orifice. It was quite natural to attribute this lesion to a persistence of the canal of Nuck, which surrounds the round ligament during intra-uterine existence. This origin, although admitted by many authorities, is denied by Duplay. Still, Schröder asserts that in a case observed by himself the fluid could be pushed into the abdomen, which certainly seems to prove the existence of a communication between the cyst and the peritoneal cavity, and an origin analogous to that of congenital hydrocele in the male. Whether this be the true origin or not, another may be claimed for it; the cyst might be seated in the substance of the round ligament. We know, in fact, that the gubernaculum of Hunter, which becomes the round ligament in the female, is at first hollow; there might be a persistence of a fœtal condition favoring the production of a pathological growth.

(For symptoms, diagnosis, and treatment, see Inflammation and Cysts of Bartholin's Gland.)

Fibroma.—This may occur as pure fibroma, as fibro-myoma, myxo-fibroma, or fibro-myxo-sarcoma. Calcareous degeneration has been noticed. Leopold found a lymphangiectatic myoma in the round ligament.

The most frequent situation is upon the right side, and it usually comes after parturition. The tumor may be seated at the internal orifice, it may be intra-peritoneal, or external in the labium majus or toward the fold of the

groin. Free from the skin, often pediculated but sometimes sessile, the mass, which is of varying size, is smooth or slightly lobulated, and usually of a fibrous consistence; it is not painful on pressure, but causes pain by the pressure which it exerts when it attains a certain volume. Cough and straining efforts have no effect upon fibromata. It is only at the beginning, when they are very small and externally situated, that they may be partly reduced through the inguinal canal. They have been known to increase in size under the influence of pregnancy and even at each menstrual period The course is slow in the case of pure fibromata, but in the case of mixed tumors may assume all the rapidity of malignant growths. In regard to the diagnosis, we must, with Duplay, distinguish the cases in which there is a pedicle from those in which there is none. If there is a pedicle which pushes it beneath the crural arch, it cannot be a neoplasm of the round ligament. If it pass above, the tumor may belong to the ligament or be a fatty hernia, an epiplocele, or an ovarian hernia. A differential diagnosis may be reached by the following signs: Fatty hernia is often reduced by pressure, is painful to the touch, feels soft, and has poorly defined limits. Irreducible epiplocele, which often acquires a fibroid consistence like that of fibroma, would be impossible to distinguish, were it not for the pressure of an epiploic cord stretched behind the abdominal wall. Ovarian hernia is ovoid, having the shape of the organ, and is exquisitely sensitive to pressure; its increase in size at the menstrual period is even more marked than in certain fibroids; the uterus is laterally displaced.

If the tumor is non-pediculated and in the groin, we might think it a ganglionic mass. But in that case it would be multilobular and never especially connected with the inguinal ring. If the neoplasm is in the labium majus, we should be apt to think of a cyst of Bartholin's gland; we must ascertain its starting-point, by its history and by direct examination; if the tumor first appeared above the labium, and then entered it, and if its insertion in the external abdominal ring can be clearly felt, we need not hesitate to pronounce it a tumor of the round ligament.

The prognosis is indicated by the course of the disease.

The treatment is extirpation; it is usually easy to enucleate fibromata when they are situated at the external ring. The ones which are subperitoneal, behind the internal abdominal ring, and of large size, may necessitate a serious operation for their removal.

CHAPTER XXXII.

GENITAL AND PERITONEAL TUBERCULOSIS.

The invasion of the genital apparatus by the tubercle bacillus is rather rare. Certain localities, as the vagina and the cervix, seem to possess slight susceptibility to it, probably because of the protection afforded by the resistant stratified epithelium. The Fallopian tubes are usually the starting-point of the tuberculous lesions; and from them the disease is easily transmitted to the ovaries, or more rarely to the uterus itself. I shall give a description of tuberculosis of the genital organs according to their anatomical order.

Historical Outline.—The works of Louis, Senn, Raynaud, and Cruveilhier mark the first stage in the study of this subject. With the added researches of Aran, Bernutz, and especially Brouardel, the pathological anatomy, although still placing too much emphasis upon macroscopical appearances, began to be more accurate and the clinical knowledge more exact. Since that time, the discovery of tuberculous glands and then of Koch's bacillus have given a certain criterion for research, while the increasing boldness of surgeons affords better opportunity for the study of fresh specimens. The names of Hegar, Wiedow, Cornil, and Terrillon are conspicuous among the more recent works upon the pathological anatomy and treatment of the disease.

In regard to the pathogenesis, we may mention Cohnheim, who was the first to suggest the idea of a possible transmission of the disease through sexual intercourse; Verneuil, who vigorously upheld this theory, and showed the utility of confronting the inoculated person with the inoculator—a method which materially aided the progress of the etiology of syphilitic diseases; Verchère, a pupil of Verneuil, Fernet, and Derville, who reported cases of very probable genital infection; and Réclus, who discussed them.

Etiology and Pathogenesis.—Can there be primary genital tuberculosis? Undoubtedly there can. Geil and Tomlinson, systematizing the previously announced theories of Namias, Cristoforis, and Rokitansky, long ago quoted numerous examples of isolated tuberculosis of the appendages. It is true that observations made before the discovery of the tuberculous glands and the special bacillus were not of decided importance. But later investigations have quite established the fact.

Primary tuberculosis of the genital organs is not infrequent in the male. One of the peculiarities of this species of local tuberculosis in both sexes is the possibility of its remaining latent and unrecognized for an indefinite

period, because of its sequestration by false membranes and by the inspissation of pus. This is especially observed where the lesion is in the tubes, and it may even be impossible to find the bacilli, which have doubtless been destroyed during the long continuance, although the tubercular nature of the focus of the disease is shown by the sudden appearance of an acute miliary eruption, either in the lungs or the meninges. The history of old foci of tuberculous affection in the bones or articulations furnish many analogous examples.

How is the tubercle bacillus introduced into the female genital organs? The external communications of these organs would seem to admit, *a priori*, of their frequent infection either through the atmosphere, the introduction of infectious bodies, or of tuberculous semen. This theory was inadmissible before the researches of Villemin and Koch had overturned all preconceived notions of the origin of tuberculosis. Even now this theory of direct infection is not received without dispute by all authorities. It has had overardent advocates, who were ready to accept it in some doubtful cases without sufficient proof, and also some opponents who systematically disparaged it. It seems probable that this method of infection may occur, but it assuredly is rare.

The frequency of primary tuberculosis as compared with secondary has been a subject of research. Mosler found 8 primary cases out of 46 observations. Frerichs gives a proportion of 15 out of 96, and Schram only 1 in 34. It is observed especially between the ages of twenty and forty years.

We can easily trace the infective agents in primary tuberculosis when the patients have been much in the company of any one suffering from tuberculosis; clothes, a sound, the finger of a physician or midwife, may carry the germs. Cohabitation with a person who has either genital or pulmonary tuberculosis is a well-authenticated cause in many instances. We cannot tell with certainty whether inoculation takes place by means of the spermatic fluid, the saliva, or by the blood through some scratch or wound. We may make a distinction, from this standpoint, between the cases in which the individual giving the infection has tubercles on the genital organs and those in which other organs only have tubercles. In the first case we may readily admit that the semen may contain bacilli. Cornil and Babés have in fact found bacilli in the urine of persons affected with tubercular cystitis; Rosenstein made the same observation in a patient who had only a caseous epididymitis. We may, then, in the absence of a positive examination of the semen, suppose that it has become infected in crossing the urethra. We still have to account for the cases in which there seemed to be direct infection from a man whose lungs only were affected. The virulence of the semen rests then only upon hypotheses; and the experiments of Landouzy and Martin show, in truth, that we may meet with a few bacilli in the testicles and prostate gland of phthisical patients whose genital organs are apparently healthy. But it is almost certain that these bacilli are imprisoned within

the capillary blood-vessels, and we have no authority for believing that they can escape through the membranes into the secretions. Grawitz, to be sure, proved the passage of the corpuscles and the mould germs (which are larger than the bacilli) through the epithelium of the glomeruli of the normal kidney; still, reasoning by analogy has never any but a theoretical value. Does the infection in these cases come through the semen, the saliva, or the blood of a scratch? A positive answer cannot be given. The puerperal state has a large share in primary infection; this fact is admitted by all writers. The genital tract is then open to the entrance of all morbid germs, and obstetrical manœuvres themselves may assist in their introduction. We must, moreover, remember that infection of any kind, septicæmic or blennorrhagic, predisposes to the bacillary infection. We know how the puerperal state predisposes to the first two infections; they in their turn pave the way for the third. General pathology describes these occurrences under the name of mixed or combined infection or association of microbes. A case has been reported in which there was beginning tuberculosis of the uterine cavity with cancer of the cervix.

Secondary genital tuberculosis, that which is developed in the course of tubercular degeneration of other organs, especially the lungs, is much more frequent than primary tuberculosis. Before deciding that the infection is primary, we must be quite sure that there is no tubercule at the apex of the lungs, and we know how difficult this is to determine. This constitutes the weak point of many so-called conclusive demonstrations which have been published; another weak point is the too great readiness to assert the tuberculous nature of small indurations of the epididymis or the prostate gland in persons supposed to be the source of the contamination; in many cases I think this is simply begging the question.

Tuberculosis of the genital organs, occurring in the course of phthisis, although one with it from an etiological point of view, is divided into two varieties from the standpoint of pathogenesis. In the great majority of cases, no doubt, the genital tuberculosis is secondary and metastatic, according to Cohnheim's expression, and the microbe has travelled in the blood or the lymph. At other times infection is produced by another process, which resembles that of the primary infection of non-tuberculous individuals; we might almost call it primary-secondary infection. The patient then contaminates the genital organs through the intermediary of the external medium, which she has herself infected.

When a patient in advanced phthisis develops ulcerations on the vagina, they are probably caused by linen soiled with her diarrhœal discharges or sputum. Finally, the inoculation of tuberculosis may be accomplished by continuity, by contact or propagation through the lymphatics, where there is an intestinal tuberculosis which has infected the pelvic ganglia. Bacilli in the peritoneal cavity may infect the fimbriated end of the Fallopian tube. Pinner has shown that dust introduced into the peritoneal cavity is rapidly

taken into the tube and conducted into the uterus; it must be the same with germs, and in fact Jans, in a case of pulmonary and intestinal phthisis, found numerous bacilli in the sections of perfectly healthy tubes; there is no doubt that they came from the peritoneal cavity, to which they may have travelled from the intestines. The tube may also be infected by the adhesion of a loop of tuberculous intestine, just as a tuberculous recto-vaginal fistula may follow perforation of the wall in cases of ulceration of the large intestine.

The predilection shown by tubercular lesions for the tubes may be accounted for in several ways; their mucous lining, which has many folds and is not subjected to the menstrual sloughing like that of the uterus, forms an admirable resting-place for the morbific germs which reach it. The intense vitality of the uterine mucous membrane, and its partial desquamation at the monthly period, no doubt form its principal defence against the bacilli; as to the vagina, it is protected by its thick layer of stratified epithelium, and perhaps also by the struggle for existence between the bacilli and the numerous other germs to which it always affords a lodging.

As Verneuil well observes, there is no comparison possible between the conditions of proliferation of the bacillus, which is anaërobic and develops best when deeply situated, and other microbes which, like the gonococcus, attack the first part of the genital canal with which they come in contact.

Tuberculosis of the Vulva, Vagina, and Cervix.—*Pathological Anatomy.*—Tuberculous ulceration of the vulva is a quite exceptional lesion. M. Zweigbaum, who describes a case, finds only two in the annals of science. His patient, thirty-two years of age, was phthisical, and succumbed to pulmonary and intestinal tuberculosis; the writer, however, believes that the genital lesion was primary. There were also ulcerations upon the vagina and cervix. Bacilli in abundance were found in a small flap excised during life from the seat of the vulvar ulceration.

Tubercular lesions of the vagina or vaginal portion of the cervix are rare. Daurios collected the records of twenty-four cases, but it must be acknowledged that some of them are not above criticism; external appearances or presumptions drawn from various circumstances are not enough to characterize the affection. A certain number of incontestable facts do, however, exist.

We need merely mention miliary tubercles, which may be met with in acute tuberculosis. We must also take special note of the primary or secondary tuberculization of certain fistulæ between the vagina and the hollow organs in its neighborhood.

I found only one case of the isolated primary ulceration of the vagina observed by Max Bierfreund. As a usual thing, this lesion coexists with primary affections of the tubes or uterus. In a remarkable case of Virchow's there was tuberculosis of the urinary tract, and the vagina was infected through the urine. The rectum may also be the starting-point of infection.

Tuberculous ulcers of the vagina have perpendicular walls, which are unequal and irregular, and have a depressed yellowish-gray base, covered by a characteristic caseous coating. Around the ulceration are frequently seen

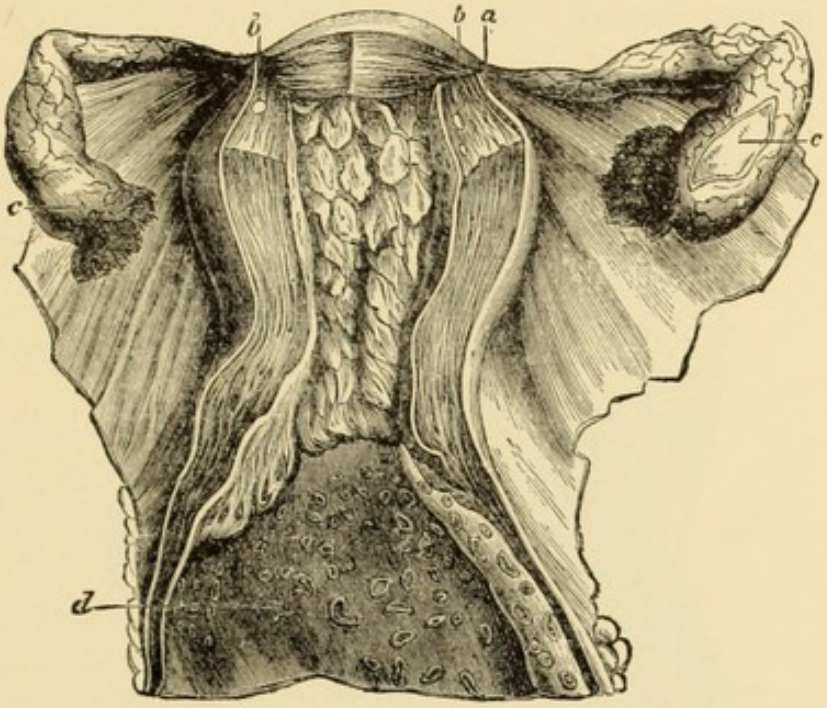


FIG. 450.—TUBERCULOSIS OF THE UTERUS, VAGINA, AND TUBES (BARNES). *a*, *b*, Tuberculous masses of the mucous membrane and uterine tissue; *c*, tubes transformed into a pyo-salpinx; *d*, ulcerations of the vagina.

small, yellow, opaque grain-like bodies, absolutely similar to those surrounding tubercular ulceration of the tongue so well described by Trélat. The



FIG. 451.—TUBERCLE BACILLI. *A*, Sputum of phthisis; there are two granular leucocytes and bacilli. *B*, Pure culture of Koch's bacilli.

Koch bacilli found upon the surface of these ulcerations or in the vaginal secretions leave no doubt as to the nature of the lesion when they can be demonstrated, which is not always the case.

These tuberculous ulcerations are temporarily cured by simple methods,

as applications of the tincture of iodine or lactic acid, but they soon return, for with a superficial affection of the cervix we may find tuberculous follicles invading the muscular layers.

Tuberculous fistulæ of the vagina, according to Daurios, may be vesico-, urethro-, or recto-vaginal. They have nothing to distinguish them from

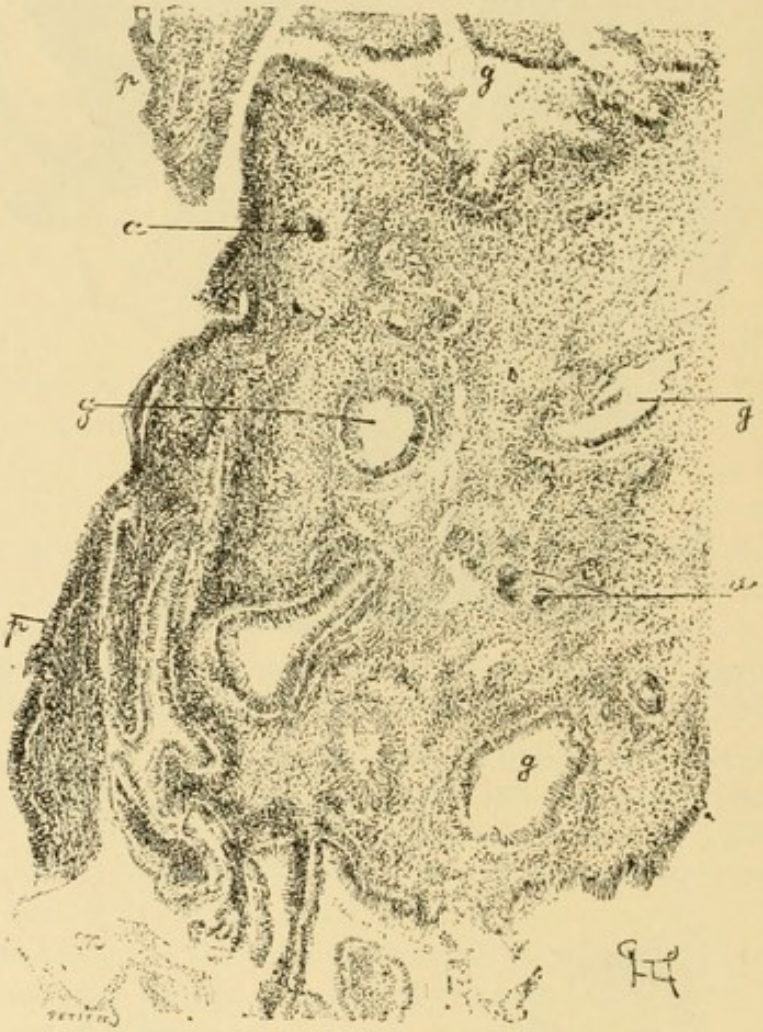


FIG. 452.—TUBERCULOSIS OF THE CERVIX UTERI. Section of the surface of the mucous membrane of the cavity of the cervix (mag. 30 diam.). *m*, Mucus upon the mucous membrane and in the depressions between the folds of the arbor vitæ; *p*, folds of the arbor vitæ and villi covered with columnar epithelium; *g*, *g*, *g*, glands and depressions tween the folds of the arbor vitæ; *a*, *a*, *a*, giant cells situated in the connective tissue of the mucous membrane, surrounded by microscopic tubercular follicles (Cornil).

ordinary fistulæ of the same region. The presence alone of tubercular follicles or of the bacilli around their orifice will allow of a diagnosis of their special character.

The observations of tubercles limited to the cervix are few in number, yet one case is reported by A. Laboulbène. Another was described at length by Cornil; which I will quote as a remarkable type of this rare lesion.

The case was one in which Péan had performed complete hysterectomy. The clinical diagnosis of the lesion was uncertain. The appearance of the

hypertrophied cervix, which was indurated, covered with irregular vegetations, bathed in a thick, yellow, grumous fluid, suggested cancer, and on this hypothesis Péan removed the uterus. "The opening of the cervical cavity showed that the folds of the arbor vitæ were very pronounced, vegetating,

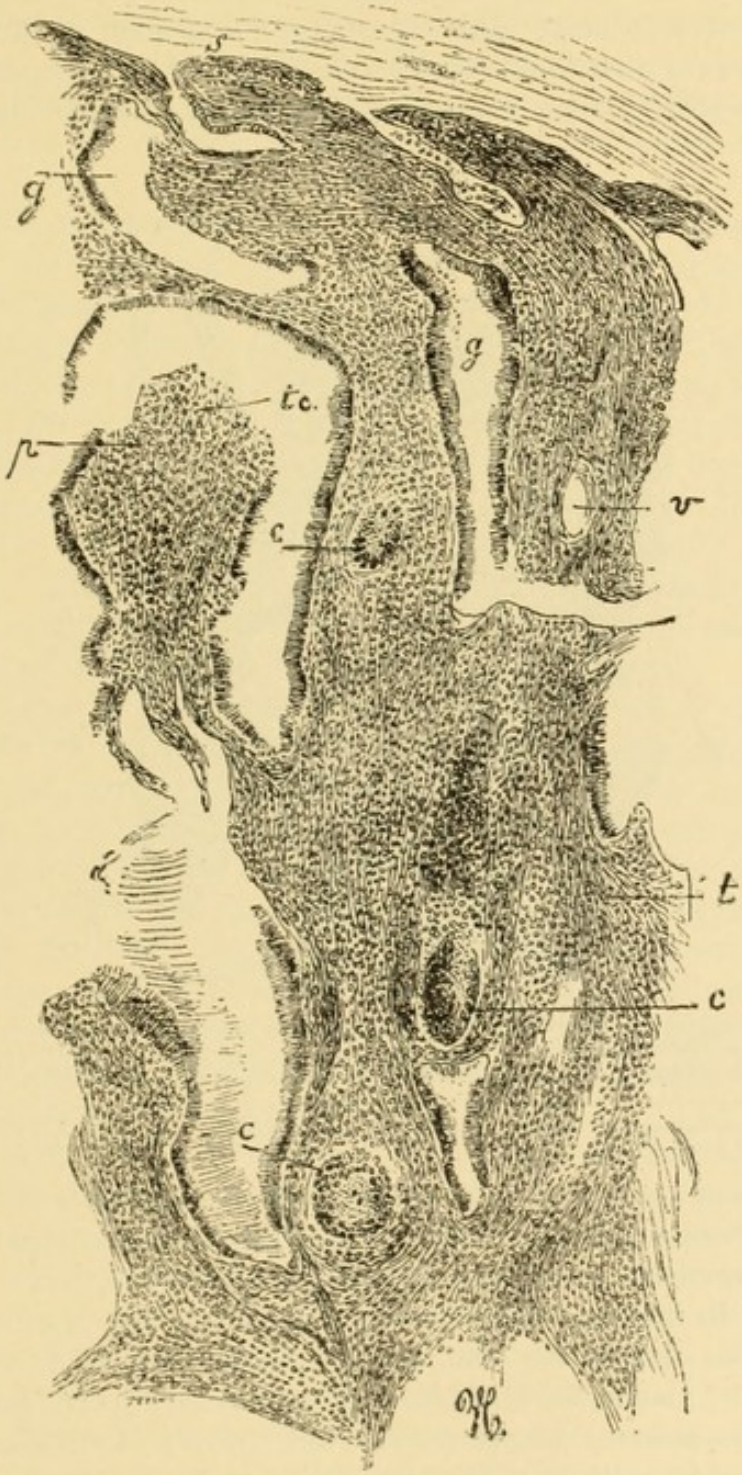


FIG. 453.—TUBERCULOSIS OF THE CERVIX UTERI. Same section as in the preceding figure, enlarged (mag. 100 diam.). *m*, Mucus; *s*, surface of villi and papillæ; *g*, mucous glands covered with columnar epithelium; *v*, vessel; *c*, *c*, *c*, giant cells in the inflamed connective tissue; *p*, a papilla partly covered by its epithelial layer, whose connective tissue (*tc*) is inflamed and shows numerous small cells (Cornil).

agglutinated together by sticky mucus, studded with opaque clots. A histological examination showed that it was a case of tuberculosis of the cervix of the uterus limited to that part of the organ. This specimen is very interesting because of its rarity, and the limitation of the tubercular process. The preparations obtained by sections perpendicular to the surface of the mucous membrane, made after hardening in alcohol, show, under a low power (Fig. 452), that the folds of the arbor vitæ have secondary villosities, and are separated by deep depressions, into which open the utricular or com-

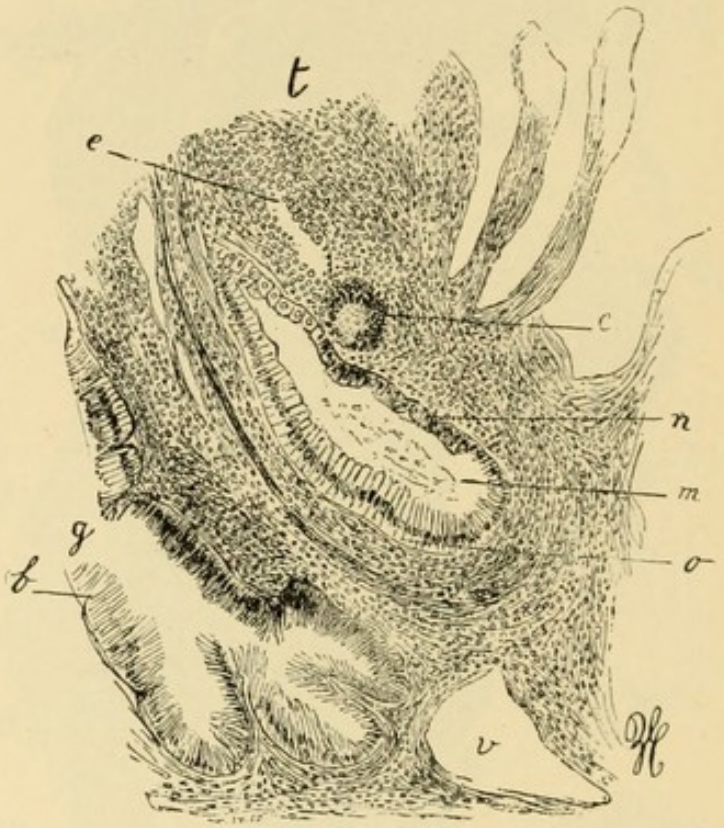


FIG. 454.—TUBERCULOSIS OF THE CERVIX UTERI. Same section as in the preceding figures, still further enlarged (mag. 150 diam.). *p*, Papillæ and superficial vegetations; *t*, connective tissue containing many round cells; *e*, fissure in tuberculous tissue, in which may be seen epithelioid cells belonging to a tubercular follicle; *c*, giant cells; *n*, epithelial covering of a gland near a tubercular follicle, showing large epithelial cells; *o*, epithelial layer formed of elongated cells; *m*, mucus contained in the gland; *b*, greatly elongated epithelial cells of a gland; *v*, vessel (Cornil).

pound glands of the cervix. The surface of the mucous membrane, as well as the depressions and glandular cavities, are lined and filled with mucus. The glandular cavities are enlarged and the connective tissue is filled with small cells. In this connective tissue on the surface of the mucosa, at the top of the folds of the arbor vitæ, in the superficial layers as well as deeper in between the glands, we distinguish giant cells large enough to be seen under this low power. The surface of the mucous membrane, the base of its folds and of its villi, as well as the cavity of the glands, are covered with elongated columnar cells. Under a higher power (Figs. 453 and 454) we see between the glands and in the connective tissue of the mucous mem-

brane an infiltration of small cells, and characteristic giant cells, which seem of themselves to form the whole tubercular lesion. It is true that the connective tissue surrounding them is richer in round cells than when in a normal condition; still, it contains many of these physiologically, and endometritis of the cervix will give rise to as many as tuberculosis. Moreover, as a usual thing, around the giant cells there is no agglomeration of epithelioid cells, nor any accumulation of cells undergoing granular or necrotic degeneration, from which it follows that the tuberculous follicles observed in this case, at an early stage of development, were not visible to the naked eye."

Tuberculous growths developed on the surface of the mucous membrane which covers the outer surface of the external os, that is to say, its vaginal portion, which is covered with pavement epithelium, show in this case the same appearance as tubercles of the pharyngeal mucous membrane; in fact, tuberculous follicles are situated on the surface of the mucous chorion. We can see giant cells in the midst of a collection of small cells; these granulations are, at their start and for a long time, covered by the normal layers of stratified pavement epithelium. Below the mucous membrane, we find a small number of tuberculous follicles, situated in the midst of crossed muscular bundles. These muscular bundles are at a given point, separated by embryonal connective tissue, which forms an island in the midst of which are one or several giant cells surrounded by epithelioid cells. These tuberculous granulations are larger than those situated upon the surface of the mucous membrane, where they are arranged in a manner quite similar to those seen in the muscular coat of the intestines, or in the lingual muscle; that is to say, they are developed in the interfascicular connective tissue, and by their growth push away the muscular fibres at their periphery. Even when we have to do with a tuberculous eruption which is slight, superficial, and of recent date, and which has caused no ulceration nor loss of substance, we must expect to find the deeper layers of the mucous membrane and even the muscular layer invaded by a few tuberculous granulations. These, which are not numerous, follow the course of the vessels in the intermuscular connective-tissue spaces.

When even in recently developed tuberculosis a histological examination shows this deep extension of the tubercular process, we may make up our minds that the physician must do more than to treat it superficially by applications or even by curetting, and that oftentimes total removal of the organ is the only method of destroying the affected portions of the uterus.

Cornil has vainly tried to discover the tubercle bacilli in this characteristic lesion; he has found them neither in the giant cells, the follicles, nor in the mucus filling the glands and covering the surface of the mucous membrane. But the inoculation of guinea-pigs with virus from this lesion gives rise to bacillary tuberculosis.

Winter, on the other hand, found bacilli in the giant cells, upon flaps of

mucous membrane from the body of the uterus and from the cervix. The case was that of a young tuberculous woman, upon whom Schröder had, five and a half years previously, performed laparatomy, followed by the introduction of iodoform into the abdomen for tubercular peritonitis, with such success that the ascites did not return, and the patient made a perfect recovery. After a long respite, however, tuberculosis was manifested in the lungs and the genital apparatus; the tubes were affected as well as the uterus.

Tubercular lesions cause a marked cervical endometritis. These inflammatory troubles affect the surface epithelium, the glands, and the chorium.

By comparing the preceding description with that of the first stages of tubal tuberculosis, which I shall describe later, borrowing from Cornil, we shall see that there is the closest analogy between affections of the cavity of the cervix and those of the tubal mucosa. We find the same disposition of giant cells at the top of the folds and villi, or in the connective tissue of these folds, the same inflammatory phenomena, the same mucous secretion, and the same modification of epithelial cells.

It is very possible that the inoculation of tuberculosis may occur by simple contact without erosion or solution of continuity of the cervical mucous membrane. At least that is what happens in the guinea-pig, as shown by Cornil and Dobroklonsky's experiments; but we have, of course, to be cautious in applying such examples to the human species. The diagnosis of tuberculous ulceration of the vulva, vagina, or cervix can be definitely made only in cases in which there is a coexistent and advanced pulmonary disease. The discovery of tuberculous follicles and, above all, of bacilli upon a fragment obtained by curetting or excision is alone pathognomonic; still, a negative result would not justify us in asserting the absence of tuberculosis. In the case of primary genital lesions, we run a great risk of confounding them with some disease of more frequent occurrence. In a case of beginning ulceration of the cervix, Pćan believed that he was dealing with cancer, but after hysterectomy it was recognized as tuberculosis.

The treatment should be palliative in cases of advanced phthisis, energetic in all others. The ulcerations are to be cauterized with the red-hot iron and dressed with iodoform. Fistulæ are to be freely incised; we should not hesitate to perform hysterectomy for even a circumscribed ulceration of the cervix, providing that there is no doubt as to the diagnosis.

Tuberculosis of the Uterus.—*Pathological Anatomy.*—In the uterus the disease is usually secondary. Three varieties have rather theoretically been pointed out: (1st) An acute miliary form, which is rare, which possesses no clinical interest, and which is merely an epiphenomenon in the course of a general systemic infection, with predominance of the general symptoms; (2d) an interstitial variety of slow development, essentially chronic, and equally rare, the diagnosis of which is impossible, but which may be suddenly manifested by some grave accident, as rupture of the uterus by inter-

ference with labor, etc., resulting from the degeneration of the uterine tissue, and the impediment to the physiological functions of this organ caused by the interstitial tubercles; (3d) an ulcerous form, the most frequent and most important. In this last variety, the lesions at first resemble those of endometritis, plus giant cells containing bacilli. Later, the tuberculous follicles become confluent and the whole mucous membrane is infiltrated with a tissue formed of small cells; it then undergoes complete caseous degeneration and is yellow and opaque for about one-thirty-second to one-sixteenth of an inch; the muscular tissue beneath is often hypertrophied. With the naked eye we are unable to distinguish, either upon the surface of the mucous membrane or in a section of it, any tuberculous granulation at all resembling the classical description of miliary tuberculosis of serous membranes. The cavity of the uterus is often filled with a thick, curdy magma. It may be transformed into a pus sac by the obliteration of the os.

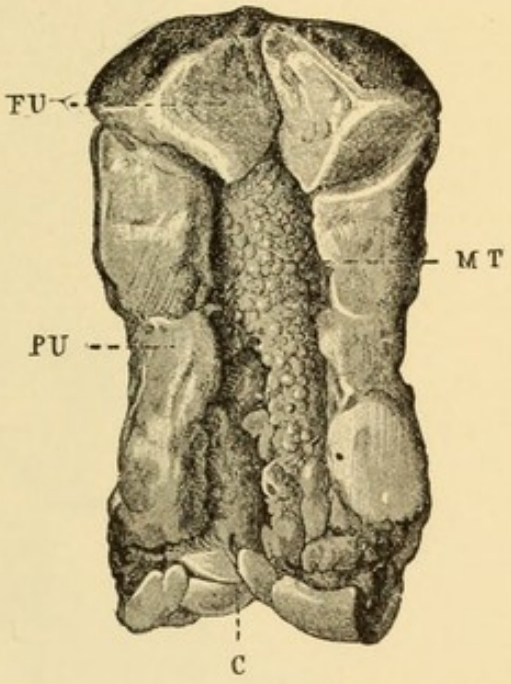


FIG. 455.—PRIMARY TUBERCULOSIS OF THE UTERUS. *C*, Cervix; *MT*, tuberculous mucosa; *PU*, uterine wall; *FU*, fundus.

As a usual thing, the lesion is sharply limited to the lower portion of the cervix, the upper portion remaining intact; this limitation may be marked by an ulceration which looks as though it had been made with a punch. Here is Cornil's description of the changes shown by a microscopical examination of a beautiful specimen of uterine tuberculosis:

"Sections perpendicular to the surface of the mucous membrane of the body of the uterus, after hardening in alcohol, showed no vestige of normal structure; neither epithelium, nor glands, nor blood-vessels were recognizable. The whole cheesy surface, under the microscope, was seen to consist of a homogeneous layer formed of small necrosed cells, which were vitreous, and no longer susceptible of staining; their nuclei were stained a faint rose color by picro-carmine. The cells were separated by their fibrillæ, which were crossed and interlaced in every direction.

"Beneath this necrotic mass was a zone containing small living cells and occasional giant cells. Next came the muscular layer, in which were seen a few tubercular follicles. A complete section of the uterine walls, including the peritoneum, showed, therefore, an inner layer of cheesy infiltration replacing the mucous membrane, a few tubercular follicles situated in the muscular wall, and granulations in the peritoneum. In ten sections of this

degenerated uterine mucous membrane I have been unable to find any tubercle bacilli."

The caseous infiltration, accompanied by superficial mortification whose detached products form the clots of cheesy pus which fill the body of the uterus, is the most characteristic feature of chronic tuberculosis. Cornil compares this lesion to one of the same nature found in the renal pelvis and calyces, and the ureters. "This resemblance is obvious. In the body of

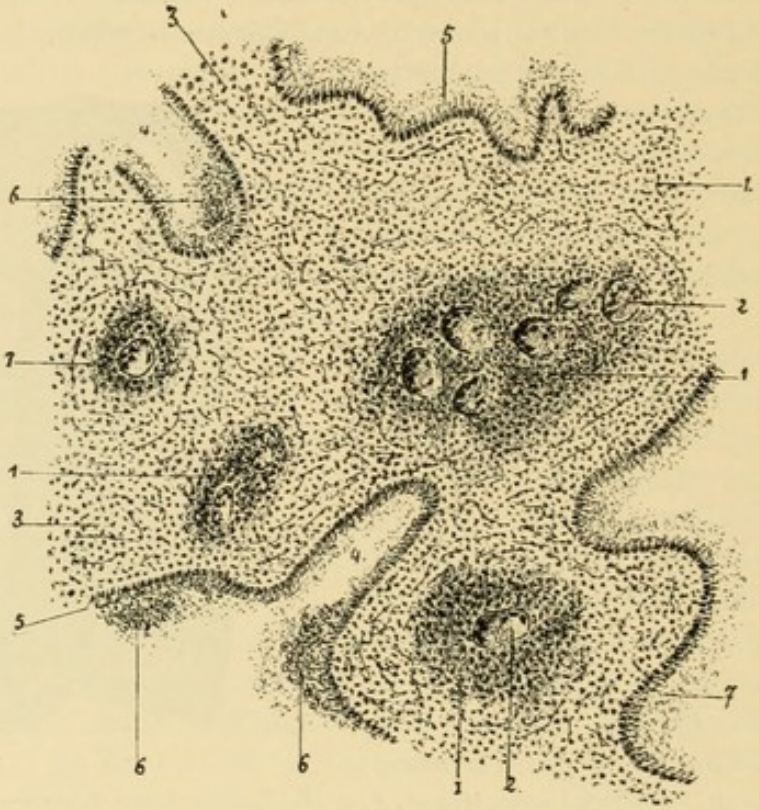


FIG. 456.—TUBERCULOSIS OF THE BODY OF THE UTERUS. Four tubercular nodules surrounded by tissue formed of an immense number of round embryonal cells. 1, Tubercular nodule; 2, giant cells; 3, embryonal connective tissue; 4, glands more or less dilated and distorted; 5, normal cylindrical epithelium; 6, same, proliferated and becoming squamous; 7, mucus containing degenerating cells.

the uterus, as in the urinary tract, we have an opaque yellow thickening with induration of a completely necrotic mucous membrane whose surface disintegrates into molecular fragments which become mixed with the pus and give the clotted aspect to which we have referred. Under the microscope, there is the same appearance; the more or less thickened layer of cheesy matter is homogeneous, and uniformly infiltrated with small cells, without any distinct tuberculous foci. We are scarcely able to distinguish here and there a giant cell in the deeper and still living layers. In chronic tuberculosis, with caseous infiltration of the ureters and renal pelvis, it is equally difficult to find one or two bacilli. From what we have said in regard to the pathological anatomy of tubercular infection of the tubes and uterus, it follows that we do not find, in either a recent or a chronic state, tuberculous granulations which are perceptible to the naked eye, or even with the microscope, which

resemble the classical description of tubercles. As a matter of fact, granulation of serous membranes has been taken as the type, and this type is but rarely met with in affections of the genital mucous membranes."

We should not be surprised at the infrequency with which bacilli are

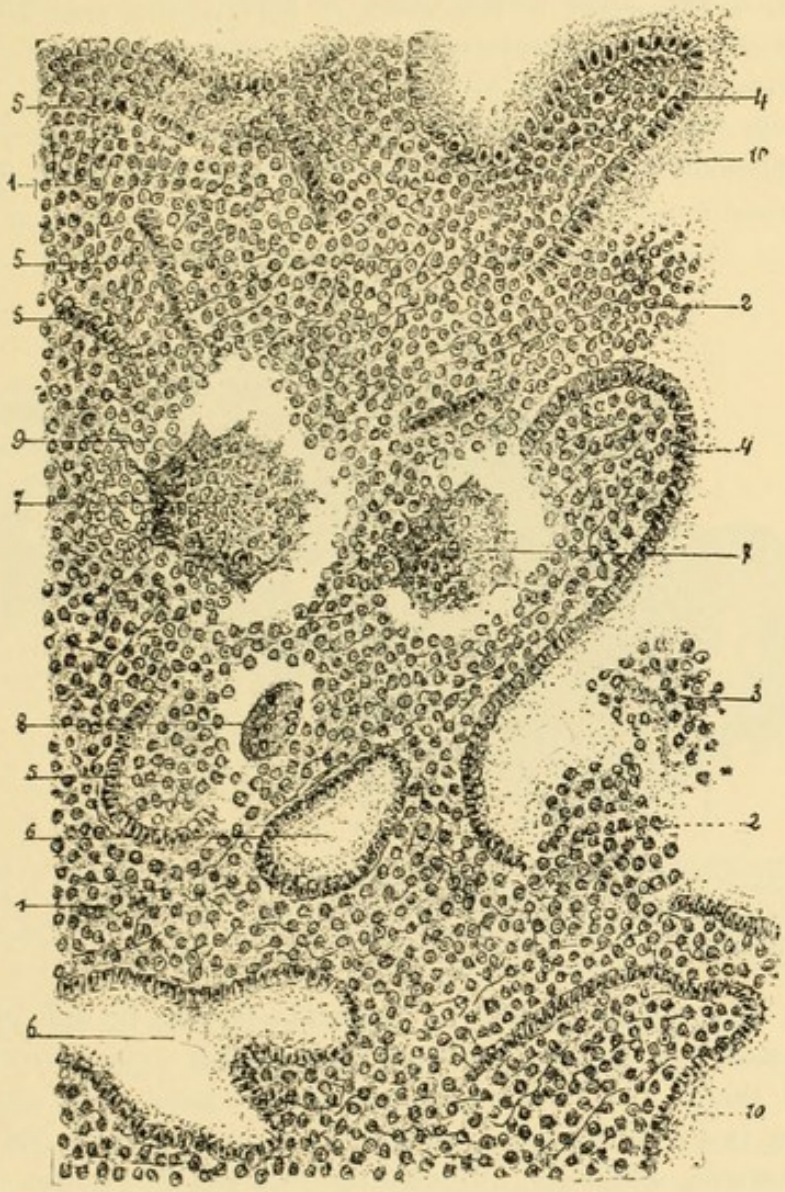


FIG. 457.—TUBERCULOSIS OF THE BODY OF THE UTERUS. From a photograph. 1, Submucous connective tissue with many cells; 2, embryonal growths appearing at surface of mucous membrane; 3, same with cells partly dissociated and embedded in mucus; 4, cylindrical-celled epithelium of uterine mucosa which has lost its ciliæ; 5, epithelium from altered glands surrounded by embryonal cells; 6, dilated and distorted glands; 7, large giant cells with many nuclei; 8, smaller cells; 9, peripheral epithelioid cells; 10, mucus.

found in uterine tuberculosis. They are certainly present, but, as in the majority of cases of local tuberculosis (tubercles of the testicle, lupus, etc.), they are few in number, probably because the lesions are of long standing. Doyen lately found some at the autopsy of a young woman who had died of puerperal fever, who also had tubercles of the uterine mucous membrane and muscular layer.

The symptoms at the onset are those of ordinary endometritis, with a more pronounced increase of size of the organ; this affection, which is perhaps more frequent than is usually supposed, may often be unperceived. The cheesy nature of the secretions and the coexistence of other lesions in the tubes and in the lungs should make us search for the granulations and bacilli which are alone characteristic of the disease. Yet the histological diagnosis presents many difficulties; we must not expect to find in the uterine mucous membrane tuberculous follicles similar to those met with in the serous membranes. Moreover, the elemental granulation of Virchow,

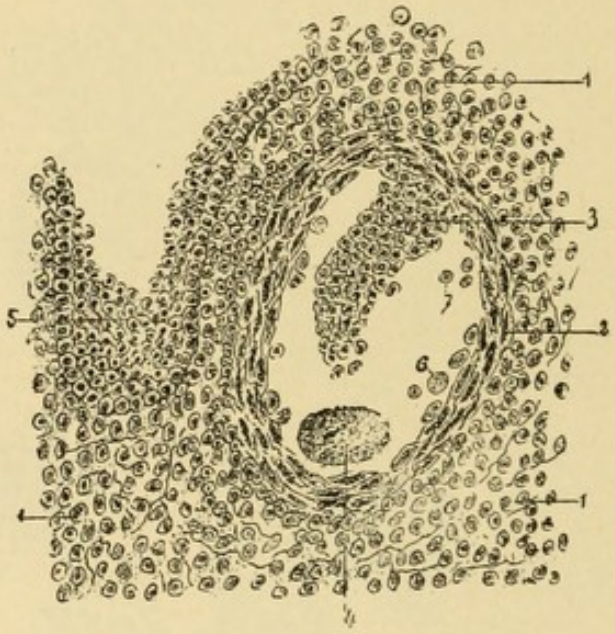


FIG. 458.—TUBERCULOSIS OF THE BODY OF THE UTERUS. Partially softened tubercular nodule whose central cells have disappeared. 1, Connective tissue infiltrated with embryonal cells; 2, ovoid epithelial cells at periphery of nodule; 3, polyhedral central cells; 4, giant cells; 5, gland whose epithelium has become stratified squamous; 6, free epithelioid cell; 7, smaller leucocyte.

which is the only constant lesion in tuberculosis, may be difficult to differentiate from a stroma very rich in the same elements and sometimes entirely composed of them; finally, the presence of the giant cell, which certain writers claim is to be found in interstitial endometritis, is not enough to warrant a positive diagnosis. According to Paul Petit, the tuberculous nature of endometritis may be absolutely determined if the specimens of scrapings of the *débris* possess the following characteristics: Interstitial cells which are necrosed or atrophied in a diffused manner or in well-defined lines; giant cells in greater or less number; embryonal nodules detached from the stroma and apparently developed around the vessels whose lumina may or may not be preserved; numerous flexible and dilated glands, lined with epithelial cells which are either considerably elongated or which have undergone an epithelioid transformation. In order to clear the diagnosis, we should always perform an exploratory curetting, which will prevent confusion with cancer of the body of the uterus.

The search for bacilli in the sections demands much time, and is often fruitless in spite of care and experience. The sections should be very thin and not large. The various modifications of Ehrlich's method may be tried, for a description of which see the special pamphlets on the subject, or the following process may be applied: The section is immersed for half a minute in picro-carmine, and one minute in a seventy-per-cent solution of alcohol in which there is 0.75 per cent of hydrochloric acid, or it may be left for twenty-four hours in Ehrlich's solution of methyl violet, then for a few seconds in an alkaline solution of one-per-cent nitric acid; it is then dried and mounted in balsam. If the microscopical examination is without result, according to Cornil, we should sow some of the uterine fluid in a tube of

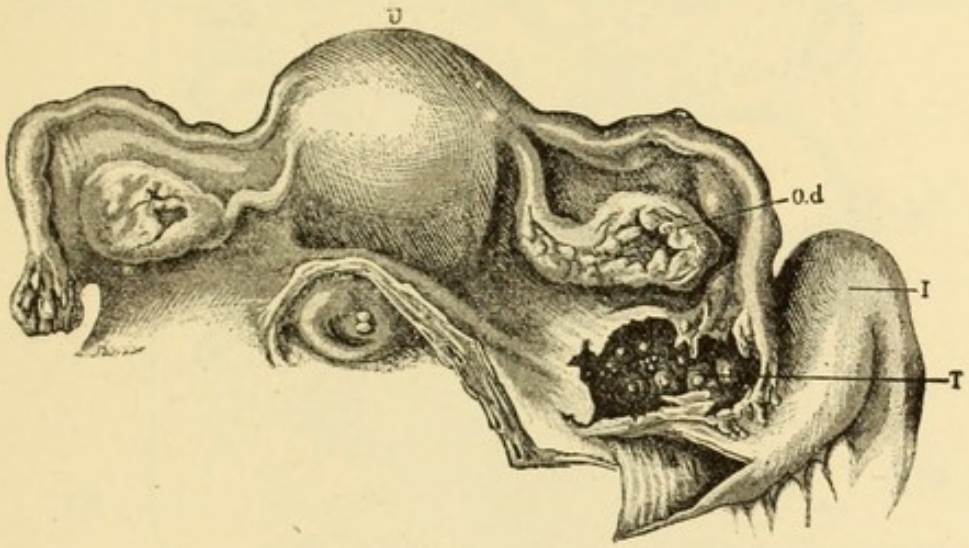


FIG. 459.—PRIMARY TUBERCULOSIS OF TUBES AND OVARIES. *U*, Posterior surface of the uterus; in the posterior lip of the cervix are two small mucous cysts · *O.d*, right ovary enclosing softened caseous masses which have been evacuated by the tearing apart of the adhesions; *T*, right tube, which is dilated and adherent, and forms part of a tuberculous pelvic abscess which is limited by the intestinal loop of the ileum. The left ovary and tube are tuberculous, as is the uterine mucous membrane. There was tuberculosis (secondary?) of the right lung (Kotschau).

glycerin jelly, or, better yet, inoculate it into the peritoneal cavity of a guinea-pig. According to Daurios, after twelve days the animal may be opened and the result of the experiment noted.

Treatment.—If the condition of the lungs permit of a radical operation, vaginal hysterectomy should be performed, instead of causing useless delay by curetting, which is usually inefficient.

TUBERCULOSIS OF THE OVARIES AND TUBES.—*Pathological Anatomy.*—The ovaries are rarely implicated alone; a few such cases are, however, given by Klob and Spencer Wells; recently Guillemeau has collected the statistics of thirteen cases, in four of which the lesions were bilateral. The tube corresponding to the diseased ovary nearly always has tuberculous lesions. The right ovary appears to be affected more often than the left, in the proportion of five to two. Lesions of the tubes are, on the contrary, very frequent. Terrillon has seen simultaneous lesions of the tubes and ovaries three times out of six. Tubal lesions have also been noted in the greater

number of cases of tuberculous endometritis, and they no doubt form the original source of the infection. With the naked eye we can perceive lesions that greatly resemble those of suppurating salpingitis, with or without cystic dilatation. The pyo-salpinx may be extensive, and possess a

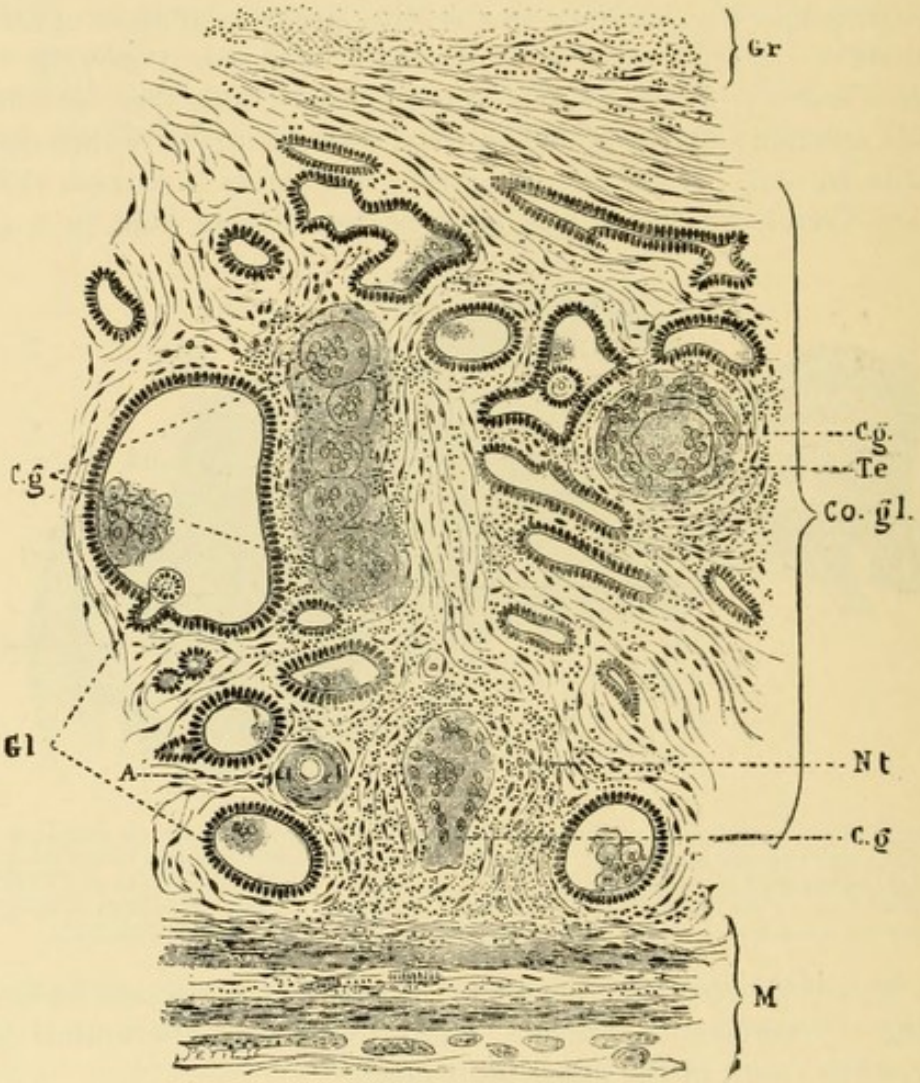


FIG. 460.—TUBERCULOSIS OF THE FALLOPIAN TUBES. Section of wall in pyo-salpinx (mag. 150 diam.). *Co. gl.*, glandular layer: remains of the mucous coat, in which are seen dilated glands; *Cg.*, giant cell in the centre of a tubercle formed by a collection of epithelioid cells; *Nt*, tubercular nodules with giant cells; *A*, transverse section of an arteriole; *Gl*, section of glandular tubes; *Gr*, internal layer of granulations; *M*, external muscular layer (Munster and P. Orthmann).

capacity of two quarts. The formation of adhesions and its diffusion toward neighboring parts transform it into pelvic abscess (Fig. 459).

Of however recent date may be the lesion, it soon invades the peritoneum, and causes the formation of false membranes, and the serous encysted effusions of perimetro-salpingitis. Fernet has even found progressive invasion of the pleura, and the production of subacute peritoneo-pleural tuberculosis whose starting-point is a primary lesion of the genital organs. The infection is carried through the lymphatics, which Hegar once found to con-

tain cheesy matter. The lymphatic communications between the pleura and the peritoneum through the diaphragm account for the infection. The mesenteric glands are often degenerated.

The tubercles of the tube, whether primary or secondary to granulations in the peritoneal cavity, are recognizable to the naked eye by the increased size of the organ, by the semi-transparent or yellow granulations upon its surface or in its muscular walls, and by its contents. Upon opening the tube longitudinally, we can see that it is dilated, that the thickened walls have tuberculous spots usually visible to the naked eye, and that it contains fluid which is more or less thick, puriform, grumous, and caseous, and whose characteristics are the same as those of tuberculosis of the body of the uterus (Fig. 460). Transverse sections obtained after hardening in alcohol show a

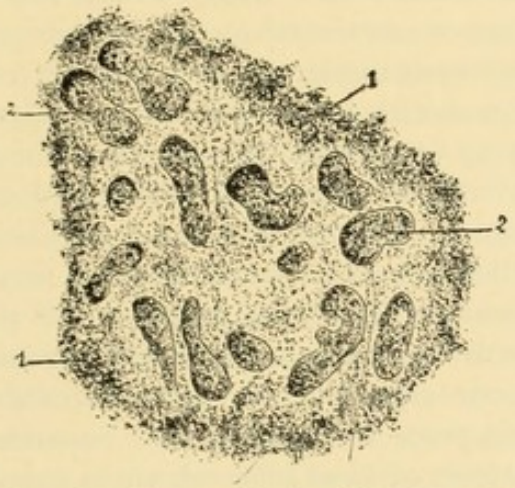


FIG. 461.—LARGE GIANT CELL (Mag. 300 diam.). 1, Granular masses; 2, irregular nuclei.

thickening of the wall and hypertrophied and branching vegetations. On the internal surface and in the substance of these vegetations and villi, we often find numerous giant cells, with several ovoid nuclei, which may take on the form of bent, sinuous, or branched rods, and sometimes groups of crystals (Fig. 461). The free surface of the villi and the folds is almost entirely covered by columnar ciliated epithelium. Here and there these cells have undergone mucoid or granular transformation, or they may be desquamated and free in the mucus, associated with a few pus corpuscles. Staining with rubine to find the bacilli is not always successful. Besides the giant cells and small tuberculous follicles developed in the vegetations, we may find in the muscular walls of the tube some follicles, of a greater or less size, containing giant cells. When the lesion is of long standing, sections of the purulent sac formed by the tube will show a smooth and continuous layer of embryonal tissue on the internal surface. Below it is fibrous tissue dotted with perfectly distinct tuberculous follicles, many of which contain giant cells with several nuclei. The walls of the tube are infiltrated with small cells, and have also a few tuberculous follicles. In the layer of fibrous tissue intermediate between the wall and the embryonal layer, we see lines

of epithelial cells which come from the epithelium of the mucous lining of the tube; they are in the form of tubular glands. At their periphery we see an irregular paling of columnar epithelium. At the centre are small, pale, rounded or ovoid cells, stained yellow by picro-carmine and whose nuclei are no longer visible. It is a mass of cells which have become necrotic, undergone mucoid degeneration, and become agglutinated together. This lesion has been called coagulation necrosis.

Koch's bacilli have often been looked for in vain in cases of salpingitis which were certainly tuberculous; but they have sometimes been found, although in small quantity, by Orthmann, Werth, etc. The symptoms are the same as those of non-tubercular salpingitis, and a probable diagnosis is usually reached by the exclusion of other causes, a study of the family history, and of any signs of the disease manifested in the lungs. The nodular character of the tubal tumor and the frequency of acute attacks of pelvic peritonitis have been considered distinctive of the disease, but they are really valueless, as they are met with in all cases of pyo-salpinx. The treatment must be varied according to whether the lungs are or are not involved.

If the lungs are sound, the attempt should be made to remove the tubes and ovaries by laparatomy. If the patient is phthisical, we shall have to limit ourselves to palliative measures, among which may be mentioned opening of the focus of disease through the vagina or the abdomen, followed by careful disinfection with a tamponade of iodoform gauze.

If pulmonary lesions exist, but are not especially severe, the surgeon must be guided in his procedures by the same considerations which would guide him in the treatment of local tuberculosis in any other situation.

Hegar advises interference in primary tuberculosis as soon as a diagnosis is reached, especially when it is probable that the process will not remain sharply limited. In secondary tuberculosis surgical interference will be indicated only if the pulmonary lesion remain stationary, while the genital lesion tends to increase. Tubercular peritonitis is not a contra-indication; on the contrary, laparatomy has been known to have a good effect upon it. In 1886 Hegar had one death out of six operations. The remote effects seem to have been satisfactory. One patient, who had been operated upon three years previously, was in good condition, although she had had a relapse; another suffered from a severe attack of pleurisy four months after the operation, but was completely restored to health, and remained in good condition for a year. In the case of the other patients, sufficient time had not elapsed to allow of a definite report of the results. Terrillon has also had several encouraging results.

[Tubercular Peritonitis.*—Anatomically the classifications which have been made of tubercular peritonitis are not altogether satisfactory. It

* These notes on tubercular peritonitis are a *résumé* of a most excellent paper by Osler in the Johns Hopkins Hospital Bulletin for 1890. B. H. W.

is customary, and correct, to exclude the cases of scattered miliary tubercles in the diffuse infective disease, and also those cases in which the peritoneal surface of tubercular ulcers is alone involved. Practically, the great differences which we see post mortem in this condition result from the situation of, the rate of growth of, and the degree of inflammation accompanying the tubercles, and whether there is much or little exudation—serous, purulent, or hemorrhagic. The anatomical basis in all cases is essentially the same, and the variations which we meet, though distinct and marked, are scarcely sufficient to warrant the elaborate subdivisions of this disease made by certain writers. In reviewing a number of post mortems in this disease we find that they fall naturally into the following categories: 1. *Acute miliary tuberculosis*, characterized by a sudden onset, a rapid development, and a serous or sero-sanguineous exudation. 2. *Chronic caseous and ulcerating tuberculosis*, characterized by larger tuberculous growths, which tend to caseate and ulcerate, leading often to perforations between the intestinal coils, and a purulent or sero-purulent exudate, often sacculated. 3. *Chronic fibro-tuberculosis*, in which the process may from the outset be subacute, or may represent the final result of the miliary form. There is little or no exudation and the tubercles are hard and pigmented. There exists the closest analogy between tubercle as we see it on the peritoneum and as it occurs in the lung—the fresh miliary eruption, the caseous, ulcerating masses, and the chronic, fibroid, pigmented nodules may be studied with equal facility in either structure. A few practical points in the morbid anatomy may be mentioned. In many cases the process is entirely local. Thus in five of seventeen cases the condition was confined to the peritoneum. In from thirty to forty per cent of the cases in woman the Fallopian tubes are found affected. The process is commonly confined to the distal ends, and may be primary—which is usual—or is secondary to the peritoneal involvement. A point, worthy of attention on account of its importance as an aid in diagnosis, is the frequent involvement of the pleura. It is often only a dry pleurisy, occurring most frequently without pulmonary action, and due to direct extension through the diaphragm. The pericardium is also liable in these cases to be the seat of an adhesive tubercular inflammation. Tubercular peritonitis occurs at all periods of life. It is common in children, in whom it is often associated with intestinal and mesenteric disease. It is most common between the ages of twenty and forty. In old age it is rare, but it may occur even in advanced life. The disease is certainly more prevalent among females. It is stated that the disease is more common in the negro than in the white race.

Clinically it is extremely difficult to make a satisfactory classification of the cases of tubercular peritonitis, and we will here only refer to certain special features in the mode of onset and to peculiar symptoms, not, as a rule, very fully discussed. The process may be completely *latent*, and the eruption take place so slowly and so painlessly that the patient may not have

presented a single symptom of abdominal disease. The condition has thus been met with in the operation for hernia, and more frequently still in association with ovarian tumor. The onset of the symptoms may be *sudden*, so that the diagnosis of enteritis or hernia may be made. This suddenness of onset is very deceptive and usually leads to the diagnosis of a simple acute peritonitis. The disease may set in with pronounced *gastric symptoms* and simulate ulcer or cancer. A more common mistake is confounding tubercular peritonitis with *typhoid fever*, which it may simulate very closely. *Ascites* is a frequent symptom, but it does not, as a rule, become very marked; thus Biat, in an analysis of eighty-one observations, found only thirteen instances with extensive ascites. In the acute miliary tuberculosis with rapid exudation the effusion may be bloody, but this is not so common as in cancer, though the opposite statement is usually made. It has frequently been mistaken for the effusion in connection with cirrhosis, of which, indeed, it may sometimes be a complication. It is somewhat remarkable with what frequency acute tuberculosis of the serous membranes occurs in this disease. Moroux and Wagner have called attention to the involvement of the peritoneum, which is not so often affected as the pleura. Acute tubercular pleurisy may occur as a final complication in cirrhosis. Cases with extreme *tympanites* are also common. This condition, the result of impairment of the tone of the muscular coats, is a very constant feature in all forms of the disease. Many writers refer to the fact that the temperature in tubercular peritonitis may be normal, but it is not generally known that the temperature may be subnormal for weeks or months at a time. In the cases of fibrous tubercle without much inflammatory process or effusion, there is, as a rule, very slight fever and subnormal temperatures are common. Increase in skin pigment, particularly on the face, is an occasional symptom in tuberculosis of the peritoneum.

To the occurrence of tumor-like formations in tubercular peritonitis we are indebted for much of the increase in our knowledge on this subject, as the errors in diagnosis have shown the frequency with which these tumors occur and also how amenable the condition is to surgical treatment. The question has not been fully considered by any recent writer, yet its importance may be gathered from the fact that in ninety-six cases in which laparatomy was performed, in thirty-seven the diagnosis was tumor, ovarian or otherwise. We may recognize anatomically, and possibly clinically, four groups of cases in which with tubercular peritonitis tumors occur and may be felt on examination: First, omental tumor; second, sacculated exudation; third, retracted and thickened intestinal coils; fourth, mesenteric glands.

(*a*) *Omental Tumors.*—On the thin and delicate layers of the epiploön tubercles will be found if present at all on the peritoneum, but they do not often form large masses which can be felt through the abdominal wall. The omental tumor in connection with this form of peritonitis results from a slow tubercular process which gradually puckers and rolls the membrane, until it

forms an elongated, firm mass attached to the transverse colon lying athwart the upper part of the abdomen. This condition, perfectly well recognized by clinicians, is in many cases peculiar and distinctive. These cases often occur without much exudation, and result from a slow, latent process which may run its course without exciting serious symptoms. To diagnose this condition from cancer is often difficult. A pronounced tubercular history, subnormal temperatures—which are not so common in cancer, and which are specialiy likely to occur in these more chronic cases of tuberculosis—and the existence of disease in the pleuræ or lungs, are suggestive indications. Fagge calls attention to the existence of a resonant percussion note above the mass, which sometimes feels as if attached to, and indeed has been mistaken for, the edge of the liver, roughened and nodular.

(*b*) *Sacculated Exudations.*—These are the most common, as they are undoubtedly the most puzzling, of the abdominal tumors produced by tuberculous disease; so puzzling, indeed, that, as a long list of cases shows in which the operation for ovariotomy has been performed, the very elect among gynæcologists may be deceived. In these cases a sero-fibrinous or purulent exudation is confined and limited by adhesions formed between the intestinal coils, the parietal peritoneum, the mesentery, and the abdominal or the pelvic organs. What is felt as tumor may be entirely fluid, or it may have an irregular nodular character from the presence between the coils of large caseous masses. These sacculated tumors, due to tuberculosis, may, as in other forms of peritonitis, be met with in the upper, middle, or lower abdominal regions. In the upper zone, which includes the stomach, liver, and spleen, encysted collections of fluid are extremely common. Thus we have the localized peritonitis associated with gall-bladder disease, and with various affections of the stomach and of the liver and spleen. The effusion in these cases may be limited entirely to the upper region of the peritoneum. In tubercular disease by far the most common sacculated exudation occurs here with peri-hepatitis over the surface of an enlarged liver, and may lead to the suspicion of a gall-bladder tumor projecting below the edge of the ribs. These encysted peritoneal tumors are less common in the upper abdominal region. In the middle zone, which includes the peritoneal cavity from the level of the transverse meso-colon to the false pelvis, and which embraces the omentum and intestine, these encysted tumors are much more common, and, as the record of operations shows, are very frequently mistaken for ovarian tumor. They fall into two divisions, those in which the entire anterior portion of the peritoneal cavity is occupied by a large collection of fluid, and those in which a more limited sacculated exudation is found on one or the other side of the abdomen or in the middle line. Lastly, there are the sacculated exudations within the pelvis proper, in which case the disease almost always starts from the Fallopian tubes. The tubercular process may be exclusively upon the parietal peritoneum, and the coils of intes-

tines glued to the lateral walls may shut off completely the pelvic from the general cavity.

(*c*) *Retracted and Thickened Intestinal Coils.*—The matting together and thickening of several coils of the intestines may form a mass of great distinctness and even lead to the diagnosis of a solid tumor. This is most frequently met with in the cæcal region. They are not necessarily fixed tumors, but may be freely movable. The coils may not form a uniform tumor, but there may be a separation into three or four irregular masses, divided by fissures and covered with thick lymph. It is possible for the coil to form a resonant tumor.

(*d*) *Mesenteric Glands.*—Less common, perhaps, in tubercular peritonitis than any one of the previous conditions is the presence of tumors caused by enlarged glands. So far as can be ascertained, in none of the cases of laparatomy did they lead to an error in diagnosis. Cases are, however, on record in which extensive tuberculosis of these glands formed palpable tumors associated with ascites. A question of special interest relates to the association of mesenteric-gland disease with tubercular peritonitis. Gairdner has urged that in a large proportion of the cases of so-called tabes mesenterica, in which there is enlargement and hardness of the abdomen—the condition which the French speak of as *carreau*—there is involvement of the peritoneum. Jacobi has recently expressed the same opinion.

The *diagnosis* of these peritoneal tubercular tumors offers difficulties which vary greatly in the different varieties. The omental tumor is probably a less frequent source of error than any other, but as an identically similar condition may exist in cancer, it is not always possible, unless there is marked tubercular disease elsewhere, to determine the precise nature; and, as we have seen, even an acknowledged expert like Gairdner may be led astray. The lumpy, nodular character of the mesenteric tumors gives to them also a certain degree of distinctness. The mistake is sometimes made of confounding the large caseous nodules situated between the intestinal coils with the mesenteric glands. The possibility of their recognition depends very much on the degree of distention of the bowels, as extreme tympanites may completely cloak a very large tumor of this character. The tumors formed by contracted and thickened intestinal coils usually lead to error in diagnosis. The recognition of the saccular exudation, more particularly its differentiation from cystic ovarian disease, offers really serious difficulties, the extent of which may best be appreciated by the fact that of ninety-six cases of laparatomy in tubercular peritonitis, in not less than thirty ovarian disease was supposed to be present. Such being the case it may be worth while to discuss briefly certain diagnostic details. There is no single criterion which enables us to say in a given case that the condition is one of encysted peritonitis, nor, indeed, is there any special group of symptoms which can be regarded as distinctive. The points most suggestive, in individual cases, of tubercular trouble are:

First. The history of the patient and of the disease. Tubercular antecedents are common. Evidence may exist of old tubercular lesions. Gradual failure in health and strength may perhaps be taken into consideration, but it must not be forgotten that in many of the cases the patients have been robust and well nourished. The mode of onset is in the majority of instances gradual, but this is such a variable factor that it is not of very much value; perhaps the most which can be said on this point is that there can usually be elicited a history of obscure abdominal pains, irregular febrile attacks, and altogether a greater degree of gastro-intestinal disturbance than generally accompanies the slow evolution of ovarian cysts. If the case has been under observation for some time, the fever record should be of great assistance, as high or very low temperatures more commonly occur in this condition, though it is true that in inflamed and suppurating ovarian cysts there may be fever of a hectic type.

Second. The local physical signs. If possible, these are more deceptive than the history and symptoms. The question is not so much between the characters of a sacculated exudation and ascites, but it is the extremely nice one of discriminating between two varieties of sacculated effusion, ovarian and peritoneal. In typical cases the physical signs have conformed in every particular to those of cystic ovarian disease. There are a few indications which may at times be useful; thus when the sacculated tumor is limited and small, the outlines may not be so definite and clear as in ovarian disease. This is a point referred to by several writers. The position and form may be variable, owing to alterations in the calibre of the surrounding intestinal coils of which in part the walls are composed. At the periphery of the tumor irregular, nodular bodies—cheesy masses—may sometimes be felt, which in several instances have led to the diagnosis of malignant disease. Depression of the vaginal wall is not a safe indication one way or the other, as the condition may be present in ovarian tumor as well as in encysted peritonitis.

Third. In every case the condition of the tubes and of the lungs and pleura should be most thoroughly examined. The association of a tubal tumor with an ill-defined, anomalous mass in the abdominal cavity should arouse suspicion at once. So also the evidence of involvement of the pleura or of the apex of one lung.

Curability.—Until within the past few years, the general opinion in the profession has been that this disease is incurable; and in looking over the text-books of medicine, with but few exceptions the prognosis is given as "always fatal." Evidence, however, has been rapidly accumulating to show that in a considerable number of cases recovery in this disease is possible, either spontaneously or after operative interference.

(*a*) *Spontaneous Cure.*—There is no inherent improbability why tubercles on the peritoneum should not undergo involution as they do elsewhere. Anatomically the peritoneal growth bears in its evolution a close analogy to

the pulmonary, and this is still further borne out by the retrograde changes through which it passes. Just as the aggregations of miliary nodules in the lung may undergo the changes which we speak of as healing, becoming hard and fibroid, so in the peritoneum the tubercle tends in many cases to become sclerotic, and passes into a condition in which it is practically harmless. This beneficial result is more likely to be seen in cases belonging to the group in which, from the outset, the process is subacute and not associated with much exudation; but there are cases on record in which recovery has followed even after extensive effusion. The anatomical changes are, in brief, these: Fibroid and pigmentary induration of the tubercles, absorption of the exudate, transformation of the fibrinous material into connective tissue, with the union to a greater or lesser extent of the intestinal coils and of the peritoneal surfaces with each other. The cases which are most likely to terminate favorably are those in which the infection is limited to the peritoneum, the inflammation of moderate grade, and the effusion slight in amount and sero-fibrinous. An adhesive inflammation, as it is termed, may accompany the process from the outset, and a gradual sclerosis may overtake the tubercles and render them harmless. Caseation and ulceration, with a sero-purulent exudation, preclude the possibility of spontaneous cure. Extension to the pleura and lungs, and the coexistence of intestinal or tubal disease, are conditions equally unfavorable to permanent recovery.

(*b*) *Cure by Operation.*—The beneficial effects which, in a number of cases, followed the opening of the peritoneum when a sacculated exudation was mistaken for ovarian tumor, encouraged surgeons to perform laparatomy in ordinary cases of tubercular peritonitis accompanied with much effusion. The questions remain for consideration, What cases are most suitable for operation, and how can we explain the beneficial influence? Undoubtedly cases with fresh eruption and considerable effusion, whether free or sacculated, offer the best chance of recovery, as the disease is more likely to be primary in the peritoneum, the general condition is usually better, and the subsequent chances of general infection are much slighter. When the Fallopian tubes are extensively diseased, and when the process has extended through the diaphragm to the pleura, the condition is of course less favorable. The existence of marked omental tumor, in the form of a transverse ridge, need not necessarily be an objection to operation, as spontaneous resolution of such masses may take place. In cases, then, with somewhat sudden onset, rapid development of ascites with fever of moderate grade, we may be most sanguine of success. In the class of cases with extensive caseous masses in the peritoneum and a purulent exudation, the outlook is necessarily less hopeful; but even in such instances, particularly when the exudation is sacculated, laparatomy may be advised as a palliative measure. In the chronic adhesive form, no benefit can be expected to follow the operation, which can only be intended to remove an omental mass or to open a sacculated effusion. In the majority of the cases of this group

nature is effecting a cure in which she scarcely needs outside assistance; and the danger lies not so much in the peritoneal disease as in the risk of pulmonary infection. It is difficult to explain the beneficial results of the operation. It is interesting to note that not alone in tubercular peritonitis, but in other forms with effusion, the simple opening and drainage of the cavity has seemed to exercise a very beneficial effect on the subsequent course of the disease. Mr. Lawson Tait comments at some length on this remarkable tendency of abdominal neoplasms to undergo retrograde changes after an exploratory incision. His statements on this point are most interesting and deserve the careful consideration of physicians as well as surgeons. He says that he has seen tumors disappear after laparatomy in cases of disease of the liver, spleen, and head of the pancreas. He does not specifically mention cancer of the peritoneum. His remarks deserve quoting, as they bear directly upon this subject: "The cases are far too numerous, and the results indicate sequence far too clearly, for us to dismiss the phenomena as a mere coincidence; nor can we accept the explanation of subsequent medical treatment as having brought about this much-desired ending. I am satisfied that the mere opening of the peritoneal cavity has a direct influence in setting up the process of absorption of the tumor, and my conviction in this direction has increased my confidence in the principle of exploration. That some emphatic physiological change is at once set up by opening the peritoneal cavity is clearly indicated by the uniform onset of a most distressing thirst, which lasts for days, and is not seen so markedly after any other operation known to me. Let the incision in the abdominal wall be made down to the peritoneum, but let the serous cavity remain unopened, and this thirst is not marked. But let the peritoneum be opened but a finger's breadth and the result is marked. That a therapeutic change is effected in the peritoneum itself by the mere opening of the cavity is now universally recognized in the treatment of what we call tubercular peritonitis by abdominal section. I have now had a large experience on this point, and can say positively that we can cure permanently and speedily cases that have gone even as far as suppuration, by opening and cleansing. But in the bad cases in all probability the cleansing is never complete, no matter how much time and care are spent on it. And in the non-purulent cases I very often do no cleansing at all, but merely empty out the serum and put in a drainage pipe. Yet the great majority of these cases are cured by these simple means." Evidently, in whatever way brought about, the opening and drainage of the peritoneum favor in a remarkable way the regression of the tubercles; and it does more than this, for with an improvement in the local symptoms the fever reduces and the general condition of the patient rapidly improves. It must not be forgotten that in certain cases the bacilli are very difficult to find in peritoneal tuberculosis, though they may be most abundant even when the tubercles are very hard and fibroid. The important practical point is the relief and cure of these cases by laparatomy, and

the surgeons may well leave to the pathologist the minor question of determining the nature of the chronic peritonitis. Among the conclusions which follow from the foregoing considerations are:

1st. That tubercular peritonitis is often a latent affection, localized in the peritoneum, which may even run its course without inducing special symptoms.

2d. That, as in other local tubercular processes, there is in this a natural tendency to healing, which takes place more frequently than has hitherto been supposed.

3d. That statistical evidence shows laparatomy to be in many cases a palliative, and in a certain number a curative, measure.]

CHAPTER XXXIII.

INTRA- AND EXTRA-PERITONEAL PELVIC HÆMATOCELE.

Definition and Classification.—A mere effusion of blood, intra-pelvic hemorrhage, should not be confounded with hæmatocele. The term, which has both an anatomical and a clinical significance, should be reserved for encysted collections of blood. As I shall show later, such a condition occurs only under special pathogenic circumstances which impart a durable character to the lesion, and give it a distinct morbid entity. The effused blood may have one of two situations: 1st. It may be within the peritoneum and in that case usually accumulates behind the uterus; this is intra-peritoneal hæmatocele; its clinical history was the first to be distinctly outlined. 2d. The blood may spread below the serous membrane, within the broad ligaments, and into the peri-vaginal cellular tissue; it here forms a veritable thrombus, and the earlier writers described it by that name. The name of extra-peritoneal hæmatocele is less appropriate than that of hæmatoma, but it has been fixed by custom.

Intra-peritoneal Pelvic Hæmatocele.—*Synonyms.*—Retro-uterine, peri-uterine, pelvic, peri-hysteric, uterine, circum-uterine hæmatocele are some of the various names which have been given to the affection. I have adopted the name of pelvic hæmatocele, which is the most comprehensive; but it must be acknowledged that the name retro-uterine hæmatocele applies best to the clinical variety most frequently met with.

Historical Outline.—To Nélaton is justly ascribed the honor of having been the first to inscribe this disease in the nosological tables by his masterly description of it. It will not in the least detract from his merits to mention the ideas held by Ruysch upon the effusion of blood within the peritoneum; by Bourdon upon the physical signs of these tumors, ideas which were vaguely hinted at by his teacher Récamier; by Velpeau, who seems to have diagnosed them without pronouncing upon their exact situation. Special mention should be made of the works of Bernutz, in which he ably delineated many of the features used later by Nélaton in his more extended work. In addition, we must cite the important works of Huguier, Puech, A. Voisin, Trousseau, Langier, Gallard, Besnier, Poucet, MacClintock, Barnes, Schröder, Olshausen, Bandl, etc., to the greater number of which I shall have occasion to refer again.

Etiology and Pathogenesis.—The effusion of blood into the pelvic cavity is probably quite frequent: there is no doubt that at the menstrual period the

tubes are the seat of an exudation of blood as well as the uterus. Many menstrual disorders caused by fatigue, strain, or cold are really due to the effusion of a small amount of blood into the peritoneal cavity, where it is rapidly absorbed. We know by numberless physiological experiments, as well as by observation of what occurs during many laparatomies, how easily the blood disappears when the peritoneum is in a healthy condition. But let it be impaired or destroyed, and this absorptive power disappears at once; hence the necessity for drainage in many cases of laparatomy. Here also is the probable explanation of the non-resorption of blood in hæmatocele, when the blood is not effused in great abundance. In fact, if an extensive effusion of blood fails to be absorbed, as occurs for instance after the rupture of an extra-uterine tubal pregnancy, the clots which are formed act as foreign bodies; the peritoneum is impaired, and by the formation of its protective false membranes tends to isolate the cause of irritation. The imprisoned blood undergoes a slow process of molecular disintegration, and sometimes, under the influence of septic infection derived no doubt from the tube, may even decompose and become mixed with pus.

If the blood from an intra-peritoneal tubal hemorrhage spread slowly, and be of small amount, it will be absorbed unless some previously existing condition oppose, and this condition is usually an inflammation of the pelvic peritoneum surrounding the diseased tubes which are the source of the hemorrhage. A great number of autopsies and examinations during laparatomy have demonstrated this origin. F. Imlach reports that in fifteen cases of laparatomy for hæmatocele he found both tubes distended by thick black blood, exactly like that effused into the abdomen. Now, tubal pregnancy is not to be thought of when the lesion is bilateral, nor can we admit a reflux of blood from the abdomen into the tubes. E. Sinclair Stevenson also believes, from evidence furnished by specimens of extirpated tubes, that the narrowed calibre of the inflamed tubes may cause hemorrhage into the peritoneal cavity at the menstrual period. Tubal inflammation prepares in advance for encysting the effused blood, by the formation of false membranes around the fimbriated extremity of the tube; the vestiges of these membranes are found in the partitions of the cyst. Slight attacks of pelvic peritonitis, with relapses, are almost always observed at the outset of the disease.

The usual origin of extensive effusions of blood is undoubtedly the early rupture of an extra-uterine tubal pregnancy, so that the history of pelvic hæmatocele is really in most cases only a chapter in the subject of extra-uterine pregnancy. Hæmatoceles from any other cause are quite the exception. For a more detailed description of this accident, consult the chapter devoted to the subject. As to the progressively developed and concealed hæmatocele, which are very rare, and usually complicate some other lesion (salpingitis, fibroids), they are probably true intra-peritoneal salpingorrhaphies.

This question of pathogenesis has been and still is the subject of dispute.

I will briefly review the various theories which have been successively advanced. Each one seems to exclude the others, and yet it is probable that they all are founded upon well-authenticated cases; one factor only is constant, and that is the impairment of the absorptive power of the pelvic peritoneum, which is either a primary or secondary affection, and caused by preexisting perisalpingitis or by the abundance of the effusion, which injures the peritoneum by prolonged contact and a sort of permanent imbibition.

Varicose Rupture.—The rupture of varicosities of the utero-ovarian venous plexus, pointed out by Ollivier in 1834, was given especial prominence by Richet. But recent histological researches appear to show that even in the case of apparently authentic varicose rupture there is nearly always an unrecognized tubal pregnancy. The hæmatocele produced during the course of a tubal pregnancy may come, not from rupture of the ovum, but from rupture of a dilated vein on the broad ligament. I have observed one such case. The excessive pressure which follows ligature of the tubo-ovarian vessels after salpingotomy sometimes occasions an intra-ligamentous rupture of the veins, either as the result of some slight exertion, or else from the congestion present at the menstrual epoch. Winckel has shown that the phleboliths contained in the varicose veins may ulcerate through their walls toward the peritoneal cavity as well as toward the interior of the broad ligament.

Disorders of Ovulation.—This theory attributes the production of hæmatocele to some ill-defined irregularity of ovulation; if the tube is not in exact contact with the ovary at the moment of ovulation, the blood will be effused into the peritoneal cavity. Gallard believes that in every case of hæmatocele there is extra-uterine ovulation, whether the ovule have been impregnated or not.

Reflux through the Tubes.—The majority of the older writers deny that the tubes themselves have any part in the catamenial flow; but they admit the possibility of a reflux of the menstrual blood from the uterus, under some disturbing influence. Bernutz, who admits that hæmatocele may be symptomatic of the menstrual flow, supports his view upon the authority of Ruysch and Haller. Guérin suggests that the troubles produced by membranous dysmenorrhœa are of a nature to cause an effusion of blood into the peritoneal cavity. He says: "The uterine mucous membrane swells to such an extent during menstruation that it entirely fills the uterine cavity. When the menstrual crisis is to terminate in the exfoliation and throwing off of this membrane, its turgescence does not prevent hemorrhage, but merely impedes its flow into the vagina; the mucous membrane becomes detached from the subjacent tissues and for a while hermetically seals the opening into the cervix, while the tubal orifices are open." The uterine contractions then would tend to expel the blood through the ostium abdominale into the peritoneal cavity. Guérin quotes in support of this theory a case of membranous dysmenorrhœa complicated by hæmatocele, and claims to have seen many other

examples. This etiology seems to me to be doubtful, unless there exist an acquired or congenital contraction (see Stenosis of the Cervix and Retention Accidents following Genital Atresia).

Ovarian Apoplexy.—Microcystic degeneration resulting from chronic ovaritis, follicular cysts, and cysts of the corpus luteum are sometimes the seat of hemorrhages, and their rupture may cause an effusion of blood into the peritoneal cavity, which is, however, never very abundant.

Pachy-peritonitis.—We know that meningeal hemorrhages are due to the rupture of the dilated and friable vessels of the false membranes in anterior pachy-meningitis. Dolbeau was the first to demonstrate this interesting fact of general pathology, and then Virchow, who is usually considered to be the originator. Might not a similar process explain the formation of hæmatocele? The idea is natural in view of the formation of false membranes due to pelvic peritonitis. Ferber, Besnier, and Bernutz developed this theory, which has certainly been over-abused.

Rupture of Extra-uterine Pregnancy.—Huguier gives to occurrences of this nature the name of pseudo-hæmatocele. If the rupture is accompanied by extensive hemorrhage and causes sudden death, it could not legitimately be given the name of hæmatocele. But why refuse it to the cases in which the effusion is circumscribed and encysted? It is even probable that these cases are more frequent than is usually supposed, and that there are intra-peritoneal abortions, so to speak, which are often overlooked as are often the ordinary abortions when they occur in the first weeks of conception. In exceptional cases we find a fœtus which has undergone more or less alteration; more usually it has disappeared, but under the microscope, on certain portions of the boundary wall of the hæmatocele, we find chorionic villi (see Extra-uterine Pregnancy).

Among predisposing causes must be mentioned any general disease which causes hemorrhages. But it would be absurd to give the name of hæmatocele to the effusions of blood into the pelvis in cases of scorbutus, icterus, phosphorus poisoning, etc.

I should not omit to point out the influence of menstruation as a determining cause. Hæmatocele usually makes its appearance at the menstrual period, as we can readily understand if we consider the congested state of the pelvic organs at that time. Anything adding to the existing erethism, as fatigue, shock, coitus, etc., acts in the same way.

Without denying to each of the causes given some part in the etiology of intra-peritoneal pelvic hæmatocele, we may assert that the great majority of cases start from some tubal lesion, hemorrhagic salpingitis with peri-salpingitis in the case of progressive hæmatocele of moderate amount; fœtal cyst for the sudden and abundant hæmatocele called cataclysmic (Barnes).

Pathological Anatomy.—The tumor is usually situated in the cul-de-sac of Douglas, which is the most dependent portion of the pelvis; hence the name retro-uterine hæmatocele, chosen by Nélaton. Previously existent

plastic inflammation may obliterate the cul-de-sac, and the blood will then accumulate between the bladder and the uterus under the influence of gravity, and an ante-uterine hæmatocele will thus be formed. G. Braun and Schröder give some examples of this kind; other more numerous examples refer to ante-uterine extra-peritoneal hæmatocele.

At the outset the blood is liquid, and forms a sort of lake which is easily displaced, for it is rare to have pre-existing false membranes constituting a sac. The cyst, however, is rapidly formed, and is then entirely separate from the mass of intestines. It may therefore be difficult to distinguish the arch formed by the new membranes from an uplifted peritoneum, and to

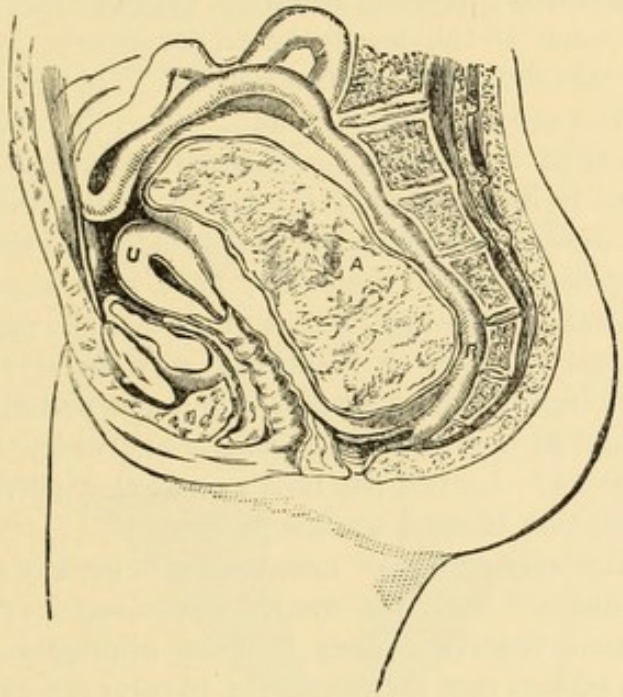


FIG. 462.—RETRO-UTERINE HÆMATOCELE. *U*, Uterus; *R*, rectum; *A*, intra-peritoneal hæmatocele encysted by false membrane.

differentiate between an intra- and extra-peritoneal hæmatocele. In the latter form, however, the tumor is more laterally situated, as it is chiefly the broad ligament which has been unfolded and displaced. The sac adheres anteriorly to the posterior wall of the uterus, which is pushed toward the symphysis; it is of a blackish color. The ovaries and tubes become less and less recognizable and more easily confounded with the walls of the tumor. Sometimes the tubes are filled with blood and torn; in the case of fœtal cyst, only one is affected. The agglutinated intestines may adhere to the cyst wall. When it is opened, we find a mass of coagulated or syrupy, semi-liquid blood, according to the length of time that the lesion has existed. It is black in color, like the interior of a raisin; in the most external part we may find layers of whitish fibrin. The cyst walls are thick in some places, and thin in others where a rupture seems imminent. The rectum is compressed and displaced (Fig. 462).

We must not confound with hæmatocele the hemorrhages occurring within ovarian cysts; their walls possess a characteristic structure. It is also incorrect to give the name to the temporary accumulation of clots in a pelvic abscess which has been punctured. The size of the tumor varies; it may reach that of the uterus at term. If it persist a long while, compression of the ureters may lead to renal lesions as in the case of other abdominal tumors. Suppuration frequently occurs. At autopsies signs have often been found of attempted spontaneous cure—absorption of the fluid and retraction of the sac, which was filled with newly formed connective tissue, stained by the pigment of the blood.

Even in cases in which there is reason to suspect the rupture of a tubal pregnancy as the cause of the lesion, we do not usually find any trace of a fœtus; it usually disintegrates and is absorbed. This rupture occurs very suddenly toward the second or third month; when the autopsy is held soon after the beginning of the accident, and when the fœtus was alive only a short time previous to its occurrence, it may be identified among the clots. Often the patient dies so suddenly that no cyst is formed and there is merely an internal hemorrhage. Still, there may have been a previously formed hæmatocele, a second one proving fatal; in that case the phenomena develop with sufficient rapidity to allow of identification of fœtal remains at the autopsy. Though the fœtus leave no trace, it is not so with the chorionic villi, which may be found by a careful examination and which frequently reveal the cause of the lesion. L. Tait has thus proved that pelvic hæmatocele is the ordinary termination of extra-uterine pregnancy.

Symptoms.—The appearance of hæmatocele is usually preceded by morbid symptoms connected with the uterine appendages: pain, disorders of menstruation, gastric reflexes. They indicate salpingitis or extra-uterine pregnancy. It is seldom that the effusion of blood is not ushered in by acute accidents, but their intensity varies. They may be what Barnes calls cataclysmic: depression, syncope, cold, sudden death. If the patient survive this internal hemorrhage, the symptoms of an abdominal tumor appear, while the general symptoms gradually disappear.

In less severe cases, the onset is marked only by local pain and a sensation of weakness, joined to an increase in size of the abdomen.

Finally the intra-peritoneal oozing of blood may occur in an insidious, almost imperceptible manner.

Upon the days following the first appearance of the morbid phenomena, attacks of plastic peritonitis circumscribe the effused mass, and occasion nausea, abdominal distention, pain, and fever.

The objective signs revealed by touch and bimanual palpation are those of a fluctuating tumor in the cul-de-sac of Douglas, which pushes the uterus upward so that the cervix is reached with difficulty. If we do manage to reach it, we find it flattened against the pubis. The tumor soon loses its fluctuation, and acquires a consistence like that of snow; but this consist-

ence may vary greatly, and in some places be hard and in others soft. Bimanual exploration will enable us to outline the body of the uterus, which seems to be encased in the tumor that fills and more than fills the pelvis (Fig. 463). Rectal touch is greatly interfered with by the compression of the intestine. This compression may give rise to symptoms of internal strangulation; that of the bladder to retention of urine; that of the sacral plexus to acute neuralgias of the lower limbs. The general condition varies; even when there is no suppuration we frequently observe irregular attacks of fever, due to the peritoneal reaction caused by the formation of false membranes.

The course of the disease is essentially chronic, but successive acute attacks occur, as if additional amounts of blood were from time to time

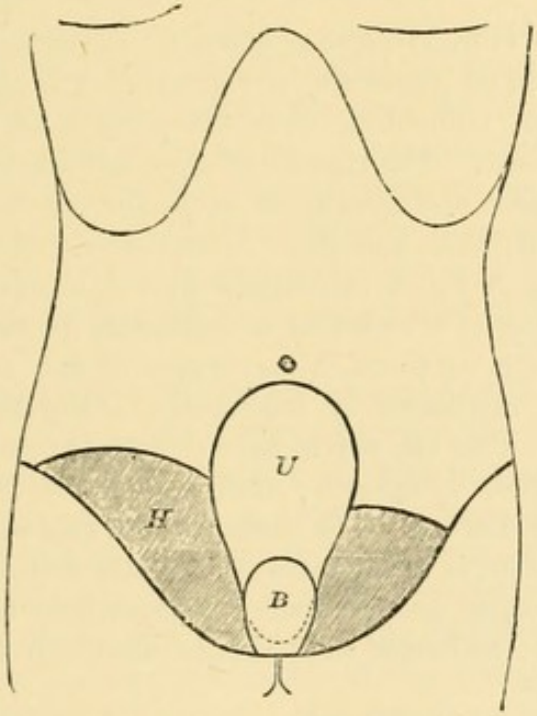


FIG. 463.—RETRO-UTERINE HÆMATOCELE. *U*, Uterus; *B*, bladder; *H*, hæmatocele.

effused. They may be manifested a few days after the onset or later at the menstrual periods, no doubt under the influence of the catamenial congestion. When the intra-peritoneal hemorrhage is caused by the rupture of a fœtal cyst, a relapse is especially to be feared, and may cause sudden death, even when it seems as though all danger had passed. Outside of these exceptionally severe cases, the disease tends to a cure by progressive absorption or spontaneous evacuation; the latter, however, which can only occur after suppuration of the sac, may cause grave accidents.

In the most favorable cases the patient is unable to walk for many months, and is exposed to repeated slight attacks of peritonitis during which the tumor is subjected to changes of size and finally diminishes by degrees. After its disappearance there may remain an indurated nodule, or simply a displacement and immobility of the uterus.

Suppurative inflammation is ushered in by an aggravation of the general symptoms, erratic chills and sweats. At the same time the tumor increases in size and softness. Perforation into the abdominal cavity is rare. The peritonitis which sometimes occurs in cases of suppuration of the sac is usually due to direct propagation of the inflammation through the walls.

Perforation into the rectum is more frequent. It is preceded by signs of rectitis, and ushered in by sudden diarrhœa with black and fetid stools, causing a sensation of relief and a disappearance of the tumor. The evacuation may be complete and recovery follow; but, on the other hand, death may occur from exhaustion or from infection caused by the entrance of fecal matter. Perforation into the vagina is rare; into the bladder it is altogether exceptional.

Diagnosis.—The clinical picture given by hæmatocele is often so characteristic that there is no possibility of mistake. The sudden appearance of a retro-uterine tumor, coinciding with the phenomena of internal hemorrhage, is pathognomonic. The rupture of a pyo-salpinx or of a pelvic abscess causes only sharp pain and symptoms of peritoneal reaction, usually more intense than in hæmatocele, and there is no tumor. Neither will there be danger of mistaking it for a retroflexed gravid uterus. One of the best means of avoiding error is to endeavor to outline the boundaries of the uterus, which in hæmatocele is enclosed in the centre of the swollen mass. This examination will be facilitated by anæsthesia. Ovarian cysts and uterine fibroids imprisoned within the pelvis have nothing in common with hæmatocele except the objective symptoms; their manner of appearance and their course are entirely different. The same may be said of extra-uterine pregnancy, which, moreover, is rarely situated directly behind the uterus. The hypertrophy of the organ and persistent amenorrhœa favor the supposition of ectopic pregnancy; as I have said, this is often only the starting-point of later hemorrhages.

At an advanced stage, inflammatory nodules of perimetro-salpingitis can only be diagnosed by the history of the case.

The diagnosis of the origin of the hemorrhage cannot be definitely made. In the hæmatocele that is ushered in suddenly, we are usually safe in considering the cause to be rupture of a fœtal cyst. The hæmatocele which begins insidiously and progresses slowly is usually due to a gradual effusion of blood caused by hemorrhagic salpingitis. Where large varicosities exist, there might be a rupture of a vein of the broad ligament.

Prognosis.—The affection is serious; in rare cases, sudden death occurs; there is always the danger of severe accidents before recovery is established. Moreover, a cure is rarely complete; the plastic remains around the uterus are a frequent source of discomfort, and almost invariably cause sterility.

Treatment.—Active interference is justified only by the appearance of accidents which may endanger the life of the patient. In the beginning, if the symptoms are not severe, we may apply ice to the abdomen to combat

both the hemorrhage and the peritonitis. Absolute rest is indicated; the bladder is to be regularly emptied by the use of the catheter and the intestines by enemata. We must be careful not to administer too much opium for the pain, on account of its constipating effect. Antisepsis of the vagina is to be carefully looked out for, in order to avoid all danger of infection through the genital tract.

The history of surgical interference in this affection can be divided into three periods: from Récamier's time to Nélaton's it was thought necessary always to puncture or incise these collections of effused blood whose spontaneous absorption seemed impossible; later the number of unsuccessful results caused this method to be abandoned, and it was discovered that large hæmatoceles were apt to become spontaneously cured; the expectant treatment was then systematically adopted. At the present day we leave the disease to itself so long as it follows a regular and progressive course toward absorption. But, thanks to antisepsis, we need no longer hesitate to interfere as soon as the patient's life seems to be threatened by compression or inflammatory phenomena. Rapid evacuation of the cyst is then obligatory.

Incision is preferable to puncture; the latter does not permit of the evacuation of solid matter nor of a thorough cleansing, and may form a septic fistula. The site of incision is to be determined by the protrusion of the tumor.

If it project frankly into the posterior cul-de-sac, it should be opened through the vagina. The cervix is drawn forward, the index of the left hand placed in the rectum, while by the use of retractors the operating field is enlarged as much as possible, and an incision is made following the axis of the tumor, with care not to go too far to the sides on account of the ureters. The finger in the rectum serves as a guide in avoiding the intestine. As soon as the interior of the cyst is reached, the incision is enlarged with the scissors, if necessary, and the evacuation of the syrupy fluid and the clots aided by weak antiseptic injections. We should proceed with the greatest care, and not attempt to cleanse out the cavity too suddenly, for fear of injuring the adhesions bounding it. After cleaning, we fill the cavity with a loose tamponade of strips of gauze, which are to be left in place for forty-eight hours; this protects against further hemorrhage, and completes the process of disinfection. When this gauze is removed, the antiseptic irrigations are renewed, and a T-tube is inserted, which is packed about with gauze, but only in the vagina, from fear of absorption. The free end of the tube is to be wrapped in antiseptic dressings; injections may be made through the tube once or twice a day if necessary. If the cavity be very large, each antiseptic injection should be followed by one of boiled water, otherwise we may have toxic symptoms.

Antisepsis has completely altered the prognosis of this operation. Nélaton, who at first advocated its use, gave it up on account of the frequent cases of septicæmia following it. Gusserow gives his personal experience,

consisting of eight cases, with six cures lasting from six to twenty-one days; he advocates interference in very serious cases only. Routier reports three cases successfully treated by vaginal incision, which he now prefers to laparatomy. Vaginal incision necessitates perfect antisepsis, and is often dangerous when the tumor is some distance away from the posterior cul-de-sac, which may be obliterated, and projects into the abdomen. If the cavity is very large, a vaginal incision, which must always be limited in extent, may be insufficient for complete evacuation and perfect antisepsis. Under these conditions I once successfully performed subperitoneal laparatomy. This operation consists essentially in a long incision parallel to the crural arch, the detaching of the peritoneum as far as the cyst, and penetration into the latter through the surface which adheres to the pelvis, without entering the large serous cavity. After having carefully emptied the blood cyst, its cavity is to be explored by the introduction of the fingers into its most dependent portion, and by combining vaginal touch with this procedure, we determine the most favorable point for the insertion of a drainage tube through the posterior cul-de-sac. Whether the cyst be small or large, this drainage with a T-tube is to be combined with drainage by abdominal incision, with two tubes fastened together like gun-barrels, or a series of tubes in juxtaposition like the representations of Pan's flute, or with strips of iodoform gauze. For two or three days at least it will be well loosely to tampon the cavity with the gauze prepared in a weak solution of iodoform; this has the triple advantage of opposing secondary hemorrhage *a vacuo*, of completing the antiseptic treatment, and of supplementing the passive action of drainage tubes by more active capillary drainage.

If, during an attempted subperitoneal laparatomy, we are unable to detach the peritoneum as far as the point where the pocket adheres to it, we can always resort to the following process: We freely incise the peritoneum at the bottom of the wound, and place tampons upon the pocket which is intact, so as to provoke the formation of a passage closed in by adhesions between it and the incision. After twenty-four hours the tampons are removed and the cyst opened.

Laparatomy properly so called, or transperitoneal incision, has given good results. If possible, we must fix the pocket to the abdominal wall by veritable marsupialization, empty it, tampon, and drain. This theoretical manœuvre is rarely practicable, as there is so seldom a well-defined and resistant pocket; the walls are usually formed merely by the agglutination of neighboring organs. We may be obliged to limit ourselves to an antiseptic irrigation of the cavity, and then simply abandon it in the abdomen. Capillary drainage and a tamponade with iodoform gauze would be advisable in such a case.

It seems to me that transperitoneal laparatomy should rarely be performed, on account of the danger of septic peritonitis.

One case in particular, and fortunately a rare one, necessitates prompt

surgical interference; this is when the starting-point of the troubles is the abortion of a tubal pregnancy. In such cases the hemorrhage comes in successive attacks; shall we wait for the catastrophe or anticipate it by an immediate laparatomy? Martin reports a case where he regretted having abstained from operating; the patient died of a fresh hemorrhage four days after the consultation. In such cases bold interference seems to me not only legitimate, but absolutely called for at once by the special clinical symptoms.

EXTRA-PERITONEAL HÆMATOCELE.—The effusion of blood into the connective tissue of the pelvis has been called extra-peritoneal hæmatoma, thrombus of the broad ligaments, and pseudo-hæmatocele. Some writers have denied its existence outside of the puerperal state, in which thrombus of the vagina and vulva may also be produced, but at the present day its existence is acknowledged.

Etiology.—It may be produced by the influence of pregnancy, which, as we know, causes a dilatation of the entire pelvic venous system, especially of the utero-ovarian plexus. But utero-ovarian varicocele may exist and cause a subserous rupture, even outside of pregnancy, from rupture or ulceration of veins containing phleboliths. It is usually observed as a result of overwork or sexual excesses, during the menstrual period, in multiparæ whose veins are more dilated than those of women who have never had children.

According to Byrne, thrombus of the broad ligament is more frequent than is usually admitted, and may often cause pelvic abscess or phlegmon. Skene Keith calls attention to the fact that an ephemeral extra-peritoneal hæmatocele often follows salpingotomy, because of a congestive hemorrhagic outbreak at the period corresponding to the next menstrual epoch. Beigel believes that extra-peritoneal hæmatocele constitutes a considerable portion of cases usually classified under the more ordinary form.

Pathological Anatomy.—The blood may form a circumscribed tumor between the folds of the broad ligament, which, not being a closed cavity, but communicating with the pelvic cellular tissue, permit of an escape of the blood if it be abundant; the effusion then is directed toward the vagina and rectum. The tumor is usually of medium size, varying from the size of a fist to that of a man's head. It is frankly lateral, and, should two tumors exist, one is always much larger than the other. The two may, however, unite. Sometimes the tumor is in front of the uterus. A. Martin, who has had the opportunity of studying the pathological anatomy in several operations, has always found a pocket with an irregular surface, studded with diverticula which penetrate the cellular tissue, and crossed by bridles of connective tissue and broken blood-vessels. The contents are formed of blood and more or less degenerated clots; there is sometimes an admixture of pus; it may communicate with an intra-peritoneal effusion by a tear in the broad ligament.

Symptoms.—This accident usually occurs to women who are apparently

in a healthy condition. Sharp pain in the abdomen with a tendency to syncope mark the onset. There may, however, be successive attacks. The symptoms of profound anæmia and troubles due to compression of the bladder and rectum are manifested, together with swelling and tenderness of the abdomen. By touch and bimanual palpation we feel that the tumor is in the broad ligament and not in the cul-de-sac of Douglas; it is soft and pasty; the uterus is upon its internal surface, and more or less pushed aside, but it can be distinctly outlined on every side. As to the other symptoms and the course of the disease, they are the same as those given for intra-peritoneal hæmatocele.

One special symptom, ecchymotic spots of the vagina, belongs to extra-peritoneal hæmatocele. In some rare cases ecchymosis of the abdominal wall has been observed. The differential diagnosis between it and extra-peritoneal hæmatocele cannot always be made. It must be based upon the etiology, the frankly lateral situation of the tumor, and its relations.

Treatment.—Expectant treatment is the rule. If the gravity of the symptoms calls for interference, we cannot do a vaginal operation because of the danger of wounding a large vessel or the ureters. Subperitoneal laparatomy seems to me to be the best operation. Martin recommends trans-peritoneal laparatomy, with cleansing of the cavity, and suture of the wound over a T-tube which emerges through the vagina. He has had nine successful results out of ten operations. In some cases vaginal hysterectomy might give good results.

CHAPTER XXXIV.

EXTRA-UTERINE PREGNANCY.

In extra-uterine or ectopic pregnancy the impregnated ovum is developed outside of the normal uterine cavity.

Pathology and Etiology.—Extra-uterine pregnancy is determined by any condition preventing the application of the ampulla of the tube to the surface of the ovary at the time and place of rupture of the Graafian follicle. We know that spermatozoa may penetrate to the peritoneal cavity, and that they may there retain their functional life; also that the ovule may travel a considerable distance without losing its vitality. The most frequent conditions leading to extra-uterine pregnancy are adhesions of the ovaries and tubes, a result of peri-salpingitis; loss of the ciliated epithelium; or an obstacle to the migration of the ovum in the shape of an intra-tubal polypus. Emotional conditions at the time of conception have also been suggested as a cause.

The condition is somewhat rare. Out of 60,000 women examined in the course of seven years in the clinics of Carl Braun and Späth, of Vienna, there were but 5 cases of extra-uterine pregnancy. This proportion would seem to be too low: Fasola observed an equal number of cases out of only 1,565 pregnancies in multiparæ who had remained for some time sterile. Toth observed 31 cases out of 1,700 women suffering from gynæcological affections. A return of extra-uterine pregnancy in the same woman has been noticed.

[Greater skill in diagnosis and early resort to laparatomy in doubtful cases have proved this condition to be much more frequent than was supposed a few years ago.]

Classification.—Numberless divisions and subdivisions of this subject have been made, but are of little value. The greater number of fœtal cysts are situated in the tube and are tubal pregnancies. If the ovum is developed entirely within the tube, we have a simple tubal pregnancy; if the uterine walls are also involved, it is a tubo-uterine or interstitial pregnancy; and if the fœtus is partly within the abdominal cavity, a tubo-abdominal pregnancy; to these varieties may be added the tubo-ovarian. If the tube should rupture and the development of the fœtus continue within the abdominal cavity, we have a secondary abdominal pregnancy. Some authorities maintain that abdominal pregnancy may be primary. If the rupture occur in the attached portion of the tube, the fœtus may develop within the folds of the broad ligament—a condition to which has been applied the name of

subperitoneal. Finally, there exist several well-established cases of ovarian pregnancy in which the ovum has developed upon the surface of the ovary,

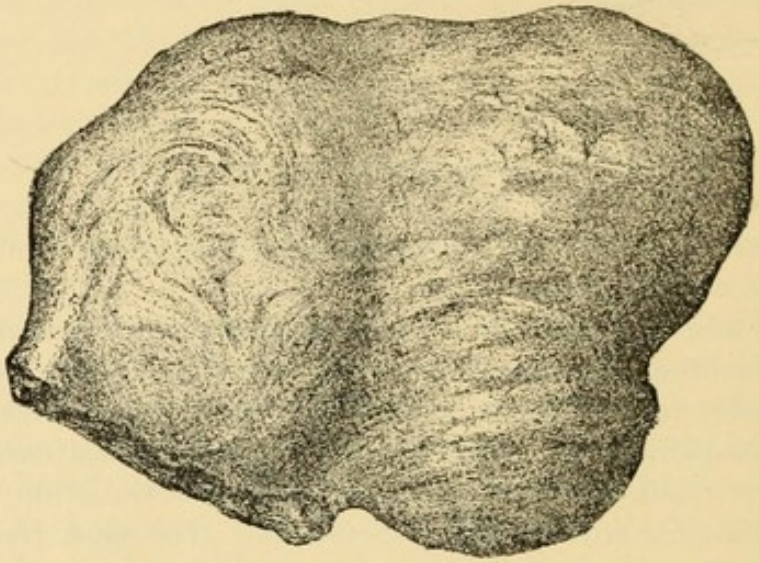


Fig. 464.—Tubal Pregnancy of Two and a Half Months, Sac Closed (Bouilly).

but their number is smaller than has been supposed. Certain anatomical characteristics make the diagnosis between this variety and abdominal pregnancy difficult.

Pregnancy in a rudimentary horn of the uterus differs so essentially from normal pregnancy, and so resembles fœtal cysts, that its description should

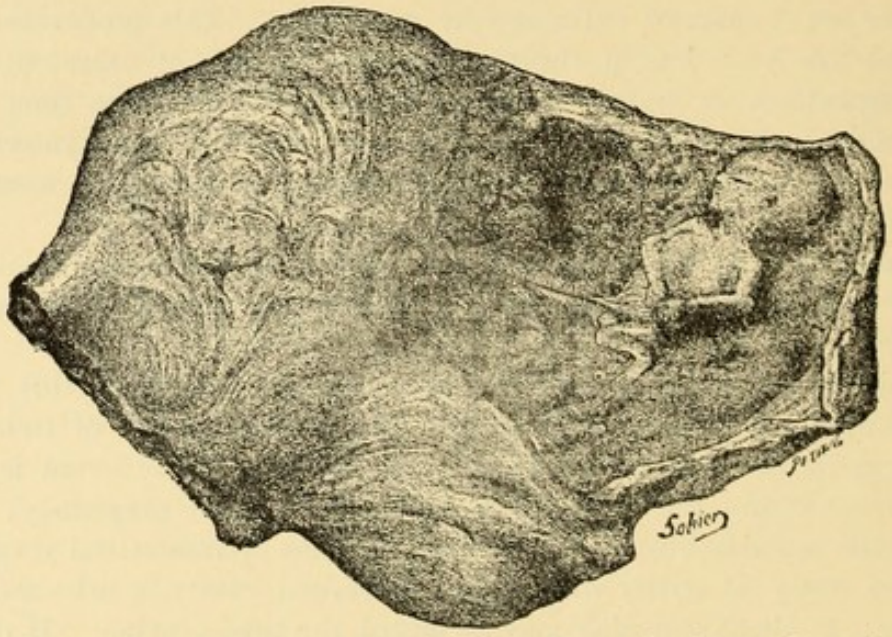


Fig. 465.—Tubal Pregnancy of Two and a Half Months, Sac Opened (Bouilly).

be included with that of extra-uterine pregnancies. For this reason the term ectopic is preferable to that of extra-uterine pregnancy.

Pathological Anatomy. Tubal Pregnancy properly So-called.—Hennig found the ovum occupying the central portion of the tube in 77 out of 122

cases. In 10 it was situated in the proximal portion, in 17 near the centre, 8 times in the outer third, and 5 in the external fourth. Out of 610 cases collected by von Schrenck from the medical literature of 1888 to 1892, there are 125 in which there is no indication as to the situation of the extra-uterine pregnancy. It was tubal in 339 cases, abdominal in 33, ovarian in 19, and in 14 cases it was in a rudimentary horn of the uterus. The proportions therefore are as follows: 83.5 per cent for tubal, 8.2 per cent for

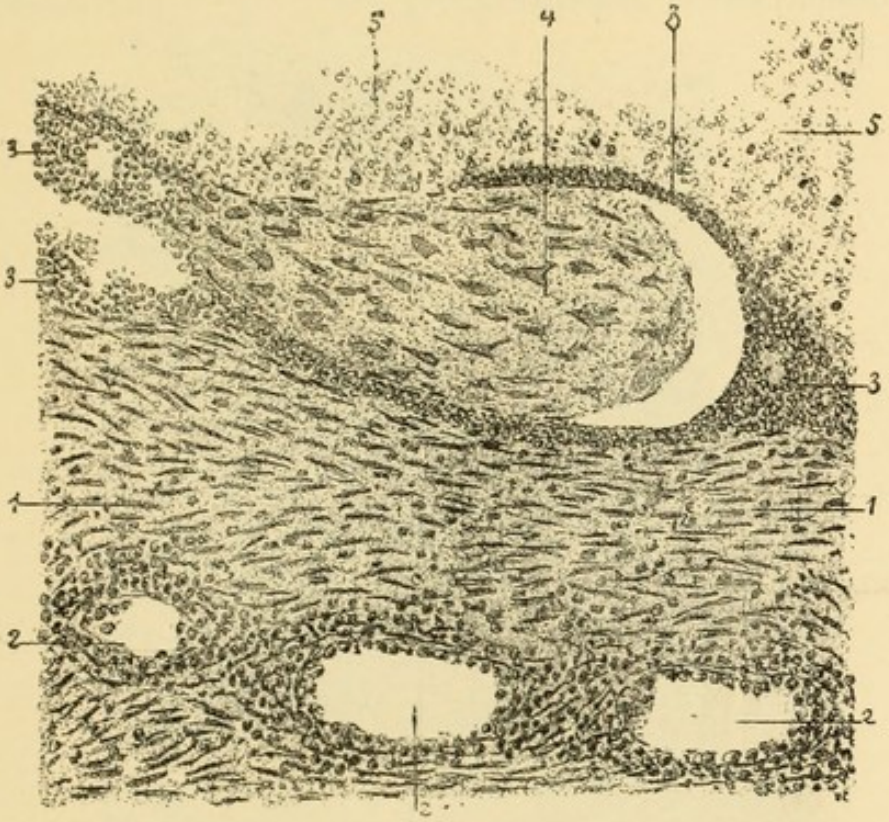


FIG. 466.—TUBAL PREGNANCY. Section of embryo and wall of tube. 1, Fibro-muscular tissue of tube; 2, blood-vessels surrounded by embryonal cells; 3, layer of large proliferated cells on inner surface of tube; 4, villus with irregular branched cells, surrounded by preceding layer; 5, layer of coagulated blood and fibrin with many white blood cells.

abdominal, 4.6 per cent for ovarian, 3.6 per cent for a rudimentary uterine horn.

As to the relative frequency of ectopic pregnancy upon the right or the left side, von Schrenck finds that it scarcely differs, being 124 for the right and 123 for the left. Hennig, in the 122 cases which he collected, notices the same thing. On the other hand, Hecker out of 64 cases finds 27 on the right and 37 on the left; Campbell out of 75 cases 34 on the right and 41 on the left; while Martin out of 77 cases finds 44 on the right and 33 on the left.

Tubal pregnancy properly so called may be subdivided into interstitial pregnancy, when the ovum is found in the intra-uterine portion of the tube; pregnancy of the isthmus, or tubal pregnancy properly so called, when it occupies the middle portion of the tube; and finally pregnancy of the am-

pulla when, as is most frequently the case, it is found in the external portion. J. C. Webster distinguishes an ampullar, an interstitial, and an infundibular variety; the latter including tubo-ovarian and tubo-abdominal pregnancies.

Parry out of 214 cases noted 31 interstitial, 34 infundibuliform, and 149 ampullar pregnancies.

Martin in his 77 cases noticed 1 interstitial pregnancy, 7 intra-ligamentous, 8 isthmic, and 57 ampullar, among which were 6 tubo-ovarian and 3

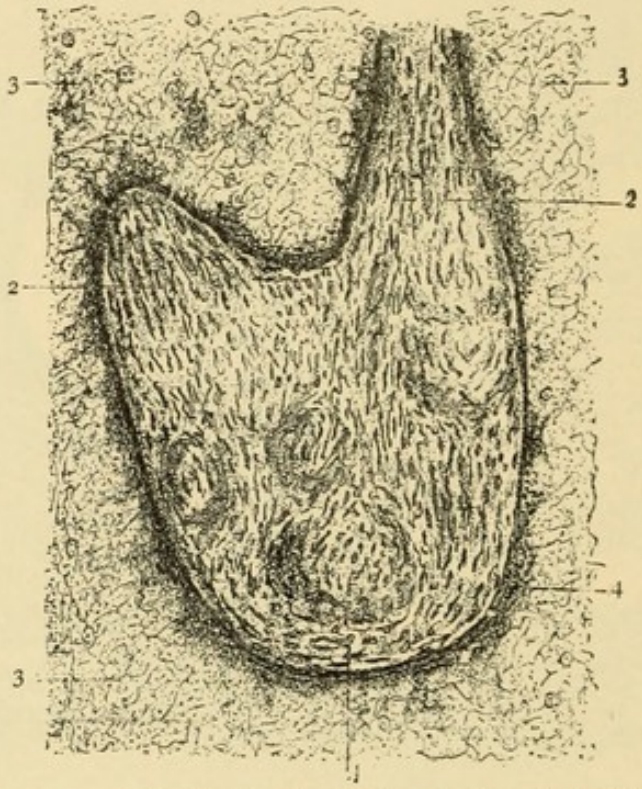


FIG. 467.—TUBAL PREGNANCY. Single villus (350 diameters). 1, Swollen end of a villus; 2, long irregular cells surrounded by granular colloid material; 3, fine network of fibrin enclosing many white blood cells; 4, compact limiting layer.

tubo-abdominal. Finally, bilateral tubal pregnancies have been reported, and twin pregnancies in one tube.

As soon as the ovum has become fairly attached, the mucous membrane of the tube undergoes a transformation similar to that of the uterine mucous membrane in the formation of the decidua. Rokitansky has well described the downy appearance of the mucosa, the villi of which interlace with those of the chorion. Until the placenta is formed, their mutual adhesion is but slight; the proximal orifice of the tube may remain open and the change in the mucosa extends to the lining of the uterine cavity.

During the first three months the small tumor which is seen upon opening the abdomen can in no wise be distinguished from an ordinary hæmatosalpinx, as its cavity is generally filled with effused blood. It is usually egg-shaped, but sometimes resembles a bagpipe (Fig. 464), and contains a

transparent liquid in which the embryo floats, or clots of more or less recent formation, which are sometimes stratified like those found within an aneurismal sac. In the latter case there may be some difficulty in finding the little fœtus, and oftentimes the nature of the fœtal cyst can be proved only by the identification of the chorionic villi on the walls of the tube. The cyst is usually pediculated, but is sometimes broadly adherent to the surface of the broad ligament, often penetrating into its substance and causing an

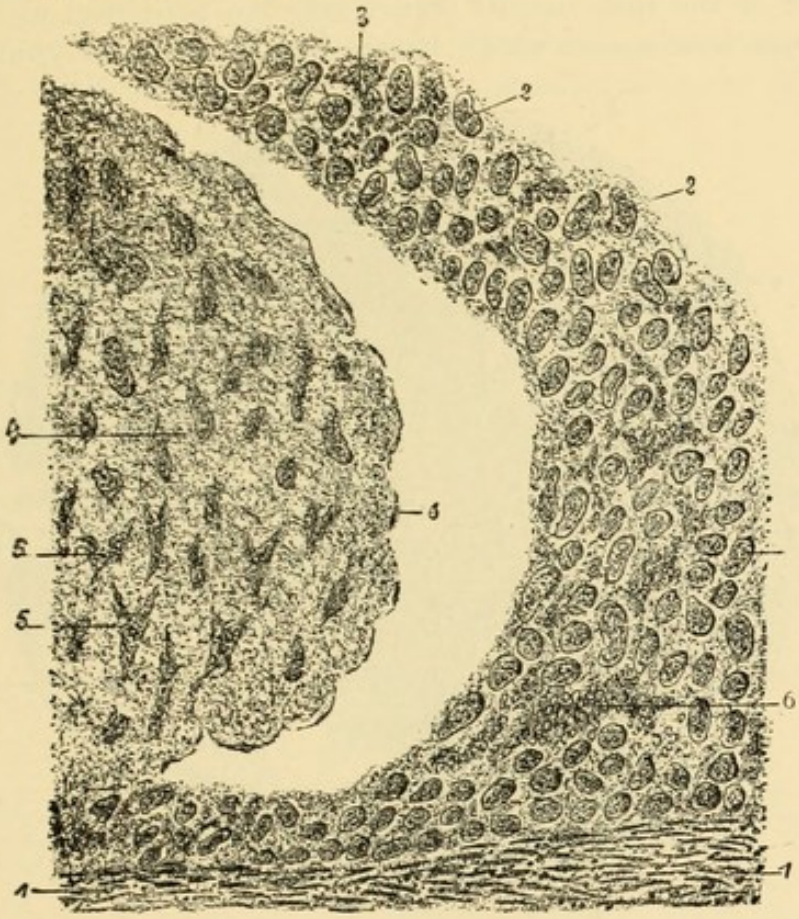


FIG. 468.—TUBAL PREGNANCY. Wall of tube and villus (650 diameters). 1, Fibro-muscular tissue of tube; 2, proliferated and hypertrophied connective-tissue cells; 3, extravasated red blood cells; 4, villus undergoing colloid degeneration; 5, degenerating cells; 6, surface of endothelium.

expansion of its folds. More rarely the cyst walls are so thin and transparent that the embryo can be seen. Hennig has noticed that the muscular layer of the tube hypertrophies until the end of the second month; later, under the influence of progressive distention, it becomes thinned and the fibres separate.

Early rupture is the rule in tubal pregnancy. Out of 45 cases studied by Hecker, the rupture occurred 26 times during the first two months, 11 times in the third month, 7 times in the fourth, and once in the fifth. Hoffmann, in 8 medico-legal autopsies, found the rupture 7 times in the second month, and once in the third. In von Schrenck's valuable report, he states that rupture of the sac was noted in 141 cases; it occurred 13 times

during the first month, 67 during the second, 28 in the third, and 12 times in the fourth. The size of the ruptured cyst is usually that of a hen's egg. Kaltenbach believes that adhesions preventing the expansion of the tube are an immediate cause of rupture. The tearing apart of excessively vascular adhesions may in itself be the cause of severe hemorrhage; Kaltenbach has reported a case in which it was fatal. Freund has had a case, thus far unique, in which the rupture was due to myxomatous degeneration.

Rupture of the tube usually occurs into the peritoneal cavity, causing the variety of hæmatocele which Barnes has named cataclysmic. Should

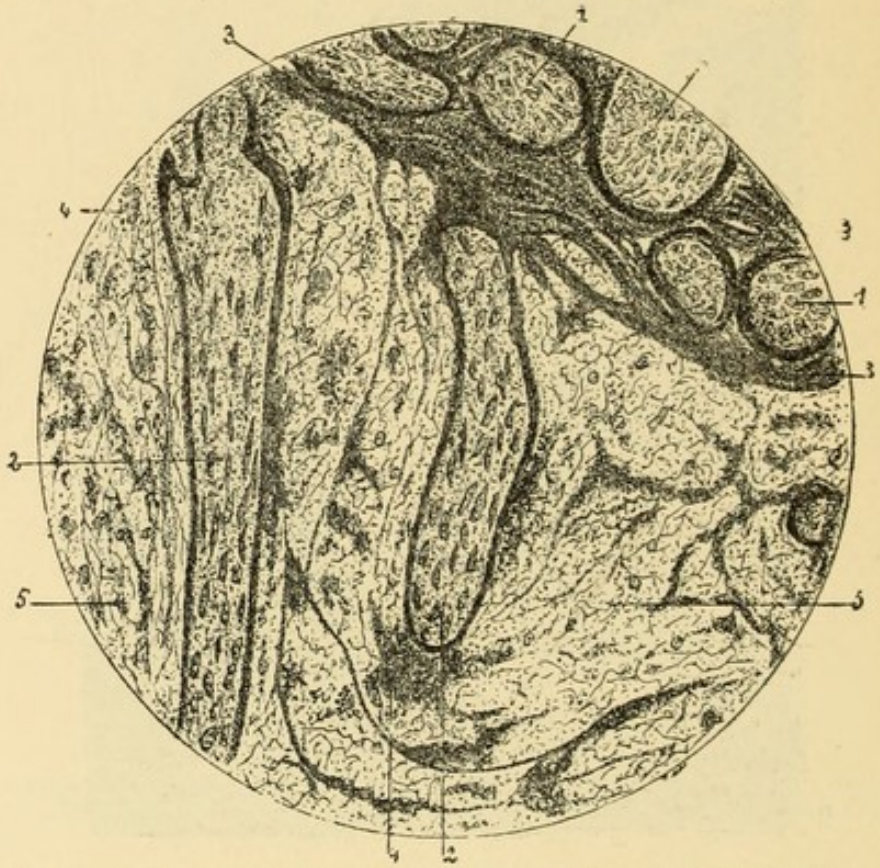


FIG. 469.—RUPTURED TUBAL PREGNANCY. General view. 1, Transverse sections of villi; 2, longitudinal sections; 3, branching compact fibrous septa; 4, coagulated fibrin; 5, network of fine fibfes of fibrin interlacing in all directions and containing white blood cells.

the rupture occur within the folds of the broad ligament, the resulting hæmatocele is extra-peritoneal, and the ligamental folds tend to limit the extent of the hemorrhage.

The course of development of tubal pregnancy varies. In exceptional cases, the embryo perishes at an early date, and is so completely disintegrated that no trace of it can be found. The sac no longer increases in size, but may be transformed into a hæmato-salpinx by the internal hemorrhage which has caused or accompanied the death of the embryo. The clinical characters and the prognosis of the lesion, of course, vary greatly. The surgeon who later performs an operation for its extraction often finds the greatest difficulty in establishing its true nature, even by a microscopical

examination of the walls, in which there are usually a few chorionic villi to be found. Even complete absorption of the contents of the tube may occur after a longer or shorter interval. This is the result aimed at by physicians who endeavor to bring about the death of the fœtus by injections of morphine or by electricity. If the fœtus die at a later date, it acts as a foreign body, and may become encysted and transformed into a lithopædion, as we shall see later, or may provoke the symptoms which accomplish its elimination.

Finally, the fœtus may live to term. This occurs, as a rule, when the tube distends or bursts open laterally, the expanded surfaces of the broad

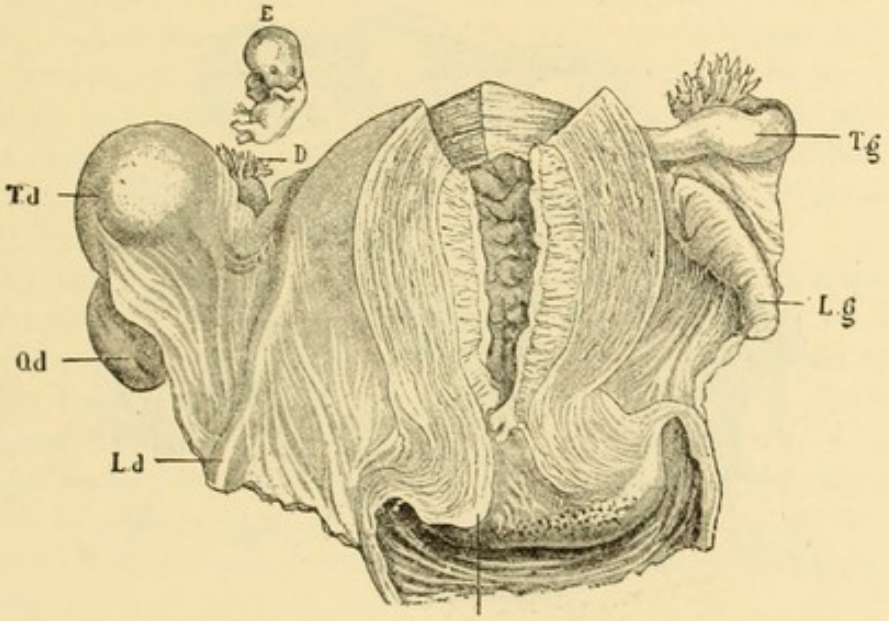


FIG. 470.—TUBAL PREGNANCY IN WHICH RUPTURE HAS OCCURRED. *Td*, Right tube in which may be seen the tear *D* beneath the embryo *E*; *Od*, *Ld*, right ovary and round ligament; *Tg*, *Lg*, left ovary and round ligament; *C*, cervix. (Fœtus of about two months; the mother died in a few hours from internal hemorrhage. Specimen belonging to Professor Hoffmann, and placed in the Medico-Legal Museum of Vienna.)

ligament protecting the included fœtal cyst from rupture into the abdominal cavity (subperitoneal variety).

In such cases we have at term the curious symptoms described as false labor, when, if art do not step in to assist nature, the child dies. If the woman survive, we have a train of phenomena common to all the varieties of ectopic gestation reaching term, to which I shall later recur.

Tubo-uterine or Interstitial Pregnancies.—Here the ovum is developed in the very short portion of the tube which is included within the uterine walls. A part of its surface is free, and separated from the peritoneal cavity by false membranes only. These cases are of rare occurrence; the statistics in regard to them have been collected by J. Baart de la Faille. When the fœtal cyst ruptures, there may be a hemorrhage escaping by the natural passages. The placenta and fœtus may follow, or may be discharged into the peritoneal cavity. The duration of pregnancy is usually longer than

in the tubal form; it may go on to term, but may also be terminated by fatal hemorrhages before the fourth month. Schultze considers that interstitial pregnancy is very frequent and often unrecognized, and that numerous abortions in supposed normal pregnancies could have had no other origin.

Tubo-abdominal Pregnancy.—The ovum here develops at the distal extremity of the tube; it is but partially enveloped by it, the external portion of the sac being covered by false membranes. It is adherent to neighboring parts—the broad ligaments, ovaries, mesentery, intestines, bladder, and even, if the cyst attain a sufficient size, the spleen, kidneys, and liver. The placenta is usually situated in the pelvis. The ovary may be flattened

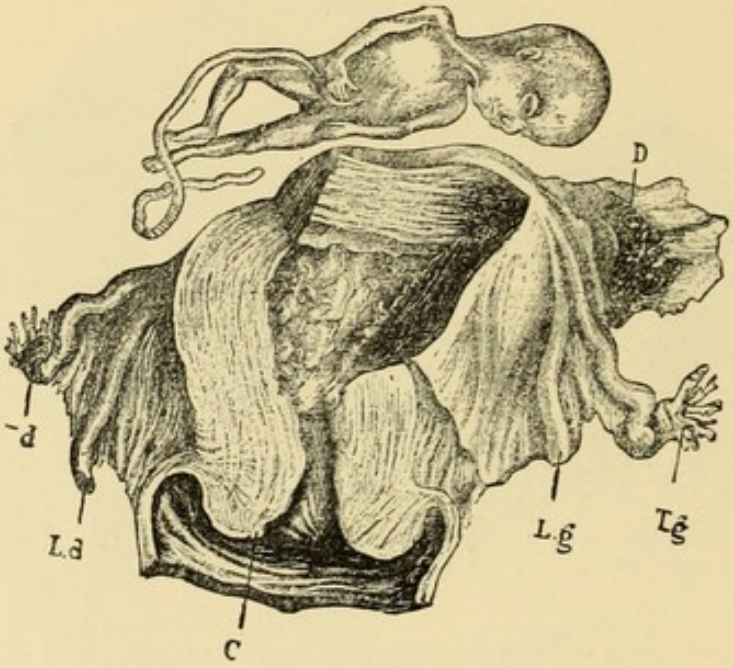


FIG. 471.—INTERSTITIAL PREGNANCY. RUPTURE. *D*, Tear; *C*, cervix; *Td*, *Ld*, right ovary and round ligament; *Tg*, *Lg*, left ovary and ligament. (Fœtus nearly four months. The woman had an attack of vomiting in the evening and died the following day from internal hemorrhage. Specimen belonging to Professor Hoffmann, and placed in the Medico-Legal Museum of Vienna.)

and incorporated with the walls of the cyst, in which case the pregnancy is termed tubo-ovarian. The possible extension of the cyst toward the abdominal cavity by successive additions of false membranes explains the occasional postponement of rupture to term.

Many cases of so-called tubo-ovarian or even ovarian pregnancy cannot be explained upon general principles, but require special demonstration. Vulliet, not without some reason, has maintained that in some cases the pregnancy is developed within a pre-existing tubo-ovarian cyst. He calls to mind the fact that Burnier demonstrated the presence of Graafian follicles in the wall of a tubo-ovarian cyst removed by Schröder, and argues that therefore impregnation is possible in the neighborhood of these cysts.

Upon Burnier's demonstration and upon a case observed by himself, he bases his assertion that pregnancy may develop within these cysts, distending

them in the same way as contained fluid would do. Paltauf, Schaeffer, v. Rosthorn, and Lihotsky have since published statistics which confirm this statement. I have myself observed a case of this nature. It was a species of hæmato-oöphoro-salpinx evidently due to extra-uterine pregnancy, as was shown by a microscopical examination.

Ovarian Pregnancy.—The existence of this variety has been contested; many of the cases claimed for it have been proved to be cases of tubo-abdominal pregnancy with intimate but secondary adhesions to the ovary. It is, however, not impossible that impregnation should occur in a ruptured Graafian follicle in such a way as to cause the insertion of the placenta upon the ovarian tissue; but these cases are of rare occurrence. In the very full collection of the Museum of Vienna, Bandl found only one specimen of ovarian pregnancy, and almost questions the possibility of its existence. Puech, it is true, quotes a number of cases; but, as I have already said, ovarian tissue in the walls of the cyst does not establish a sufficiently accurate anatomical diagnosis, as intimate secondary adhesion of the ovary may account for its presence.

According to Hueppe, we must admit the following processes in order to explain ovarian pregnancy: Impregnation upon the surface of the ovary, after which either the follicle closes and the fœtus is developed within the ovary after the manner of a cyst, or the follicle remains open and the fœtus escapes, the placenta remaining behind in the ovary.

Besides these two varieties of ovarian pregnancy, Hueppe admits a third or external ovarian pregnancy. In this class, the formation of the placenta is similar to that in cases of abdominal pregnancy, with which it is apt to be confounded.

Patenko has observed a case in which extra-uterine pregnancy was developed at the expense of the right ovary, which presented the following characteristics: 1. A diminution in the dimensions of the right ovary (length of right ovary, 16 mm.; of left ovary, 35 mm.; breadth of the right ovary, 19 mm.; of the left ovary, 18 mm.). 2. Transformation of a part of the ovary into a cyst. 3. Ovarian structure of the wall of the cavity, demonstrated by a microscopical examination, and finally the discovery of the remains of the fœtus and a trace of a placenta in the cavity itself.

Heinicken regards as ovarian pregnancies only those in which the placenta develops in the interior of the ovary, the fœtal sac developing in the peritoneal cavity. Zmigrodsky admits two varieties—that in which the ovary is the primary and only seat of the ovular development, and that in which, with external development of the pregnancy, intimate union occurs between the placenta and the ovarian tissue. Generally speaking, he says, the site of the placental attachment plays the chief rôle in the classification of extra-uterine pregnancy. A distinction should be observed between simple adhesion of the fœtal sac to the ovary and organic connection of the placenta with the ovarian tissue.

Werth says that a study of ovarian pregnancy has given him but one positive indication, but that this indication is of the most pronounced diagnostic value, and is as follows: When the fœtal sac springs unmistakably from the appendages, while the condition of the Fallopian tube excludes the possibility of its participation in its formation, the conclusion is inevitable that we have an ovarian pregnancy. Mouratoff, Sänger, Leopold, Mackenrodt, and Larsen have reported cases in which ovarian pregnancy was satisfactorily demonstrated.

Abdominal Pregnancy.—When the ovule falls into the peritoneal cavity and is there impregnated, it may attain complete development in that situation. As a usual thing, it becomes surrounded by a pseudo-membranous sac, which may become greatly thickened by the addition of successive layers, and may firmly adhere to neighboring organs. In some rare cases the fœtus is enveloped in a thin, transparent membrane. A condition of extreme vascularization is found in the viscera in contact with the ovum. There is nothing corresponding to a decidua, as there is in tubal pregnancy.

The placenta has no regular form and may attain enormous proportions. It is reported that in the course of a laparatomy performed for ectopic gestation, Gaillard Thomas was asked by one of his assistants whether the placenta which he was extracting were not the liver, so greatly did it resemble that organ.

Where compression does not strangulate the ovum, its development is, as a rule, not interrupted by rupture or hemorrhages, but goes on to term. The placental circulation may sometimes be continued after the death of the fœtus, and cause fatal hemorrhage. Ordinarily, however, this circulation ceases gradually, and is completely abolished about two months after the death of the embryo. It has been claimed that abdominal pregnancy is always secondary and consecutive to rupture of a tubal pregnancy. It is probable that this is its most frequent origin, but several well-authenticated cases establish the existence of primary abdominal pregnancy.

Pregnancy in a Rudimentary Horn of the Uterus.—Cases of this class, as Kussmaul has well shown, have often been mistakenly diagnosed, and erroneously attributed to tubal pregnancy. The first well-described case is that of Dionis. Sänger has collected all the statistics bearing upon the subject up to the year 1884; the cases are thirty in number. Of these twenty-three terminated by rupture in the first six months, three by calcareous degeneration, while four were treated by means of laparatomy. Bandl, Landau, and Wyder report similar cases. It may be difficult, even at autopsy, to determine whether the cyst is developed in the tube (interstitial variety) or in a rudimentary horn of the uterus. The diagnosis is of course impossible upon the living subject. The difficulty lies in the fact that the tumor developed in a rudimentary horn is separated from the rest of the uterus by a species of pedicle (Fig. 472).

Careful examination will show certain characteristic relations between

the tube and round ligament and the fœtal cyst. In tubal pregnancy the tube is greatly shortened, reduced to its uterine segment, while the round ligament is found in the internal portion of the sac. When, on the contrary, the rudimentary horn becomes gravid, the tube maintains its normal length, and its insertion, as well as that of the round ligament, is found to be external to the sac.

Condition of the Uterus in Extra-uterine Pregnancy.—The changes undergone by the uterus furish one of the most curious characteristics of extra-uterine pregnancy. There is a general hypertrophy of the organ with increase in the size of its cavity which may reach 12 to 14 cm. (5 to 6½ in.);

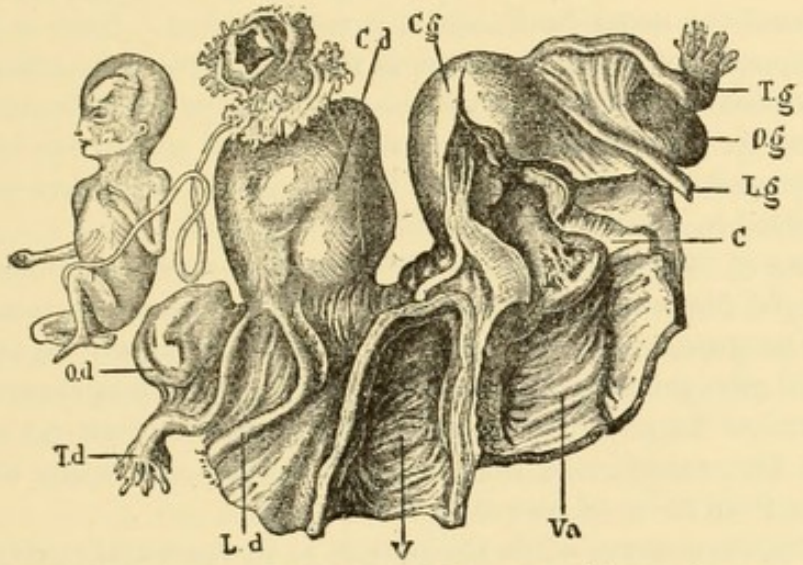


FIG. 472.—ECTOPIC PREGNANCY IN A RUDIMENTARY HORN OF THE UTERUS. RUPTURE. *Cd*, Right horn, closed at the proximal end, seat of the pregnancy (at the upper part of this horn is seen the tear); *Od*, right ovary; *Td*, right tube; *Ld*, right round ligament; *Cg*, *Og*, *Tg*, *Lg*, left uterine horn, ovary, tube, and round ligament; *Va*, vagina; *V*, bladder. (Fœtus of three months and a half; mother died of internal hemorrhage in six hours. Specimen belonging to Professor Hoffmann, placed in the Medico-Legal Museum of Vienna.)

at the same time the mucous lining undergoes modification similar to that of a gravid uterus; a plug of mucus obliterates the cervix.

The nearer the ovum is to the uterus and the nearer pregnancy is to term the more marked are these changes.

They are evidently of a mixed character, and due to reflex or sympathetic trophic phenomena, analogous to those produced in the breasts, and also to the increased pelvic circulation. Hennig has noted a few exceptions to the rule.

The location of the uterus varies with that of the ovum. At the third or fourth month the latter is usually in the cul-de-sac of Douglas, and the uterus is displaced more or less anteriorly or to the side, as can be demonstrated by external palpation. The situation of the uterus in cases of ectopic gestation is, however, by no means always the same. It may be found in front, back, or on the sides. As to the cervix, it may be displaced with the uterus, in which case it will with more or less difficulty be found

also in the elongated cul-de-sac, or it may be met with in the very centre of the excavation.

The ovary upon the same side as the embryo usually contains a large corpus luteum, the origin of which has formed the subject of many discussions.

Cases have been reported in which a normal and extra-uterine pregnancy coincided.

Anatomical Changes Consecutive to the Death of the Fœtus.—The fœtal cyst may rupture at an early date, with fatal results, or it may give rise to a retro-uterine hæmatocele in which the embryo may become lost, as it were, and unrecognizable. If the fœtus reach term, its life may be a trifle prolonged beyond the usual limit, but it eventually dies. One of two things will then happen: either its presence is not tolerated, and a train of symptoms is produced which result in the death of the mother or expulsion of the fœtal débris; or the foreign body is tolerated and undergoes fatty or calcareous degeneration. The calcified fœtus, which sometimes remains for years embedded in the tissue, is called a lithopædion.

Symptoms of Ectopic Pregnancy.—Although it may exceptionally happen that an ectopic pregnancy will develop, giving only the symptoms of a normal uterine pregnancy, as a rule pathological symptoms will be added to the physiological phenomena from the very first month of pregnancy. Numerous observations have demonstrated the fact that the ovum may rupture as early as the first month, and the symptoms which accompany this rupture do not differ from those of hæmatocele.

If this accident occur while the patient is in apparently perfect health, and soon after a meal, it may lead to a suspicion of poisoning, a fact which may be of great importance in legal medicine. The phenomena are those of an internal hemorrhage, sometimes of a rapidly fatal character. The attack may recur, in which case death is usually produced after two or three seizures, or even more remotely by successive hemorrhages. As a rule, during the second and third months the following events occur: a sharp pain in one of the iliac fossa which may go so far as to cause syncope (especially if there be a hemorrhage); disorders of micturition and defecation; peritoneal or hemorrhagic symptoms. Not infrequently we may at this time observe a flow of blood which may last several days or weeks, and is sometimes accompanied by expulsion of the decidua. It should be well understood that expulsion of decidual membrane does not necessarily indicate the causation of ectopic pregnancy. Menstruation ceases just as it does in normal pregnancy. Metrorrhagias are sometimes noticed, a flow of blood the color of chocolate or of coffee grounds, but there is no report of any case tending to prove that the patient loses blood in similar periodicity, quality, or quantity to that of menstruation.

Following symptoms which indicate a rupture of the walls of the fœtal cyst, the ovum either dies or continues to live. In the first event we have

all the symptoms of a retro-uterine hæmatocele. This hæmatocele often becomes encysted, organizes, and is finally reabsorbed, but in many cases both cyst and contents become infected and cause symptoms of pelvic suppuration. When the pregnanc is not interrupted the symptoms gradually diminish, and the patient is usually able to resume her ordinary advocations, simply showing the symptoms of ordinary pregnancy. Sometimes the abdominal symptoms persist and oblige the patient to keep her bed. Freund, in abdominal pregnancy, has observed intestinal colic, and diarrhœa due to irritation of the intestine from adhesion of the fœtal cyst. Symptoms of compression of the bladder and rectum, leading in the latter case even to intestinal occlusion, have been noticed.

The pains take on an expulsive character at a period more or less remote from the time at which labor would normally occur. The cyst may rupture into the abdominal cavity, which is rare, except when the fœtus is dead and the fœtal cyst infected, and the patient succumb to acute or chronic peritonitis, which sometimes takes on the character of septicæmia. If this crisis be safely passed, a stage of tolerance of the foreign body may be entered; yet this period is not altogether to be trusted, since grave inflammatory symptoms may occur, even after all danger seems averted. A lithopædion dating back sixteen years has been known to cause intestinal obstruction and peritonitis; these bodies have also been eliminated by the rectum, after the lapse of periods varying from one to forty-three years.

In other cases the rupture, instead of occurring into the abdominal cavity, occurs within the folds of the broad ligament. The hemorrhage is less in amount, limited in extent, and the resulting symptoms are less severe. Further, if the life of the fœtus is not compromised, this extra-peritoneal development of the ovum is more favorable to success in the event of operation. Finally, in extremely rare cases, rupture occurs into the uterus itself; the conditions of this result are a tubo-uterine or an interstitial pregnancy. Spontaneous expulsion of the fœtus may occur by suppuration of the cyst and evacuation of its contents. The fœtus reduced to its skeleton or to a shapeless mass of débris is, as a rule, expelled through an abscess in the abdominal walls, or by a perforation of the rectum. More rarely, perforation is into the vagina or the bladder, and without operative interference may give rise to endless suppuration.

Diagnosis.—For purposes of diagnosis extra-uterine pregnancy is divided into two stages, each one of which is marked by typical signs.

1. *Embryonal Period, Extending from the Commencement of Pregnancy until Quickening.*—This stage is the one which is the more frequently met with, and also the one which presents the greatest diagnostic difficulties, which, however, have but slight importance from the standpoint of treatment, as we shall see later. This period corresponds to the first four or five months of fœtal life, but in the event of the death of the fœtus it may be prolonged much beyond this time without appreciable modification of its

conditions, unless some accident supervene, such as rupture or inflammation of the cyst.

The rational signs present no striking characteristics; they consist of symptoms more or less marked, referred to the genital organs. Menorrhagia may be present, necessitating the tampon; in other cases, all of the signs of normal pregnancy may be present—suppression of the menses, changes in the breasts, and sympathetic disturbances of the digestive and nervous systems. To avoid confusion we must endeavor to determine the outlines of the uterus and to ascertain whether there be a pelvic tumor.

Colicky pains followed by expulsion of a decidual membrane will often point to disturbance in the life of the ovum, and indicate death of the embryo. Yet this occurrence, especially if accompanied by metrorrhagia, may at times falsely lead to a diagnosis of abortion, as pregnancy may persist. If such be the case, we unquestionably have to do with ectopic gestation.

Pain due to intestinal adhesions characterizes tubo-abdominal and abdominal pregnancy. When the ovum is incarcerated in Douglas' pouch symptoms of compression of the rectum or bladder are often manifested. The ovum then is often mistaken for a fibroid tumor of the posterior wall of the uterus.

Bimanual palpation may reveal the ovum at the side of the uterus, sometimes continuous with it, but sometimes separated by a sulcus or a pedicle. It constitutes a tumor which in no wise differs from the usual tubal cyst—the hydro-, hæmato- or pyo-salpinx. If we succeed in mapping out the body of the uterus, we shall find it somewhat increased in size and displaced laterally; the cervix will not be perceptibly changed. When the tumor occupies the cul-de-sac of Douglas (which is of rare occurrence), it is there encysted, and ballottement after the fourth month may decide the differential diagnosis. Retroversion of a gravid uterus is apt to be suggested in such a case, and mistakes are probable. Either a diagnosis of retroversion is made where extra-uterine pregnancy exists, or a diagnosis of extra-uterine pregnancy is made when really a retroversion is present. The sound is sometimes used to establish the diagnosis in these cases. In a case of Bailey's, however, with retroversion it penetrated but eight centimetres. Another sign may be incidentally of value: in the case of the fœtal cyst, examination never excites contractions, while these may be sometimes obtained in the bimanual examination of the gravid retroverted uterus.

Rectal touch completes our evidence in regard to the size and relations of the tumor. Such examinations should be conducted with the greatest gentleness, on account of the danger of inducing rupture and serious hemorrhage. The passage of the uterine sound should be totally prohibited for the reason that it provokes contraction of the uterus and tubes.

Diagnosis between extra-uterine pregnancy and pregnancy in a rudimen-

tary horn of the bifid uterus is impossible upon the living subject; it is made with difficulty even in the cadaver, in spite of the modifications produced by the development of the fœtal cyst.

The diagnosis of rupture is easy when the signs of internal hemorrhage become apparent. As to the death of the fœtus that may be suspected when, after expulsion of a decidual membrane, the sympathetic symptoms of pregnancy gradually disappear. We may get an increase in the sensibility and size of the tumor, corresponding to the hemorrhage into the ovum which occasions the death of the embryo, and, following this, a diminution and induration of the fœtal cyst.

2. *The Fœtal Period properly So-called, Commencing with the Fifth Month.* —The sympathetic phenomena of gestation persist, and are accompanied by abdominal pains, often of so severe a character as to confine the patient to bed. These pains, together with the loss of blood, the fixity, irregular contour of the tumor, and its lateral location, prevent extra-uterine pregnancy of this class from being confused with normal pregnancy. Combined manipulation which will allow of the mapping out of the uterus, at least in its inferior segment, will show that it is not perceptibly dilated, and that it is displaced to the side opposite the tumor.

Diagnosis of the variety of the pregnancy is impossible. It was formerly supposed that all extra-uterine pregnancy which passed the fifth month was abdominal, but we know now that tubo-abdominal, tubo-ligamentary, subperitoneal, ovarian, and tubo-ovarian pregnancies may all go on to term. In the intra-ligamentary variety, the tumor is usually surrounded by a thick membrane, while in abdominal pregnancy the fœtal parts are easily felt beneath the abdominal walls. The location of the placenta is indicated by palpation (*frémissement*) and auscultation (*bruit de souffle*).

The existence of false labor is determined by expulsive pains. These have been demonstrated in the course of a laparatomy; they are due to the contractions of the uterus at regular intervals as in normal labor. False labor usually occurs precisely at term, sometimes prematurely at the seventh month, and more rarely beyond term. It should not be confused with the painful crises associated with the phenomena of rupture.

The death of the fœtus is made evident by loss of the heart sounds, by increase in the volume and softening of the tumor due to venous thrombosis with subsequent transudation of fluid, and by the appearance of milk. If the fœtus is tolerated, there now begins a work of mummification transforming the ovum into a solid adherent tumor, which in the absence of history might be easily confused with a fibroid of the uterus, an old pelvic hæmatocele, a tumor of the ovary, a dermoid cyst, or a cancer of the peritoneum, etc. The evidences of pregnancy not followed by labor should be examined with the greatest care. In the case of doubt, or if serious symptoms develop, we may perform laparatomy, which may be merely exploratory, and will sometimes permit us to determine exactly the nature of the cyst and its

relations; also whether it can be removed directly or whether it can be better attacked from another direction.

The fistulæ consecutive to a suppurating fœtal cyst may be diagnosed by the *débris* of the skeleton which pass through them or which may be reached through these channels after dilatation.

Finally we sometimes have to make a diagnosis of the complications of this condition. I will refer you to the treatises on obstetrics for those exceptional cases in which extra-uterine pregnancy, recent or remote, has complicated uterine pregnancy; for the cases of old extra-uterine pregnancy complicating that of recent date; and finally, for the cases of extra-uterine pregnancy complicated by hydramnios.

Prognosis.—During the first half of extra-uterine pregnancy, rupture constitutes the greatest danger; according to statistics, the patient usually succumbs. On the other hand, the operation for the removal of the fœtal cyst is of slight gravity at this period. It may be said that the prognosis is serious only in those cases in which the tumor is not recognized and extirpated. The condition of things in the second period is totally different. The condition in itself is grave, the question of treatment is also serious, for this becomes more hazardous as we approach term, when hemorrhage is most to be feared. It is impossible to determine from statistics the fatality of this condition when not interfered with. Spontaneous recovery has been most often effected through the elimination of the cyst by suppuration, and this process is less or more serious according as it is or is not methodically and antiseptically treated. The results are known in 499 out of 500 cases collected by Parry. In 336 the patient succumbed, in 163 she recovered; giving a general mortality of 67.2 per cent.

According to Himmelfarb, pregnancy in a rudimentary horn of the uterus is very serious in its results if left to itself. It is probable, however, that many of these cases are undiagnosed when the abortion occurs in the early months before the fœtus has attained a size which makes expulsion through the strait separating the sac from the uterus impossible.

Treatment.—One chief fact is to be borne in mind regarding the treatment of extra-uterine pregnancy, namely, that every stage of the development is attended with formidable danger: Hemorrhage threatens in the first period, peritonitis and septicæmia in the second, while internal suppuration and compression may occur, even after the ovum has been transformed into an apparently inert mass. In view of these accidents, there is reason in Werth's suggestion that ectopic pregnancy is always to be regarded as a malignant growth and treated as such. The rare cases of tolerance or of spontaneous recovery do not authorize expectant treatment.

From the standpoint of the indications, the question of therapeusis is, as has already been stated, very simple. It is reduced to the mere question of operative opportunity and of the technique to be adopted in the extirpation of the fœtus. I cannot, however, pass over in silence certain modes of

treatment, some of which are interesting for their historic value, while others are still warmly advocated. These all refer to the first period of ectopic gestation, and are directed to the accomplishment of the death of the embryo, and the promotion of its absorption or its toleration by the tissues.

Among the methods of treatment which are now obsolete I may mention weakening the patient by starvation and purgatives, the administration of strychnine up to its toxic effect, the hypodermic injections of ergotin, mercurial inunctions, the administration of iodide of potassium, repeated bleedings, and puncture of the cyst.

Two methods of producing the early death of the fœtus are still employed, and their merits still discussed. These are the injection of morphine and the use of electricity.

The injection of morphine by means of a hypodermic syringe is recommended before the fifth month. Two injections of the hydrochlorate of morphine of half a grain each at eight or fifteen days' interval are sufficient. We cannot ignore the fact that this method, so seductive in its simplicity and apparent harmlessness, may give rise to grave accidents, as hemorrhage, septicæmia, and perforation of an intestinal loop. Moreover in any case where it might be efficacious, as in the beginning of the pregnancy, laparatomy in the hands of an experienced surgeon is attended with less risk.

Electricity has been employed by the following methods: electro-puncture, galvanization, and faradization. The latter only is in use at the present time. The negative pole is applied to the rectal or vaginal mucous membrane in the neighborhood of the ovum. The positive pole is applied by means of a large electrode to the abdominal wall an inch or more above Poupart's ligament. The current is passed for five or ten minutes, the strength being progressively increased according to the sensitiveness of the patient, and the treatment is repeated if necessary.

This method has been very popular in America; it has also its ardent advocates in Russia. It is very difficult, however, to arrive at any true idea of its value, as exactitude of diagnosis is impossible, and as most of the reports in regard to its results have been made by practitioners whose authority is not established.

The treatment is far from being without danger, for, besides encouraging temporizing in the presence of a condition which menaces life, it is itself capable of exciting tubal contractions and causing rupture. Brothers has reported two cases of death. Janvrin quotes a third.

Extraction of the Fœtus, with or without the Sac.—This, whether it be accomplished by laparatomy or elytrotomy (vaginal incision), is, as I have said before, the procedure which is gaining in favor, as applied to all the stages of extra-uterine pregnancy. In order to place the indications, however, and to show their relations to the individual case, classification is indispensable.

1. *Pregnancy before the Fifth Month without Rupture.*—As at this period

we can obtain no certain signs of pregnancy, action must be based upon not much more than a suspicion of the nature of the case. To justify laparatomy it is sufficient for us to know that we have a painful tumor of the appendages. The operation at this time does not differ materially from that for the extraction of serous, bloody, or purulent cyst of the tubes, the majority of extra-uterine pregnancies being tubal in origin; this frequency is such that Lawson Tait goes so far as to deny the existence of any other variety. A single distinguishing feature in the technique of these operations refers to the danger from hemorrhage in case of rupture of the cyst during the efforts at extraction. This accident, which may be fatal, has been noted by several authors.

In operating for a non-pediculated tumor such as is found in intra-ligamental or subperitoneal pregnancy, which is in fact a species of included cyst, we dissect out the cyst, incising the serous capsule at a point free from blood-vessels, rapidly placing artery forceps where needed. The placenta is removed at once, in order to avert the profuse hemorrhage which might occur, even at this early stage. Tamponing the cavity with iodoform gauze may also be of service.

Extirpation of fœtal cysts of the tubes during the first three months has been practised frequently of late, and the reports of societies show that such operations are becoming more and more numerous. They are not dangerous: Lawson Tait has had a series of 43 successful cases; Veit reports 12 recoveries out of 15 cases, and Zweifel 8 cures out of 10 cases.

Elytrotomy has been performed during the first four months of extra-uterine pregnancy. It amounts to the same as vaginal incision of a retro-uterine hæmatocele; sometimes one finds only clots, sometimes a fœtus and placenta. In all cases we should be conservative as to examinations and manœuvres which might lead to rupture of peritoneal adhesions.

2. *Pregnancy before the Fifth Month, complicated by Rupture and Grave Internal Hemorrhage.*—The question of treatment in these cases is no longer subject to the uncertainty which surrounded it a few years ago. When hemorrhage from an external wound or from an internal rupture threatens the life of a patient, we must at once seek its source. Temporizing, waiting for spontaneous hæmostasis, is in the great majority of cases to abandon the woman to her death. The responsibility of operating in such a case is a much less serious alternative, for if the patient do not succumb from shock, she will die from a second or a third attack of hemorrhage or from the complications of the resulting enormous hæmatocele. The cases in which spontaneous recovery has justified such an excess of caution on the part of the physician are rare.

Keller in 1872 formulated the preceding rule. Its demonstration, however, belongs to Lawson Tait, who has had recovery in forty out of forty-two cases. It is true that in only twelve of these cases could the fœtus be found, but in the remaining cases the placenta rendered the diagnosis of

extra-uterine pregnancy certain. His example has been followed in America and Germany. Schwarz recommends in this connection that we remove the whole of the blood, not placing any dependence upon the absorptive powers of the peritoneum, but rather in the case of profuse hemorrhage, fearing the depressive influence upon the nervous system of the accumulated clots. Hæmostatic tamponing of the peritoneal cavity with iodoformed gauze should be used if necessary.

3. *Pregnancy beyond the Fifth Month, the Child being Alive.*—These cases of course assume a large degree of importance, but great difference of opinion exists in regard to them on the part of different authorities. Some have in mind an operation which will save both the mother and child; while others are occupied exclusively with the mother and the more or less pronounced danger which attends interference with the placental circulation when it is in an active condition. The fœtus is a negative quantity in the problem, for, they argue, as it is probably deformed, rarely viable, its preservation should not weigh in the balance when it endangers the mother's life, and the latter is the only factor to be considered.

The partisans of primary operation, on the other hand, say that, in the case of operation after the death of the fœtus, if the woman is less exposed to the danger of hemorrhage, she is more exposed to that of septicæmia, the likelihood of which increases rapidly during the two months necessary for the cessation of the placental circulation, this being the time assigned by the advocates of the expectant treatment.

On the whole, the vitality of the ectopic fœtus has been greatly underrated. Many cases are known in which it has been perfectly developed. If, then, through the progress of operative technique, the chances for the mother are the same whether the operation is performed before or after the death of the fœtus, the first period is certainly the one to be preferred.

We must acknowledge, however, that the results have not thus far been as a whole encouraging. Maygrier, out of 17 cases collected up to 1886, found a mortality of 15 cases, or 88.2 per cent. In 10 cases the woman died of hemorrhage, either at the time of the operation, from the detachment of an adherent placenta, or later, following the spontaneous detachment of placental fragments. Of the infants, 9 lived only a few hours and the fate of 8 was unknown. Werth has collected 8 cases, published from 1880 to 1886, with 7 deaths for the mother, and 3 only for the child; 2, however, succumbed soon after birth; 2 others were well at the age of three months.

Harris has still more recently collected 30 cases of primary laparatomy, performed, that is to say, before the death of the fœtus. He found up to 1880, 20 cases with 1 success only for the mother and 10 for the child, life persisting for a variable period. From 1880 to 1886 he found 10 cases with 4 successes for the mother and 6 for the child.

At the present time, however, the aspect of the question is changed. Operations are now, as a rule, successful, as witness the following statistics,

gathered by me since those of Werth in 1886. Lazarewicz, Breisky, L. Brühl, John Williams, Eastman, Olshausen, Braun (two children and two women living), Treub, Lawson Tait (three operations, three infants and two women living), Rein and Lihotsky, Taylor, v. Strauch, Chrobak, Schneider, Frommel, M. Price, Johnson, Urbain, Guéniot, Werder, Roncaglia, Pinard, Reismann, have all operated a little before term, or at term and have saved both mother and child. Champneys, Braun (in a second case), Stadfeldt, Gueniot, Marchand, Sippel, Lebec, saved the child alone. Spaeth and Joseph Price lost both, but they operated in the presence of peritonitis due to rupture of the sac. Hildebrandt operated upon two moribund cases, but succeeded in saving one child.

G. Beisone lost the mother, but saved the child. Schauta and Olshausen (in a third case) saved the mother, but the child rapidly succumbed. Rochel saved the mother, but the child seems not to have lived. To sum up, excluding the second case of Price and those of Spaeth and Hildebrandt, which were desperate, we have, as a result of 40 operations, 29 living women, and 32 children who lived for at least a few days.

This success seems to be due principally to the improved technique of the operation, and in particular to the complete ablation of the sac and of the placenta. We can see here, as in all laparatomies, how we may with experience surmount operative difficulties. We see also the evident exaggeration of those persons who consider the ectopic fœtus necessarily doomed on account of deformities or congenital feebleness. Even when this feebleness exists, we know that we have resources in "gavage" and the "couveuse," by which we may at the present time save the child who in other days would have been lost. We may now perform laparatomy with the expectation of saving two lives. It is preferable not to wait for the phenomena of false labor, as Duncan and Reed recommend, because the fœtus then succumbs very rapidly. According to the recommendations of Fraenkel we may decide upon the time for intervention by the volume of the fœtus as determined by external examination and palpation; the operation is usually preferably done during the first two weeks of the ninth month.

In regard to the choice of methods, laparatomy is as a rule indicated, for it permits us to cope with the operative difficulties which present themselves. We would not, however, entirely proscribe elytrotomy. If on vaginal examination we do not find the placenta, and if the fœtus be deeply engaged in the pelvis, elytrotomy may be preferable even as affording drainage for the placental wound which will be probably located upon the anterior wall of the abdomen. This situation may be assured if on auscultation the placental bruit is found synchronous with the maternal pulse.

At the inception of false labor the woman should be kept absolutely quiet and the pains should be controlled by injections of morphine or enemata of laudanum. Operation at this period will be ill-timed, at least unless the phenomena of grave internal hemorrhage make it necessary.

Pregnancy beyond the Fifth Month, the Child recently Dead.—The question of laparatomy immediately after the death of the fœtus is, by the majority of foreign authors, and unanimously by those of our own country, answered in the negative. Parry advocates indefinitely expectant treatment, and trusts to the transformation of the fœtus into a lithopædion and to its spontaneous elimination. This doctrine was also held by Tarnier and Budin. Litzman, Werth, Maygrier, and Pinard give a less absolute rule, but, influenced by the older statistics and fear of hemorrhage, advise waiting until the obliteration of the placental circulation. The time required for this obliteration is uncertain; for while it has been approximately given as two months, alarming hemorrhage has been known to follow detachment of the placenta at the end of three months, so that the delay has not only permitted the death of the child, but has also exposed the mother to new dangers. Many of the deaths following secondary operation, that is to say, an operation which has of deliberate purpose been delayed, may be attributed to the expectant treatment, since intercurrent septicæmia or peritonitis often fatally complicate the surgical intervention which a few months previously could have been undertaken under the most favorable conditions. In consideration of the results obtained in recent cases of primary operation (laparatomy) we shall be authorized, I think, in reforming the dictum which has been set down by our predecessors and adopted as a rule. Here, as in all of the problems of abdominal therapeusis, the theoretical objections of the timid surgeon fall before the results of a bolder practice characterized by good technique.

The advent of fever and the prodromata of septicæmia, instead of contraindicating operation, but render it more urgent. In even such cases the patient has been saved.

5. *Pregnancy beyond the Fifth Month, the Child having been Dead for a Considerable Time.*—If the death of the fœtus has been remote and toleration seem to have been established, and there is a prospect of its transformation into a lithopædion, is it wise to interfere and to subject to the dangers of laparatomy a woman who is otherwise in good health? I believe that even in such cases operation is indicated, in view of the future. It is an established fact that the tolerance accorded to the ectopic fœtus is always precarious, and that decomposition of the ovum with infection and consecutive peritonitis may supervene at any time before the fœtus is entirely transformed. Even after the change has been completed infection may occur, and be followed by expulsive efforts due to suppuration, causing grave complications and great danger.

6. *Old Suppurating Fœtal Cysts, with or without a Fistula.*—It is apparent that here we have simply to assist the work of nature.

If an abscess exist we should open it, whether it point toward the abdominal wall, the rectum, or the vagina, and explore for the fœtal bones. We are sometimes aided by the existence of a fistula, allowing the use of a

probe, which can be carried into the little skeleton and serve as a guide for the incision. These operations compare favorably with those for the extraction of the fœtus by laparatomy. They are without danger if care is used to secure antisepsis in the matter of the sac, which is generally very foul.

I have had occasion to remove by the rectum the whole of the skeleton of a fœtus in a case in which spontaneous efforts at elimination both by rectum and vagina had failed. Sloughing of the septum from the pressure of the sac had resulted in a recto-vaginal fistula. The patient was seen in the service of Gallard. She recovered rapidly, thanks to regular antiseptic injections of the cavity of the abscess, which was very fetid. Out of twenty-three cases collected by Parry, of suppurating fatal cysts of long standing, only three ended fatally.

7. *Pregnancy in a Rudimentary Uterine Horn.*—If abandoned to themselves, cases of this kind give a mortality of twenty-three out of fifty during the first six months. The indication here is to interfere by laparatomy. The operation is much more simple than in the preceding class of cases, and has been successful in five out of six cases, performed either at term or long after. The horn of the uterus is removed, just as is the case with the entire uterus in Porro's operation. A patient of Sänger was twice normally delivered after such a procedure.

Technique of Extraction by Laparatomy.—I do not here intend to describe every detail of the operation, since the rules already indicated in the chapters on hysterectomy and ovariotomy are applicable here as well. I merely wish to draw attention to a few special points relative to the difficulties to be expected.

Hemorrhage is the complication most to be feared where the pregnancy is advanced and the child is alive or but recently dead. To guard against this danger in choosing a place for opening the sac, we must avoid the situation of the placenta. If on examination of the relations we find total removal of the sac difficult, we must give it up and suture it to the abdominal wound, being careful to observe the precautions mentioned further on. Traction on the cord or placenta should be avoided. The best medium for controlling hemorrhage is the tampon of iodoform gauze. Whatever the cause of application, the loose tampon of iodoformed gauze may be left in position without fear of decomposition for three or four days. Where used to combat hemorrhage, it should not be removed before the eighth day.

Infection of the peritoneum by the contents of the cyst is to be guarded against in cases in which we operate after the death of the fœtus and in which the patient has fever indicating septic absorption. We should try to remove the sac entire without opening it. If we cannot avoid an incision, it will be better not to dissect out the sac, as the raw surface left by this procedure is exposed to infection from the septic contents.

A. Retention of the Cyst. Marsupialization.—Where enucleation of the sac without incision is difficult, it is advisable to tampon down the abdomi-

nal wound over the sac with iodoformed gauze, and to postpone the opening of the cyst for several days in the hope of the formation of bands of adhesion which will unite it to the abdominal wall. If the situation is urgent and does not permit this delay, we may before opening the sac unite it to the layers of the wound by a line of sutures or by a rapidly inserted continuous suture. In placing these sutures which unite the abdominal wall with the sac, care should be taken not to penetrate into the interior of the cavity, but to carry the needle through the superficial layers only of the wall of the sac. Incision should be followed by delivery of the fœtus by the feet, and division of the cord between two ligatures. We should then thoroughly cleanse the cavity with a solution of corrosive sublimate (1 : 2,000) or if preferred a saturated solution of naphthol; explore the bottom of the sac and, if it reach the neighborhood of the vagina, introduce a forked drainage tube, passing the longer branch through the posterior vaginal cul-de-sac. The placenta may be mummified by the use of a mixture of tannin and salicylic acid or powdered benzoate of sodium. Iodoform gauze is to be kept in the sac, and drainage carefully attended to. Cicatrization takes place slowly by granulation. The placenta comes away in fragments.

Martin has a treatment of the sac analogous to that which he uses after the enucleation of intra-ligamentary fibroid tumors. He removes as large a part of the wall of the cyst as possible and sutures the remainder, so as to completely isolate the interior of the cyst from the peritoneal cavity, and drains through the vagina.

B. Total Extirpation of the Cyst.—This is a most important modification in the operative technique. The treatment by suppuration of the sac is comparable to that of certain adherent ovarian cysts. It is very tedious, and may result in a permanent fistula, besides exposing the patient to the danger of hernia. Litzmann first proposed to entirely remove the sac with its contents, the fœtus and placenta, so as to favor rapid recovery as after the removal of hæmato- or pyo-salpinx. This procedure, called the radical operation, did not, however, at first give as good results as that by retention of the sac. Maygrier, in 1886, knew of only 7 cases of extirpation of the sac. Werth, out of 11 cases collected in 1886, notes 7 recoveries and 4 deaths, or a mortality of 36 per cent; while out of 40 cases with retention of the sac there were 14 deaths and 26 recoveries, or a mortality of 35 per cent. Later the operation has given a series of remarkable successes with a living child. In several of these cases adhesions implicating the intestines did not preclude recovery. Werth, who has collected a more recent series, embracing cases of laparatomy for pregnancy at term published since 1887, has out of 9 operations only 1 without extirpation of the sac. This series has only 2 deaths. I have myself a larger list, including statistics for the last two years, completing by continuity the series of Maygrier and of Werth in his first great work. Many cases have undoubtedly escaped me; yet I have found 18 cases of extirpation of the sac (1887 to 1891), with 26 recoveries,

1 death, and 1 result unknown. Of operations for the extraction of the living child I have already cited the 9 cases of Lazarewicz, Breisky, Eastman, Olshausen (1 case), Traub, Schauta, Rein, Lihotsky, and de Reismann. The others, in which the operation was done after the death of the child and at term, are as follows: Hofmeier, 1 case, with a fatal result; Kusnetzky, 2 cases, recovery; Sutugin, 2 cases, with recovery; Muratow, 1 case, with recovery; Sajarsky, 2 cases, with recovery; Kadjan, 1 case, with recovery; Slavjansky, 1 case, with recovery; Quénu, 1 case, with recovery; Wiedow, 1 case, with recovery; and Olshausen, 3 cases, recovery; Matlakowski, 1 case, recovery; Rein, 1 case, recovery; Odenthal, 1 case, recovery; Fantino, 1 case, recovery; Schauta, 1 case, recovery; Folet, 1 case, recovery.

Technique.—Definite rules for the technique of this procedure cannot be given. In its main features it resembles operation for the extirpation of an adherent ovarian cyst or for a parovarian cyst included within the broad ligament. The principal operative stages are, however, as follows:

1. Abdominal incision with provisional sutures uniting the sac to the lips of the abdominal wound.

2. Opening of the sac at its thinnest portion, avoiding vessels if possible or seizing them as they are divided.

3. Extraction of the fœtus by the feet, ligature and section of the cord.

4. Removal of the provisional sutures, extraction of the sac by rupture of the adhesions, and enucleation of the subserous portion; forceps should be rapidly applied to bleeding points, the fingers being used to aid in compression if needed.

5. Final hæmostasis of the base of the sac by ligature or the tampon of iodoformed gauze. Even where the tampon is not employed it will be wise not entirely to close the abdominal wound, but to maintain drainage from the lower portion either by a rubber drainage tube or several strips of antiseptic gauze. If the sac is strongly adherent to the intestine, we must resect it up to the adherent parts, and continue the tampon of iodoformed gauze of the base of the sac until complete exfoliation of the retained portions of the cyst.

Technique of Extraction by Elytrotomy.—The vaginal incision was advocated by Baudelocque. Maygrier, in 1886, collected 4 cases of elytrotomy in the second part of pregnancy, the fœtus being alive. These presented 2 recoveries, 1 doubtful, and 2 deaths, or a mortality of 50 per cent. The same operation with a dead fœtus has given 7 recoveries and 5 deaths, or a mortality of 41.6 per cent. Schauta found from 1876 to 1891 12 cases of elytrotomy, of which 5 were during the four last months of pregnancy, and 7 after term. Of the 5 first cases, the placenta was left 3 times (1 death). Twice the placenta was removed, in 1 case with a living child, and the patient cured; the other patient died. In the 7 cases of elytrotomy after

term 3 were followed by death; in 1 case only was the placenta removed. This operation, in my opinion, should be reserved only for cases in which the fœtus is dead. We cannot, in the absence of reliable reports, assert that it is dangerous to the living child, but *a priori* this would seem to be the case from the danger of hemorrhage. In laparatomy, hemorrhage can more readily be controlled. It is altogether different where the fœtus is dead. Here elytrotomy is to be preferred when the cyst is impacted in the pelvis, the placenta not being accessible by the vagina, and the bladder and uterus displaced laterally. The first condition only constitutes the real indication, for the presence of the placenta in the vaginal cul-de-sac causes no real danger after the expiration of about two months when the fœtal circulation has ceased.

The following is the technique observed by Pinard, who successfully performed two elytrotomies for two cases of pregnancy at term, the child being dead: The woman is anæsthetized and placed in the obstetrical position. After exploration of the vaginal cul-de-sac, puncture is made with a bistoury at a point distinguished by absence of arterial pulsation. The finger is introduced through this incision, which is enlarged by tearing and dilatation accomplished by the fingers introduced as a cone. The hand having entered the opening, the fœtus is grasped by the feet, which are brought to the vulva. By slow and continuous traction, the breech and the trunk are made to engage; the two arms and the head are then delivered. The cord is secured and the placenta is removed if it can be easily detached. If, however, there appear to be adhesions, it is left in place. The interior of the cyst should be irrigated with a solution of corrosive sublimate (1 : 5,000) or a saturated aqueous solution of β naphthol. I am inclined to think that the introduction of iodoformed gauze is preferable to the frequent injections recommended by Pinard. The gauze may be renewed every three or four days, or even be allowed to remain undisturbed much longer. Should phenomena of septic infection supervene, we could resort to the continuous irrigation, which has given such good results in puerperal septicæmia.

Spontaneous elimination of the suppurating sac through the bladder is very rare. Winckel, in a recent work, has collected only twelve published cases. Laparatomy, the vaginal incision, elytrotomy, the sub-pubic incision, have all been tried. These operations can be, as a rule, avoided. It is sufficient to dilate the urethra, or if necessary to incise it so as to reach the orifice of the sac with the index finger, to enlarge this, to extract the bones of the fœtus with the forceps, and to cleanse the sac by injections. If it is not possible to treat the condition in this way, or if serious accidents require active intervention, we may resort to vaginal incision followed by immediate suture after the evacuation and disinfection of the sac. The operation through the dilated urethra may be completed in two or three *séances*, with the aid of cocaine. Borated vesical injections should be continued until all traces of cystitis have disappeared.

In cases in which a large cyst is firmly impacted in Douglas' cul-de-sac, instead of elytrotomy we may prefer perineotomy either transverse or vertical, or a para-sacral incision, or we may gain access to the pelvic cavity by means of a preliminary resection of the coccyx and a part of the sacrum. It belongs to the future to determine the suitable application of these new operations.

CHAPTER XXXV.

DISEASES OF THE VAGINA.

Vaginitis.

Pathogenesis and Etiology.—The mucous membrane of the vagina, like other mucous membranes in immediate contact with the air, is a dermo-papillary surface markedly analogous to the external integument in its rugosities and its stratified pavement epithelium. It is, however, distinguished from the skin by the absence of the impermeable corneous layer. The constant exfoliation of the cells of the mucous membrane and the incessant renewal of its exposed surface form its only protection against the action of external irritants, and it is difficult to understand exactly how the mucosa resists the action of the numberless germs which multiply in the vaginal canal. The new pathogenic theories in regard to the comparative receptivity of the various tissues to infection are evidently applicable to this case. The vagina is the normal habitat of indifferent microbes. Several of these are pathogenic in character, but rendered inoffensive through attenuation. These morbid germs gain entrance in a number of ways—through the simple entrance of air, coitus, injections, etc. Inoculation shows that for these germs to multiply or to exhibit their virulence we require a medium favorable for their culture. Irritation is not, as held by the older authors, a sufficient cause. Burning with the red-hot iron and the action of caustics will cause but a localized lesion, an ulcer without surrounding inflammation, if injections be employed which prevent the accumulation of secretions; while the same lesion, or the presence of a foreign body otherwise aseptic, such as a pessary, will develop an intense vaginitis if with neglect of cleanliness we have the conditions which favor the development of the microbes. These considerations indicate the pathogenesis of vaginitis, and explain the predisposing influences of menstruation and parturition, as these favor the stagnation and decomposition of secretions.

Gonorrhœal infection is of supreme importance in the etiology of vaginitis, on account of the persistent character of the inflammation caused, and the gravity of its complications. Since the discovery of Neisser, the germ of this affection has been considered a specific coccus called the gonococcus, present in the form of rounded or oval bodies, resembling coffee beans, and sometimes adhering by their plane surfaces, producing a profile like the figure 8. In groups of five to ten these form globular colonies surrounded by a single hyaline membrane. Associated with pus or more rarely with epi-

thelial cells, they penetrate these and multiply in their interior. This property appears to distinguish them from other varieties of the same form. This last assertion has, however, been contradicted by Stekhoven. The gonococci penetrate the epithelium with greater ease where the cells have been dissociated by the formation of pus. The microbes are colored by methyl violet and fuchsin.

Bumm states that the development of gonorrhœa is never primary in the vagina, but that invasion is by way of the cervix or more rarely the urethra,

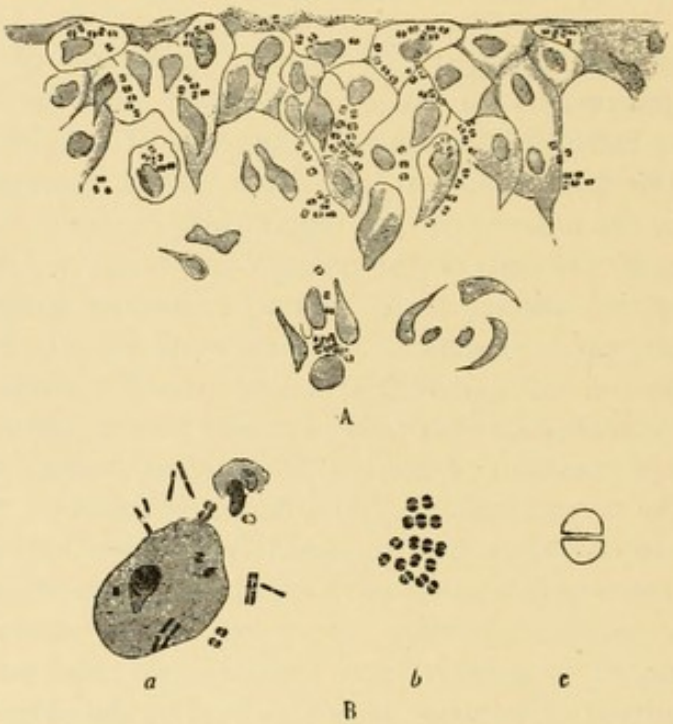


FIG. 473.—MICROBES OF GONORRHŒA. (Neisser's gonococcus.) *A*, Transverse section of palpebral conjunctiva in a case of gonorrhœal ophthalmia which had been in existence for three days. The gonococci have penetrated the epithelial layer, and are scattered in small groups through the subepithelial tissue. *B*, Specimen taken from the vaginal secretion of a puerperal woman; *a*, epithelial cell and pus corpuscle, upon and around which may be seen bacilli and gonococci; *b*, gonococcus from a pure culture; *c*, diagram of the diplococcus of gonorrhœa (gonococcus) (Bumm).

where the epithelium is least resistant. This is especially true of the cervix, where the epithelium is cylindrical. According to Steinschneider and Fabay, however, the urethra is the more frequently attacked.

According to Schultz's recent investigations it appears that the cervix and urethra are involved in the same proportion of cases. In 104 cases in which he discovered the gonococcus, it was found 81 times in the cervix, 78 times in the urethra, and in only 9 instances in the vagina.

The rôle of the gonococcus was long undisputed, the facts proving its preponderating agency appearing to be easily demonstrated. Most numerous in the acute stage, rarer in the chronic forms, they multiply or diminish in number according as the disease is active or latent. They are found in gonorrhœal discharges from the urethra, the glands of Bartholin, the rectum, in gonorrhœal salpingitis, and in purulent ophthalmia. They have even been

discovered in the blood and in the articular synovial fluid of patients suffering from gonorrhœal rheumatism.

Succeeding to this period of certainty has come a time of doubt and criticism. The specific value of the gonococcus has been denied on account of its extreme resemblance to the non-pathogenic diplococci. These microbes or pseudo-gonococci, so to speak, are found in intestinal, pulmonary, and buccal ulcerations, according to Eklund; according to Amicis, in simple experimental urethritis; and according to Sternberg, in urine, which he considers their normal habitat (micrococcus ureæ). Is, then, the gonococcus but an indifferent saprophyte capable of taking on pathogenic characters under peculiar conditions; or is it a distinct species, having definite pathogenic properties and susceptible of attenuation and of preserving in a latent state the noxious properties to which it reverts in a favorable medium? This is the hypothesis which appears most probable; but, on the other hand, direct experiment by means of cultures and inoculations have not given a decisive result. Sometimes they produce gonorrhœa, but more often not. Besides the presence of the microbe itself, there are other necessary factors which can be inferred but have not yet been demonstrated.

The pathogenic microbes of suppuration and putrefaction also cause vaginitis if favorable circumstances are present; that is to say, if they gain access to the genital canal in sufficient numbers, and if they find there in retained secretions a suitable medium for growth. These germs may be introduced from without. A gaping vulva enfeebled by rupture of the perineum favors their development. An opposite condition, the presence of a hymen at the introitus, may have an analogous effect by a different mechanism, namely, the retention of secretions and of the menstrual discharge in the retro-hymeneal cul-de-sac. This is the predisposing cause of non-specific vaginitis in little girls and virgins; to it may be added masturbation, which causes direct inoculation. The various kinds of vulvar inflammation due to the erythemata and the exanthemata may also serve as the determining cause. Oxyurides, transported from the rectum, are often intermediary agents. Infection may be also by means of fistulæ communicating with the bladder or rectum. This is, however, exceptional. A frequent and often unrecognized medium is some pathological secretion from the uterus. The vaginal leucorrhœa which complicates metritis has no other known origin, as it disappears as a rule after curetting or efficacious medicinal applications. Local irritation and hyperæmia are not sufficient to produce vaginitis. They but permit the more rapid development of the original germ or of one introduced from without. This is the explanation of the influence of masturbation with or without the introduction of a foreign body, of the prolonged retention of a pessary with absence of care in regard to cleanliness, and of stasis due to disease of the heart or liver or to the presence of abdominal tumors or pregnancy. Bumm has made the curious statement that the latter condition will provoke an excessive development of gonococci even in cases

in which the date of infection has been very remote. Von Herff has observed what he has termed mycotic vaginitis, an affection whose pathological agent appears to be the oidium albicans. It occurred during pregnancy fifteen times in twenty-six cases, in women with gaping vaginas, and during the hot months of the year. The congestion of the genital organs at the period of the menopause, perhaps, determines the vaginitis of this period. To these agencies may be added: exposure to cold, excessive coitus, genital excitation, the use of the sewing-machine, horseback-riding, etc.

From a clinical point of view we distinguish a certain number of types:

1. The gonorrhœal vaginitis of adults, which is the most common form, and which is found also in little girls and virgins, in which case its nature is often unrecognized.

2. The gonorrhœal vaginitis of little girls and virgins, which may be the result of gonorrhœal infection of unknown origin. In regard to this affection it may be said that ordinarily the vagina has been previously made receptive by an exanthem, such as measles or scarlet fever, which has enfeebled the whole system and caused a desquamation of the epithelium. But there exists also a non-specific vaginitis due to the development of a simple saprophyte in feeble children or to a neglect of the laws of hygiene. I have indicated the rôle of the oxyurides, also that of narrowness of the hymeneal orifice, the predisposing influence of which can be compared to that of congenital phimosis in the production of balanitis in the male.

3. The vaginitis of pregnant women. This is sometimes due to an old gonorrhœa, but may be also of non-specific origin, and still may cause marked symptoms, vegetations, discharges, etc. It is without doubt due to infection by means of the staphylococcus or the streptococcus. As to the septic vaginitis of the parturient woman, it is not a distinct morbid entity, but simply a local manifestation to be ascribed, like other symptoms, to general suppurative tendency; often it is of mixed puerpero-gonorrhœal origin.

4. The vaginitis of the menopause and of old women has usually an undefined anatomical form. The absence of hygienic care and a herpetic diathesis are ordinarily sufficient to explain its production.

Pathological Anatomy.—The vagina is rarely affected through its whole extent; and then usually in the acute stage of an inflammation caused by a recent gonorrhœa, an exanthem, or an active local irritation such as a caustic injection or traumatism. In such cases the mucous membrane is swollen, reddened, and covered with muco-pus. Most frequently the general inflammation is preceded by inflamed isles or plaques. In some cases diseased zones alternate with zones of healthy tissue.

From the standpoint of pathological anatomy, C. Ruge distinguishes three forms of vaginitis: (1) granular vaginitis; (2) simple vaginitis; (3) senile vaginitis. We may add a fourth, emphysematous vaginitis—a rare lesion, but one which constitutes a distinct variety.

1. *Granular Vaginitis.*—This is the most common variety of vaginitis,

the acute and chronic form being equally frequent. The epithelium is thickened, especially in its deeper layers, which the reagents color strongly. The papillæ are hypertrophied, infiltrated with small cells, and by diminution of the intervening spaces so fused as to form little masses called granulations. The epithelial reflections may become thinned, and take on a granular appearance, which may cause them to be mistaken for granular tissue itself; in such case we are liable to the error of believing that there is a follicular

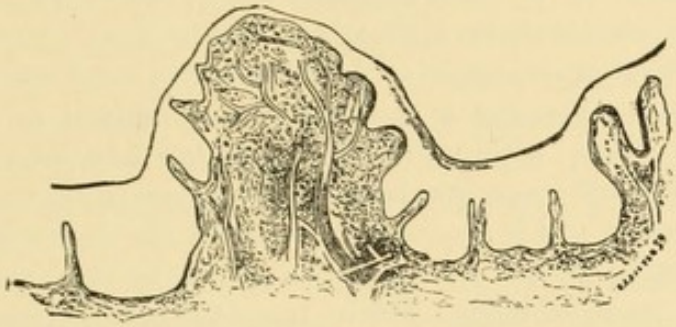


Fig. 474.—Granular Vaginitis (Ruge).

formation, whereas in reality there is merely a transformation of the papillæ and their epithelial covering, with increase of the capillary reticulum (Fig. 474).

2. *Simple Vaginitis.*—In this variety the epithelial surface remains quite smooth, but is thickened in spots. At the thinnest portions the papillæ are

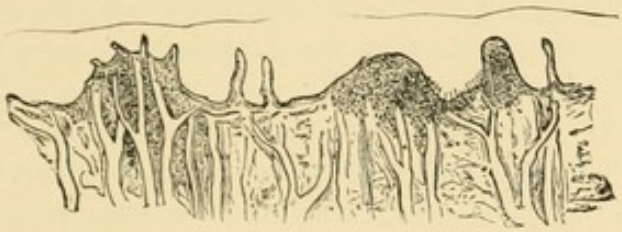


Fig. 475.—Simple Vaginitis (Ruge).

swollen, and the subjacent tissue is infiltrated with small cells. This proliferation is, however, limited to the epithelial layers, thus differing from granular vaginitis (Fig. 475).

3. *Senile Vaginitis* (Colpitis Vetularum).—This affection is present in the form of larger or smaller patches, elevated above the surface of the mucous membrane, and fused together in some places. These patches have a variable structure. Sometimes they present the characteristics of ecchymoses only; in other cases the centre of the patch is softened, and the epithelial covering is thinned or destroyed so as to permit the formation of adhesions which tend to obliterate the vaginal canal. Miliary vaginitis or the vesicular vaginitis described by Eppinger belongs to this variety; also the ulcerating, adhesive vaginitis of Hildebrandt. It is probable that it should include too the so-called leucoplasia of the vaginal mucous membrane.

All the reported cases of this affection have been in old women, and, according to the descriptions, the lesion is not different from that which has been described by Ruge. The reasoning which would prove them to resemble buccal psoriasis is superficial and faulty.

4. *Emphysematous Vaginitis or Cystic Pachy-vaginitis.*—I have already referred to the inflammatory engorgement presented at times by the mucous membrane of the vagina during pregnancy. The rugæ separated by fissures have been compared by Winckel to grains of corn upon the ear. These elevations may be traversed by lacunæ containing fluid or gas. Except in pregnancy the affection is very rare. It has been called cystic colpo-hyperplasia by Winckel. The gas is not, however, contained in cystic cavities, but, according to Ruge, within the meshes of the connective tissue. The condition should, therefore, rather be called emphysematous vaginitis. Probably the formation of gas is secondary to a molecular degeneration of inflammatory proliferating tissue, but this has yet to be demonstrated. Chiari holds that the gas is developed within the enlarged lymphatic capillaries, which are filled with swollen epithelial cells. The vesicles may rupture and form small temporary ulcerations, or they may desquamate in the form of scales.

Symptoms.—Where the vaginitis is the result of gonorrhœal infection or direct violence, local pain marks its invasion. Leucorrhœa is present, at first serous, then of a greenish-white color, puriform or frankly purulent in character. The discharge may be considerable in quantity, and give rise to a most annoying vulvar pruritus with subsequent enfeeblement of the general health. After the acute stage the discharge becomes less, until finally the affection can be detected only by careful examination of the culs-de-sac, which form a kind of natural retreat where the remains of the old inflammation may for a long time linger. This fact has given rise to the designation, gonorrhœa of the culs-de-sac. The glands in the neighborhood of the meatus also remain for a long time infected. Gonorrhœal infection of the vulva and its glands is not alone enough to determine engorgement of the inguinal glands.

In examination, Cusco's speculum is to be preferred. Digital examination reveals the condition of the mucous membrane—whether rugous or glandular; in the acute stage it is hot and painful.

Urethritis always complicates gonorrhœal vaginitis. To discover this condition, examine the woman shortly after the passage of urine. Follow the urethra with the finger from behind forward, so as to bring to the meatus the drop of pus which it contains.

The general health is often affected by an intense leucorrhœa; it produces in particular distressing gastric derangements and a febrile condition which may be either acute or subacute, due to salpingitis, with serous perisalpingitis, the affection described by Noeggerath as recurrent parametritis.

Senile vaginitis often provokes no other symptom than a leucorrhœa, se-

rous or tinged with blood. Chronic vaginitis of this variety tends to destroy the tonicity of the vaginal wall and favors prolapse.

The symptoms of the emphysematous vaginitis of pregnancy may also be limited to the production of a discharge.

Vegetations, either benign or papillomatous, may be found on the vaginal mucous membrane which is irritated by prolonged contact with a muco-purulent secretion; they are frequent in gonorrhœal vaginitis and are observed also in the non-specific vaginitis of pregnancy.

The discharge of pieces of the mucous membrane after astringent injections or simply under the influence of a very active inflammation has been called exfoliative vaginitis. This is a very rare phenomenon, and one which is not to be confused with the expulsion of an intra-uterine or dysmenorrhœal membrane, the microscope here showing large pavement epithelial cells.

Diagnosis.—The great difficulty in diagnosis is the differentiation of gonorrhœal from non-specific vaginitis. The absence of the gonococcus is not sufficient, and counter-evidence for it may be lost or become unrecognizable in old gonorrhœal affections, as I have already indicated. An accompanying urethritis is proof of the gonorrhœal character of the disease. It is in the urethra, then, that we should look for the characteristic microbes. The course of the disease and the history of the patient will furnish important evidence. If, further, the woman can be confronted with the supposed author of the infection, as is often possible, the existence of even a very old or latent gonorrhœa in the man will amount to a demonstration. Gonorrhœal ophthalmia in one or several of her children will have the same diagnostic value. Pregnancy being excluded, the presence of vegetations is strong presumptive evidence. Coexisting inflammation of the glands of Bartholin is also a pretty certain index of gonorrhœal infection.

In little girls, especially in the case of a medico-legal examination, we should be careful not to pronounce too hastily upon the infectious nature of the affection, as the extension of a vulvitis due to a lack of cleanliness may involve the vagina, especially in a child of a lymphatic temperament; here too coincident urethritis has great diagnostic value.

The vaginitis of a pregnant woman may present conditions for analogous mistakes. It should not be forgotten that it is sufficient to account for vegetations. We should not confuse an inflammatory secretion with the fetid leucorrhœa of cancer or the discharge which succeeds retention of the membranes after abortion.

Prognosis.—Gonorrhœal vaginitis is a serious affection, on account of its possible extension to the cervix and subsequently to the uterus and tubes. It is besides not very amenable to treatment, and tends to return under the influence of depressing agencies such as excessive coitus, chilling during menstruation, excessive fatigue, and the puerperal state. In its characteristics it greatly resembles an old gonorrhœa or *goutte militaire* in the male.

Gonorrhœa is in the female incomparably more serious than in the male; this is easy to understand by comparing the prognosis of cervicitis with that of a chronic gonorrhœa of the bulbous portion of the urethra; or, again, the prognosis of a tubo-ovaritis, which is so liable to suppurate, with that of an epididymo-orchitis, which is very rarely a serious affection. More frequently than in the male, too, the ascending lesions are bilateral and cause sterility, obliteration of both tubes by chronic salpingitis being the rule in prostitutes.

The element of gravest prognosis in the gonorrhœa of the female is the fact that an apparently insignificant infection of the cervix may, under the influence of the puerperal state, regain all its first virulence, and, combining with septic infection, produce a mixed puerpero-gonorrhœal infection, and give rise to the gravest complications. The necessity for prompt and energetic treatment will be appreciated. The decision of Noeggerath in regard to the incurability of this disease is not without exceptions if the patient is energetically treated in time.

The gravity of gonorrhœa in little girls is, as in the adult, dependent upon extension to the uterus, the tubes, and the peritoneum. Säxinger has observed pyo-salpingitis in virgins, where it could only be explained by the contact of some infected material, and not by coitus. I have myself recently operated upon a case of this kind. A case of generalized peritonitis reported by Welander concerns a little girl of five years; I have observed a case in a young girl. These cases are very rare, but death by suppurative pelvic peritonitis following pyo-salpinx may, at least at times, be a result of gonorrhœal infection.

The other varieties of vaginitis are less serious and yield more readily to treatment.

Treatment.—We should first endeavor to discover what has provoked or keeps up the chronic inflammation; whether a pessary, the oxyuris, or cervical catarrh. In a large number of cases vaginitis is cured by treatment directed to a metritis upon which it depends. Thus Schröder's operation, or excision of the cervical mucous membrane, is one of the best methods of treatment for certain forms of chronic vaginitis dependent upon gonorrhœal cervical infection.

Chronic granular vaginitis and senile vaginitis are best treated by tampons of absorbent cotton soaked in borated glycerin or the glycerole of tannin, or the application of nitrate of silver in solution (1 : 20).

In the acute stage of gonorrhœal vaginitis, emollients are to be recommended. It is certain that prolonged baths and diluent drinks favorably affect the urethritis which accompanies the vaginal inflammation. Injections of marshmallow or of flaxseed tea, etc., are, on the contrary, of doubtful value, and may even do harm if not aseptic. Irrigations with several quarts of boiled water (four to six) containing permanganate of potash (1 : 2,000) are to be preferred. A small glass nozzle should be carefully in-

serted on account of the great sensibility of the vaginal mucous membrane. It is very important to keep the nozzle after each irrigation in a solution of carbolic acid (1 : 20). This will avoid any fresh inoculation to which the patient might be exposed without this precaution. The patient should be kept at rest.

The acute stage having been passed, energetic antiseptic treatment should be instituted; sublimate douches (1 : 2,000) should be given twice daily, taking care to erase the folds of the mucous membrane, and wash out the culs-de-sac with the finger. After each injection, place a tampon of iodoform gauze the size of a pigeon's egg against the external os; this will soak up the secretions, and, while having an antiseptic influence, will also act as a means of drainage. We may, if necessary, substitute for the sublimate injections creolin, permanganate of potassium, carbolic acid, boracic acid, alum, tannin, resorcin, or chloral. Sublimate is, however, incomparably the most efficacious, and has never given me any bad results in these cases. Fritsch praises the chloride of zinc, two drachms and a half to the quart. In pregnant women, sublimate injections must be used with great care, and the return flow aided by the speculum, on account of the ease with which mercury is absorbed.

Balsamic treatment may be addressed to the concomitant urethritis. Copaiba and cubebs are, however, badly borne by women, and, moreover, urethritis is much less persistent than in the male on account of the shortness, straightness, and width of the canal. Iodoform pencils introduced into the urethra and slightly crushed by pressure through the vagina are very effective in chronic urethritis. When the treatment of the vaginitis is sufficiently advanced, the secondary metritis should be attacked, and with its cure we may expect the disappearance of the last remnants of the vaginal inflammation.

General treatment should not be neglected. Iron and tonics should be given to chlorotic subjects. Scrofulous children should have appropriate treatment.

Foreign authors have described, under the title of croupous or diphtheritic vaginitis, the production of a false membrane due to superficial sloughing of the mucous membrane. This has, however, nothing in common with what we in France designate by the word diphtheria; it is, on the contrary, but a gangrene of the vagina, less correctly called gangrenous vaginitis, and is encountered in cases of intense septic infection of the vagina, in cases of cancer of the uterus and sloughing fibromata, or where pessaries have been indefinitely retained in the vagina without care in regard to cleanliness. It has been observed also in an intense gonorrhœa, in the puerperal state, in the course of acute infectious illnesses such as measles, small-pox, typhus fever. It is not a distinct morbid condition, but a septic accident engrafted upon an inflammatory vaginal lesion. It furnishes no special indications for treatment except the prevention of the adhesions and contractions which

follow exfoliation of the slough. For this purpose antiseptic tampons should be kept in the vagina, so as to separate the surfaces.

Dissecting phlegmonous vaginitis or suppurative inflammation of the cellular tissue of the vagina is a specially located rare variety of pelvic abscess; it has been observed in the course of grave febrile conditions. Its treatment consists in giving exit to the pus as soon as it can be localized.

CHAPTER XXXVI.

TUMORS OF THE VAGINA.—CYSTS, FIBROUS TUMORS, POLYPI, PRIMARY CANCER.

Cysts.—*Definition.*—Two very different affections are often described under the same name: (1st) A chronic stationary disease presenting vesicles of about the size of a millet-seed, generally distributed over the vaginal mucous membrane, interesting from an anatomical point of view, but without surgical importance; (2d) a well-defined cyst of the vaginal wall, a condition which occasions serious difficulty and which calls for active interference. These cysts are well defined, usually unilocular, and of a size varying between that of a small nut and an egg, tending to increase in volume if not surgically treated. The two affections, essentially distinct in pathological anatomy, course, symptoms, and therapeutic indications, have sometimes been confounded. In reality the first is but the variety of chronic vaginitis called cystic colpo-hyperplasia by Winckel. I have already described it under the name of emphysematous vaginitis in the paragraph devoted to the vaginitis of pregnancy. The contents of the vesicles or lacunæ are either fluid or gaseous, containing trimethylamin. In the study of cysts of the vagina proper, I omit this cystic pachy-vaginitis, as the origin is obscure, the symptomatology presents nothing of interest, and therapeutically it may be considered with chronic vaginitis.

Pathogenesis.—The most diverse theories have been advanced to account for cysts of the vagina. Huguier, in a *mémoire* which was for a long time considered a classic, assigned to them a glandular origin, classifying them as superficial and deep, according to their situation in the two species of glands which he thought existed in the vaginal wall. Now, these glands do not exist, but they may be simulated by crypts or lacunæ which, by obliteration of their orifices, may play the same pathological rôle. Virchow, Guérin, and Preuschen accepted the theory of glandular and pseudo-glandular cysts; Poupinel admits its probability in a certain number of cases. Other authorities, among whom are Eustache, Tillaux, and his pupil Thallinger, are disposed to consider them as hygromata or accidental serous sacs. According to Courty, they are of frequent occurrence in prostitutes.

This hypothesis is analogous to that of W. Torn for certain cysts observed in women who have borne children, as he believes these represent a traumatic serous effusion, similar in character to the traumatic serous cysts in other regions described by Morel-Lavalle.

The theory which best accords with the established facts is that advanced

by Veit. This finds the origin of vaginal cysts in the remains of the Wolffian canal in species of animals where it is very prominent, called the canal of Gärtner. Certain cysts of the vagina have been attributed to the non-union of the ducts of Müller and to the existence of a lateral vaginal cavity closed at the base and due to an aborted bifidity. Such cavities are, however, allied to hæmato-colpos or pyo-colpos, and erroneously, I believe, described as cysts. I shall return to them in connection with the question of diagnosis.

Can we have a large cyst as a result of lymphatic ectasia, as is perhaps the case in the gaseous lacunæ of pachy-vaginitis? This theory, advanced by Klebs, has been accepted for certain cases by a number of authors.

On reviewing the theories which have been advanced for so complex a clinical group as the cysts of the vagina, we shall see that none of them corresponds to any well-defined anatomical type. One only can be logically accepted. This is that of Wolffian origin, shown in the most pronounced cases by several cysts disposed in a row, or having an upward prolongation in the direction of the broad ligament. All the others are hypothetical in character and based only on remote analogies. I believe that all vaginal cysts larger than a walnut are of embryonal origin. It has been remarked that they occur singly or are few in number, and then disposed in a vertical series, as though resulting from the moniliform dilatation of a straight tube.

Where we have a large number of small cysts covering the whole or a limited part of the vaginal mucous membrane, whether irregularly distributed or disposed in groups, I consider them of pseudo-glandular formation by the obliteration of the openings of crypts or lacunæ, in the bottom of which epithelium accumulates, to give place later to a fluid exudation. It is easy to differentiate the two anatomical types.

Without absolutely denying other methods of origin, I believe them to be excessively rare. I must not omit to mention that Porak reports a case of hydatid cyst of the vagina.

Etiology.—Vaginal cysts are found at every age, and in virgins as well as in women who have borne children. We think the agency of excessive coitus as suggested by Courty to be very doubtful. Labor may have a certain determining influence, not in consequence of traumatism of the vagina, but by the over-nutritive activity of the whole generative tract caused by pregnancy, which has its proportional influence upon the abnormally persisting embryonal remains as well as upon the epithelium covering the folds and crypts of the vaginal mucous membrane.

Pathological Anatomy.—Cysts of the vagina are most frequently single. Several cysts were present in only twenty-eight of the one hundred and twenty-two cases collected by Poupinel, or twenty-two per cent. The number very rarely exceeds three or four. Poupinel has reported one case in which fifteen were agglomerated into a single tumor, but he reasonably ascribes this to a pseudo-glandular formation. The cysts which develop

from the Wolffian body are single, as a rule, rarely multiple, and then disposed one after the other in a row. Their size varies between that of a pea and a turkey's egg. Veit has seen one the size of the fœtal head. The most frequent location is the upper portion of the anterior or posterior vaginal wall. In one case, that of Bastelberger, the hymen formed part of the wall of the cyst. Sometimes the cavity has a prolongation superiorly. In the case of Watts, so frequently quoted, the sound when introduced into the cyst through an incision passed in the direction of the broad ligament. Boursier has seen a case in which a solid pedicle was plainly to be demon-

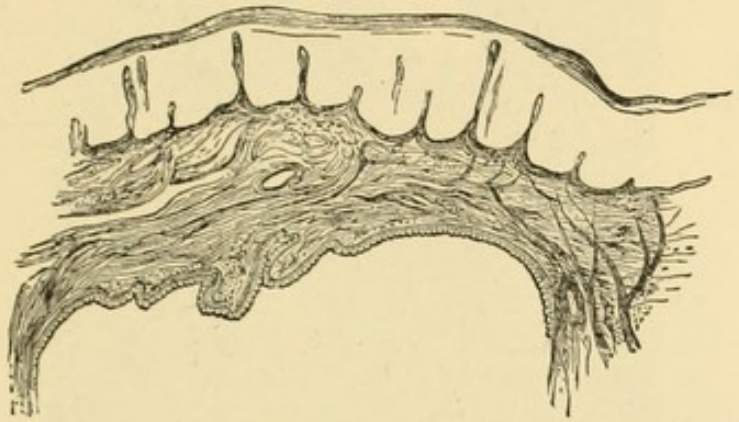


FIG. 476.—SECTION OF THE WALL OF A CYST OF THE VAGINA (SCHRÖDER). The external surface shows the pavement epithelium of the vagina; the internal, the cylindrical epithelium of the cyst.

strated deeply located and extending from the upper portion of the cyst. Reboul has a similar case, but the pedicle was partly hollow. These evidently belong to the list of cases of Wolffian origin.

The wall of the cyst is composed of finely fibrillated connective tissue, sometimes containing muscular fibres. These, however, have not the pathognomonic significance suggested by Poupinel, who thought they indicated the origin from the ducts of Gärtner. The vaginal mucous membrane usually covers the free surface, but it may be so thinned and degenerated as to be ultimately fused with the wall of the cyst, which then becomes translucent in character. An analogous degeneration has sometimes resulted in perforation into the bladder, as in a case reported by Veit. As a usual thing the internal surface of the cyst is covered by cylindrical epithelium, but pavement epithelium has also been found. The eccentric pressure resulting from distention of the cavity may produce a flattened or pseudo-pavement aspect in cylindrical epithelium. Ciliated epithelium has been found in a few cases—six times out of fifty-two cases, according to Poupinel.

The internal wall with its epithelial covering was entirely absent in four of the published cases. It is these cases which seemed to lend some support to the theory of hygromata. But even if we suppose that the examination was made under the best of conditions, the destruction of the internal coat might be otherwise accounted for in many ways.

Sometimes we find prominent papillæ upon the internal surface. Kleinwächter has demonstrated adenoid degeneration of the wall of the cyst.

The contents vary in consistence and color; most often they are viscid, transparent, and of a pale yellow tint, containing pus or altered blood.

Cheron has described a cyst of the vagina which opened into the urethra

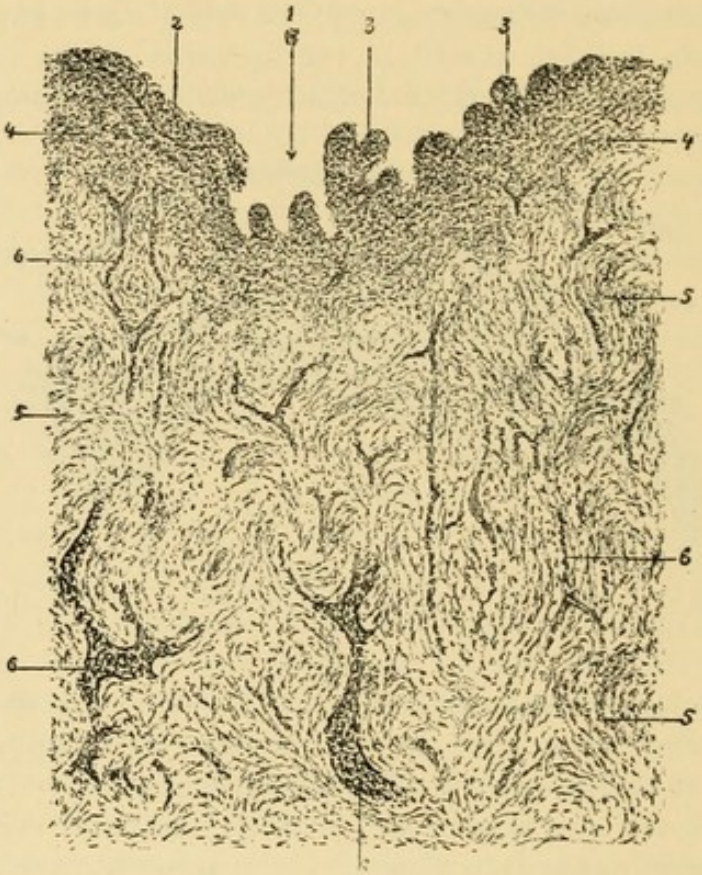


FIG. 477.—CYST OF THE VAGINA. Section perpendicular to internal surface. 1, Cyst cavity; 2, epithelial lining; 3, denuded papillæ; 4, compact connective tissue with many nuclei; 5, connective tissue in loose bundles, 6, numerous capillaries containing coagulated blood.

and contained a calculus, it was probably a simple urethrocele. Breisky considers it not impossible that the cavity of an urethrocele by obliteration of its orifice may constitute a pseudo-cyst.

Symptoms.—In its early stages the cyst attracts no attention, the earliest sign indicating its presence being prolapse of the vaginal wall, which is dragged down by the constantly growing tumor, and which the patient believes to be a descent of the uterus. Examination for pregnancy or a gonorrhœa leads to the discovery of the condition. The tumor is rounded, smooth, sessile or with a tendency to pediculation; the mucous membrane which covers it often preserves its normal color; rarely it is thinned and transparent. Fluctuation is often difficult to obtain when the cyst is small and tense. It sometimes becomes evident by seizing the tumor between the two fingers or by combining the rectal with the vaginal touch. On effort, the

tumor can be made to appear at the vulva, then resembling a cystocele if it occupies the inferior part of the vagina.

When the cyst has attained a certain size, it occasions a sensation of pressure and of discomfort on walking. Leucorrhœa will be provoked by the irritation of the mucous membrane, and its exposure to the air consequent upon the procidentia of the tumor. In a case which I observed, a large single cyst existed simultaneously with a vertical septum of the vagina, pointing apparently to its embryonal origin.

These cysts are rarely so large as to constitute an obstacle to urination or delivery; the latter might cause rupture of the cyst, which would, however, soon return.

Diagnosis.—I have already distinguished between true cyst of the vagina and cystic vaginitis characterized by the presence of a multitude of very

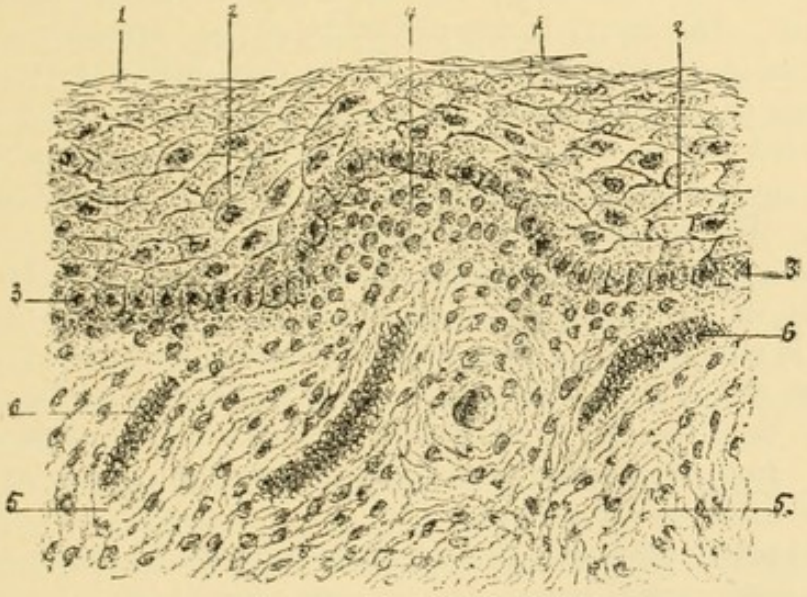


FIG. 478.—CYST OF THE VAGINA. Section of wall highly magnified. 1, Layer of lamellated corneous cells; 2, layer of long crenate cells, few showing nuclei; 3, deep layer of cylindrical cells, mostly nucleated, 4, papilla of compact tissue with round nuclei; 5, less dense connective tissue; 6, vessel filled with blood corpuscles.

small cystic cavities in the substance or upon the surface of the thickened mucous membrane. I have referred to the fact that this affection is found in pregnancy as a rule, although not limited exclusively to that condition, and that the little cavities contain gas which sometimes escapes with a crackling noise when they are opened.

Large cysts of the vagina are as a rule single, and form a prominence upon the anterior or posterior wall of the canal after the manner of a cystocele, an urethrocele, or a rectocele, especially if situated in the inferior portion. Error is avoided by combining catheterization or rectal examination with the vaginal touch.

Vaginal cysts may be confounded with certain peri-urethral cysts of the vestibule, having their origin in the crypts which surround the meatus uri-

narius. These are rarely larger than a bean, although Preuschen has seen one the size of a walnut. It is not impossible that these cysts also have their origin in the terminal extremity of the canal of Gärtner. Skene believes them to arise from two peri-urethral glands, but the existence of these glands is not yet substantiated.

Cysts of the upper part of the vagina are often distinguished with difficulty from small tumors located in the cul-de-sac of Douglas, prolapsed ovaries, cystic or non-cystic, inflammatory conditions of the tubes, and the collections of peri-salpingitis. Careful examination, under anæsthesia if necessary, will eliminate doubt in regard to these conditions. They should not be confounded with vaginal enterocele, which is distinguished by being reducible when the patient is in the recumbent position, and by increasing in size after exertion.

A collection in an accessory vaginal cavity is sometimes regarded as a vaginal cyst. The cavity is due to bifidity of the organ, the result of incomplete fusion of Müller's ducts. When this bifidity, as is usually the case, extends to the vulva, there are two vaginæ, one of which is more or less atrophied, but in exceptional cases the second vagina terminates in a cul-de-sac, into which opens a second os uteri, due to coexisting bifidity of the uterus. The condition may be unsuspected until puberty, when the cavity, becoming filled with menstrual blood, gives rise to a lateral hæmatocolpos or, if the cavity suppurates, a lateral pyo-colpos. As the bifidity of the cervix is rarely evident, there will be often no indication of the particular character of the vaginal collection, which is therefore mistaken for a cyst until it has been opened, when the discovery of a second os uteri clears the diagnosis. I observed a case of this kind in which the pseudo-cyst had suppurated and given rise to a fistula.

Hydatid pelvic cysts may project either through the vesico-vaginal septum or the recto-vaginal septum and simulate vaginal cysts.

Treatment.—We can here apply any of the different operations which have been described for other submucous cysts, as, for example, in ranula. Simple puncture or incision alone is insufficient. Puncture followed by a caustic injection may provoke an extensive inflammation, which may be propagated to the bladder or the peritoneum; there may also be unlooked-for extensions or prolongations of the cystic cavity. The surgeon has to choose between complete and partial extirpation. The first may be preferable if the tumor can be easily reached, as, for instance, if it be located near the vulva. Yet, even so, its dissection is difficult on account of close adhesions with the deeper tissues, and of the neighborhood of the urethra and bladder. It may even become impossible if the cyst ruptures during the operation. To avoid these difficulties, in one case I advantageously resorted to the process for the removal of certain cystic tumors which I described some time ago. After opening the tumor, I filled the cavity with white spermaceti wax, subsequently solidifying it by an application of ice. I then very easily dis-

sected out the tumor. The wound is immediately united by a continuous catgut suture in layers.

Partial excision is preferable where the cyst is located in the upper third of the vagina, toward the posterior wall. The tumor is to be seized with a tenaculum, opened by the scissors, and a portion of the wall with the mucous membrane covering it excised. Schröder recommends suturing the lips of the opening to the vaginal mucous membrane in order to make the opening permanent. This precaution seems to me unnecessary. It is quite sufficient to tampon the interior of the cyst with gauze; the part of the wall which has not been removed subsequently exfoliates spontaneously.

Fibrous Tumors and Polypi.—*Pathological Anatomy.*—Fibrous tumors of the vagina may originate in the uterus, and by their gradual descent open out the recto-vaginal septum. Some tumors, however, have their origin in the vagina itself.

The structure of these tumors is similar to that of uterine fibroids; they are composed of a mixture of connective tissue and unstriped muscular fibres. Paget has described the only example on record of a tumor composed exclusively of fibrous tissue.

The most common location for fibrous tumors of the vagina is the superior portion of the anterior wall. They are often very adherent to the urethra and descend to the vulva. They are usually of small volume; one has, however, been reported which weighed over two pounds. They may be pediculated and have a polpoid form, or may exhibit softening or œdema, as is the case with the fibrous tumors of the uterus, or may slough superficially and present ulcerations.

Etiology.—These tumors are most frequently found in middle age, although instances have been known in young children.

Symptoms.—These depend altogether upon the size of the tumor. If very small, it is unnoticed or simply occasions leucorrhœa. If larger, hemorrhages may be present, and the symptoms of compression, especially of the bladder. One case has been reported in which a fibrous tumor of the vagina was the cause of dystocia.

Diagnosis.—This is complicated by changes in the tumor, such as œdema and ulceration, which may cause it to resemble a cancer. A study of its relations enables one to differentiate a polypus of the vagina from a polypus of the uterus, a prolapsus, or an inversion.

Treatment.—This consists in the enucleation of sessile tumors, and section of the pedicle in a polypus. The procedure has been described in the chapter on the Treatment of Fibroid Tumors of the Uterus.

Primary Cancer of the Vagina.—*Pathological Anatomy.*—Most frequently cancer of the vagina is secondary to cancer of the cervix. It may also be produced by extension from cancer of the vulva. Primary cancer of the vagina is very rare. A. Martin has seen it but once among five thousand patients. It may occur in one of three forms: (1st) papillary; (2d) infiltrated

or nodular, both included histologically under the term epithelioma; (3d) sarcoma, either diffuse involving the whole of the mucous membrane, or circumscribed and arising from a degenerated fibroid tumor.

Etiology.—Cancer of the vagina is a rare affection. Of 24 cases collected by Küstner the majority were in women between thirty and forty years, 2 in women between fifteen and twenty years, and 2 in women between twenty and thirty years. F. Bernard, in 59 cases, found 7 between twenty and thirty years, 10 from thirty to forty, 10 from forty to fifty, 18 from fifty to sixty, 12 from sixty to seventy, and 2 between seventy and eighty years. Guersant has reported a case of cancer of the introitus in a child of three and one-half years; Johannowsky, one in a child of nine years, and Smith, one in a girl fourteen months of age. Küstner has noted the factor of heredity once only. Hegar has seen a cancer produced in the neighborhood of an ulceration due to the prolonged retention of a pessary. It is somewhat strange that cancer has never been observed in the prolapsed uterus, which is exposed to all the influences of external irritation.

Epithelioma of the papillary form usually attacks the posterior wall of the vagina, making its appearance as a broad-based excrescence, which first invades the cul-de-sac, and then extends from above downward toward the vulva, and then from below upward toward the cervix. It appears to have its origin at times in the neighborhood of the plaques of chronic vaginitis, which have been somewhat theoretically compared to buccal leucoplasia, the point of departure for lingual cancroid.

Epithelioma of the nodular or infiltrated form appears as nodules which rapidly become confluent. The growth is sometimes localized about the wall of the urethra, giving rise to a well-defined clinical type, peri-urethral cancer. Ulceration here advances rapidly.

Sarcoma presents two varieties: (1st) diffuse sarcoma of the mucous membrane, which is peculiar in that it sometimes is found in young children; (2d) fibro-sarcomatous tumors, degenerating slowly and often revealed only by the recurrence of a fibroid tumor or a polypus. In one case striated muscular fibres were demonstrated. Melanotic sarcomata have been observed.

The course of cancer of the vagina is usually rapid, excepting in the fibro-sarcomatous form, in which it may be excessively slow. Extension is to the lymphatics and to neighboring parts.

The rational signs do not differ from those of cancer of the cervix; they are: a fetid discharge, hemorrhage, pain, and symptoms of pressure upon the bladder and rectum. It is not necessary here to take into consideration the syphilitic chancre, as it is of rare occurrence, nor the round simple ulcer, which is a rare lesion and not well defined.

Treatment.—While there are but few chances of complete recovery, we may arrest somewhat the course of the disease. We shall only consider extirpation, if it be possible to remove the whole neoplasm; in such a case, on account of the great laxity of the vaginal walls, we may obtain primary union

of even an extended wound. Hegar and Kaltenbach recommend operation, even where the bladder and rectum are involved. Mundé in one case opened Douglas' cul-de-sac, closing it with a catgut suture, and, after a



FIG. 479.—EPITHELIOMA OF THE VAGINA. General view. 1, Connective tissue of mucous membrane; 2, epithelial ramifications cut at various angles; 3, epithelial pearls.

slight attack of pelvic peritonitis, his patient recovered. In a case of cancer of the posterior wall, Rueter sutured the raw surface of the wound to the

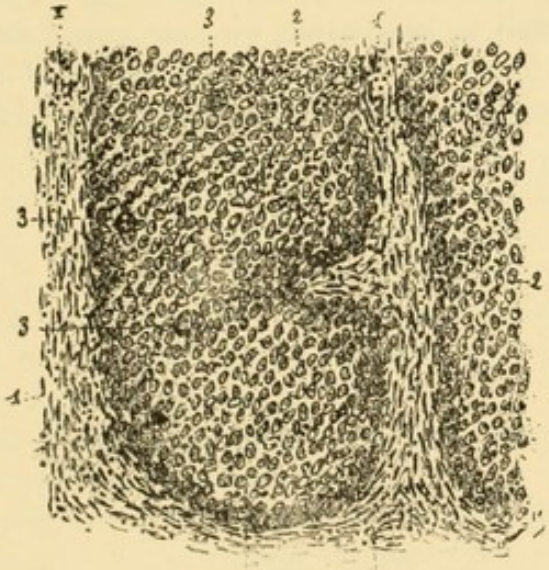


FIG. 480.—EPITHELIOMA OF THE VAGINA. Portion of preceding figure (× 300 diameters). 1, Loose connective tissue infiltrated with small round cells; 2, closely united epithelial cells with very irregular nuclei. Between them are many small round cells derived by karyokinesis; 3, cells undergoing karyokinetic changes.

previously freshened cervix. This plastic restoration of the parts prevented a recurrence, and at the end of three years pregnancy followed.

In the case of a woman in whom the cancer involved the whole of the recto-vaginal septum sloughing had given rise to a cloaca. Eiselberg, in

this case, resected the coccyx, and established an artificial anus in the sacral region, after having extirpated the whole of the diseased part. The wound was then drawn together by sutures, and the uterus was brought down and fixed, so that the cervix opened externally in the neighborhood of the cutaneous margin. Recovery was rapid. Menstruation was free, and before long stools were retained. This bold operation is worthy of imitation.

In a case of primary epithelioma of the upper portion of the vagina of a woman whose vulva was narrow, I reached the neoplasms by transverse perineotomy. The recto-vaginal septum was opened, the dissection being carried with scissors as far as Douglas' cul-de-sac. The vagina was incised behind the cervix, then the tumor, which was about two centimetres from the latter, was drawn down and freely excised. The vaginal wound was brought together by several sutures, the peritoneum drained by a strip of gauze, and the perineum closed by three metallic sutures placed according to Lawson Tait's method. The patient recovered rapidly. Some weeks later Olshausen, who appeared to be ignorant of the appearance of my article, published three cases of carcinoma of the vagina operated upon by a similar procedure. Thorn has twice employed it successfully.

Dührssen exposes the operative field by a vagino-perineal incision, and if the cervix is involved performs a high amputation.

Mackenrodt urges the use of the galvano-cautery for the excision of cancers of the vagina, and advises the removal of the uterus even when the disease is primary in the vagina.

In case extirpation is impossible we may resort to curetting, followed by cauterization with the red-hot iron. Antisepsis of the vagina is to be maintained as far as possible by injections and tampons of iodoform gauze.

CHAPTER XXXVII.

CICATRICIAL FISTULÆ OF THE VAGINA.

The vagina may communicate with the neighboring cavities by permanent cicatricial orifices or canals lined with new tissue covered with epithelium. These abnormal means of communication or fistulæ are of two classes: those which give passage to urine, and those which give passage to fecal matters.

Urinary Fistulæ.—*Etiology.*—We exclude from the class of cicatricial fistulæ, or fistulæ proper, the fistulous communications produced by cancer in an advanced stage of its development.

In the large majority of cases fistulæ date back to a difficult labor which has produced sloughing of a more or less extensive portion of the genital canal. If the fœtal head remains too long at the inferior strait, the vesico-vaginal septum is caught against the pubes, its vitality is compromised, and sloughing follows. This is the case where there is narrowness of the pelvis and exaggerated size of the fœtal head, or shoulder presentation; and it is the duration rather than the intensity of the pressure which determines the injury.

Other causes of fistula are of less frequent occurrence. The vesico-vaginal septum may be wounded by the forceps, the cephalotribe, or other instrument. Sometimes the surgeon produces the perforation intentionally as in vaginal incision for stone, or accidentally during hysterectomy.

Vesical calculi give rise to fistulæ by ulceration in the neighborhood of the calculus where it is encysted or by provoking abscess at a point of obstruction. Foreign bodies in the bladder act as the exciting cause only by serving as the nucleus for a calculus.

Ulcerations of the bladder secondary to chronic catarrh have very exceptionally advanced to perforation of the septum.

Tuberculous ulcerations of the vagina are a pathological rarity, and, if they produce a perforation, this abnormal orifice does not cicatrize; hence they have no more place in the classification of fistulæ than have the perforations of cancerous origin.

Pathological Anatomy.—The location varies with the relations of the bladder and urethra to the superior border of the pubes at the time of labor, as the fistula is produced by pressure against this bony prominence. The walls of the uterus itself are never the seat of perforation from this cause, as the internal os always maintains a position above the pubic bone. This is

not true, however, of the anterior wall of the cervix, and this is sometimes, although rarely, perforated. There then results a fistula between the cervix and bladder called the vesico-uterine, or, to be more exact, the vesico-cervical fistula. Ordinarily the external os has retracted above the head of the fœtus at the time when the decisive pressure is exerted, so that it is the vesico-vaginal septum which receives it and which subsequently perforates, occasioning the vesico-vaginal fistula. Finally, the bladder may be retained above the pubes, the urethra being extended, so that it is subjected to pressure producing the urethro-vaginal fistula. Verneuil has given the name urethro-cervico-vaginal to those fistulæ in which the neck of the bladder and the urethra are simultaneously involved.

The vesical orifice of the ureter is situated about three centimetres below the vaginal portion of the cervix, and these canals have, as has been said, a short intra-parietal course. It will be seen that, as a consequence, compression exerted at a point between the superior and the inferior portions of the bladder may result in either uretero-uterine (or, more exactly speaking, a uretero-cervical) fistula or a uretero-vaginal fistula, according to whether the abnormal opening be situated in the neighborhood of the cervix or lower down in the vagina.

Of all fistulæ, the vesico-vaginal is the most frequent. It is situated as a rule very high up in the cul-de-sac. The opening is sometimes so small as to make it difficult of discovery; at other times it forms a wide orifice, generally oval in form, and in direction transverse or oblique. Its edges are in some cases flexible, in others hard and sclerotic, and are formed by the union of the two mucous membranes; that of the vaginal mucous border is usually curled inward, forming, according to the expression of Verneuil, a species of entropion. The orifice is, as a rule, single, but there may be several openings separated by hardened or cicatricial bands. Finally, there are cases in which the vesico-vaginal septum has been completely destroyed, so that there exists what Deroubaix has called a uro-genital cloaca.

The vagina often bears the incessant contact with the urine very well, but it may be the cause of a chronic vaginitis of the most distressing character. The canal often presents cicatricial bands resulting from sloughs coincident with the fistula. These may by retraction form a diverticulum with stagnation of urine and the formation of calculous concretions. One of the most unhappy complications of the fistula, from the point of view of its treatment, is the presence of cicatricial tissue uniting the walls of the vagina firmly with the pelvic bones. The urethra is sometimes included in this cicatricial tissue; it may be deviated from its course, retracted or even obliterated. Where the perforation is large, the bladder is widely open, and the mucous membrane, irritated by exposure to the air and the vaginal secretions, becomes inflamed; further, as its rôle of urinary reservoir is lost, contraction develops.

In the case of fistulæ situated in the vaginal trigone of Pawlik, we can

penetrate with a probe or an appropriate sound into the ureter, which opens either upon its free margin or a little beyond it into the bladder; it is probable that there exists in such cases a certain degree of ureteritis which, according to Sänger, would be recognizable to the touch. Freund, in an autopsy upon a uretero-uterine fistula, found the ureter dilated, as in a case of hydro-nephrosis, and with marked contraction below the fistula.

Simple uretero-vaginal fistulæ without simultaneous communication with the bladder are very rare. Most frequently the perforation of the ureter is secondary to a vesico-vaginal fistula. In the same way the uretero-uterine fistulæ are but a variety of the vesico-uterine or vesico-cervical, in which as a result of cicatricial contraction the wounded ureter comes into contact with the cervix, which has been more or less injured and communicates with the bladder.

In the course of time the part of the fistula which had relation with the bladder may become obliterated by progressive concentric contraction, while the portion into which the ureter opens persists because of the continual dropping of the urine from this canal.

All ureteral fistulæ are of an inveterate character, or, if one may so express it, are always half cured. Hence the difficulty in finding the small orifice in the fossæ and cicatricial tissue.

If the fistula is urethro-vaginal, it is located near the vulva, between three and five centimetres of the meatus. A fistula of this kind may precede a vesical fistula and the urethra be obliterated between the two openings. These fistulæ may be very small or of large size.

As a rule, metritis is present where a urinary fistula keeps the cervix in a state of constant irritation. The alteration of the vaginal portion by sclerosis and ulceration may be considerable. In one case it actually resembled a nodular cancer.

Symptoms.—After a difficult or instrumental delivery we often have involuntary evacuation of urine; it is possible that this is due to a laceration of the vesico-vaginal wall, but is quite as probably dependent upon a traumatic paralysis of the neck of the bladder which antedates the slough sometimes by several days.

The date assigned by the patient for the appearance of the trouble is then of little importance; nor is it necessary to conclude with Deroubaix that in the majority of cases the fistula makes its appearance immediately after delivery. The incontinence of urine and the appearance of the fistula are not necessarily contemporaneous, as the patient is apt to think. Not until the third or the fourth day is the slough soft enough to permit the escape of urine. At first this will be in an inappreciable quantity, increasing with the amount of tissue detached; this process has sometimes been deferred as long as a month. The amount of the urine lost will vary with the dimensions of the orifice; while the alterations in quality, such as the addition of muco-pus or phosphates, are dependent upon a concomitant cys-

titis. The decubitus of the patient will influence the amount of urine thus discharged. Verneuil has seen a case in which urine was lost only when the patient lay upon the side. We can easily see that, in the case of a fistula of the base of the bladder, retention would be possible, in the upright position, of fluid which would at once escape were the perforation nearer the neck. The position of the edges of the wound, as well as that of neighboring cicatricial ridges, will also have an influence.

In the case of urethro-vaginal fistula, urine is discharged into the vagina only at the time of micturition. In the uretero-vaginal or uretero-uterine fistulæ the urine secreted by one kidney accumulates normally in the bladder, while that secreted by the other filters away drop by drop, or by a small stream, into the vagina. This perpetual involuntary discharge constitutes a veritable martyrdom for the patient, causing a constant wet condition and a penetrating odor which nothing will control, while the vulva and nates are the seat of a most distressing irritation.

The general health may be preserved; it may, however, be profoundly affected by extension of the inflammation along the genito-urinary tract, giving rise to metro-salpingitis or pyelo-cystitis. Amenorrhœa has often been noted. Sometimes, however, conception and normal delivery occur.

Diagnosis.—If immediately after labor we have an involuntary escape of urine, we need not at once conclude that we have a urinary fistula, for, as I have already said, such an escape of urine may be due to a paralysis of the neck of the bladder or even of the body of the bladder, with consecutive over-distention. A careful examination, and if still in doubt an injection of milk into the empty bladder, will decide the point. If there is the least perforation, the liquid will appear in the vagina.

A digital examination is sufficient for the determination of large fistulæ, especially if combined with catheterization with a metallic sound. Examination by the speculum is, however, essential for the precise location of certain perforations of very small calibre.

To examine for fistula, first place the woman in the lateral or Sims position, then in the genu-pectoral, depressing the fourchette and exposing the lateral walls with appropriate specula. The latter position is most favorable for bringing into view the anterior wall if at the same time we fix the cervix and draw it slightly down with the fixation forceps. The examination is under any circumstances difficult if the vagina is contracted, and can often be accomplished only by the aid of previous dilatation, either rapid or slow, according to one of the various processes of which I shall speak in connection with the treatment of these conditions.

When the vagina has been made sufficiently accessible, examination may be still further impeded by cicatricial bands and irregularities. We must smooth out the folds, and go with a fine probe into every suspected fossa. At the same time a metallic sound may be made to elevate the anterior wall of the bladder, and the woman should be told to make straining efforts.

In a doubtful case we should not omit to inject milk into the bladder. If the interior of the vagina be now examined, the milk may be found issuing from the opening; yet if this opening be very small, the point of emergence may be invisible. I would advise you in such a case to thoroughly dry the anterior wall of the vagina, and apply to it a piece of absorbent paper while the bladder is being filled. A spot of moisture on the paper will show the location of the orifice, which can easily be found with the probe.

If we have a cervico- or a utero-vaginal fistula, the introduction of a sound into the bladder and of a probe into the cervix will be sufficient for demonstration if the fistula is of some size. If it is very small, we may inject the bladder with milk until the liquid rises to the level of the fistula, and appears at the external os. The diagnosis can be confirmed by dilatation of the cervix, and exploration practised simultaneously with catheterization of the bladder.

In the case of uretero-uterine fistula, the urine is discharged by the cervix, as in the preceding case, and the diagnosis is at first impossible. We may have to resort to very minute tests in order to make the distinction. Injections of milk will not now traverse the cervix, unless the fistula be of the uretero-vesico-uterine variety, while dilatation by the laminaria tent may be followed, as in Freund's case, by pain, vomiting, and fever, the results of obliteration of the canal through which one of the kidneys discharged.

An ingenious measure has been employed by Bernard. He made the patient urinate; then placed the patient upon a vessel and collected all of the urine passed by the vagina for two hours, subsequently evacuating the bladder by the catheter. He then compared the two quantities, and, finding them equal, decided that each came from a separate kidney. I believe that in a similar case examination for thickening of one of the ureters according to Sänger's method would confirm the diagnosis and reveal ureteritis at the location of the lesion. Catheterization according to the methods of Simon, Pawlik, or Kelly may be practised if we can gain access to the cervix, but we must remember that the ureter often contracts below the perforation, so that it is penetrated with difficulty.

We may conjecture that we have a uretero-vaginal fistula, where the orifice is one or two centimetres from the cervix, upon the vaginal wall, in the neighborhood of one of the lateral boundaries of Pawlik's triangle.

When the fistula is simply of the uretero-vaginal variety, the orifice is very small, and the margins abrupt or hidden by a granulation. When, as is more frequent, the fistula is of the uretero-vesico-vaginal variety, the orifice may be very large. We should seek for the ureter upon one of its lips, being guided by the recognized relations of this canal. Sometimes we may see the urine coming from it in little jets. We should search with the ureteral sound in the neighborhood of the posterior border, if the opening is not otherwise discovered. The penetration of the sound for a consider-

able distance, its direction toward the kidney, and the discharge of limpid urine at a time when the bladder contains an injection of milk will remove all doubts. I have in a case of this kind introduced Pawlik's sound to a depth of eight inches.

Urethral exploration by catheterization should always be conducted with great care. I have used for the purpose a small elastic sound which easily follows the deviations of the canal. It is necessary to guard against possible error pointed out by Hegar and Kaltenbach. The urethra was obstructed in its posterior portion between a urethro-vaginal and a vesico-vaginal fistula. The sound passed into the vagina through the urethral orifice and entered the bladder by the vagina. It is only necessary to recognize this source of error in order to avoid it.

The cervix in these cases is sometimes affected with chronic inflammation, hard, nodular, increased in size, covered with ulcers that have a perpendicular margin and a shining appearance similar to that of certain varicose ulcers of the legs, and giving the impression of a malignant growth. We need not hastily conclude that we have to do with a cancer of the cervix; the lesions will disappear or at least be greatly ameliorated after obliteration of the fistula.

Prognosis.—Spontaneous recovery from urinary fistulæ occurs only very early during the stage of concentric cicatrization which succeeds the discharge of the slough. At this stage one is sometimes surprised at the rapidity with which even large perforations diminish in size or disappear. In the course of time, however, this process of cicatricial reformation terminates. The perforation has now definite margins formed by the epithelium of the two mucous membranes united on their free borders; and there is no further spontaneous tendency to cure. Fistulæ are an infirmity rather than a disease, their gravity consisting in inflammatory complications involving the bladder and uterus, with frequent extensions to the kidneys, the Fallopian tubes, and the peritoneum. Ureteral fistulæ opening into the cervix are especially liable to these complications.

The curability of the different varieties of fistulæ varies with their location, extent, duration, and the condition of the vaginal mucous membrane.

Fistulæ of the base of the bladder are treated with greater facility than vesico-vaginal fistulæ or even those of the urethro-vaginal variety, which *a priori* should be easily curable. Vesico-cervical fistulæ are most rebellious to treatment. All of the ureteral fistulæ, whether opening into the vagina or the cervix, are extremely difficult to treat, their obliteration even exposing the patient to new dangers from the possibility of resulting diminished permeability of the ureter itself.

Treatment.—Urinary fistulæ in women were described toward the end of the sixteenth century by Séverin Pineau. His treatment by vivification and suture was recommended in the seventeenth century by the Dutch surgeon Von Roonhuysen, but the operations failed for the want of a good technique,

so that in the eighteenth century all curative treatment was abandoned, and Jean Louis Petit applied in such cases a kind of urinal which he called "*trou d'enfer.*" Desault and Choppart limited treatment to the permanent catheter and the vaginal tampon in the early stage to favor spontaneous cicatrization. At the beginning of the nineteenth century various tentative operations were practised. Delpech, Dupuytren, and Jules Cloquet recommended cauterization. The suture was tried anew by Lewisky in 1802, by Naegele in 1812, by Lallemand, Deyber, and Malagadi of Bologna in 1828, by Roux in 1829, and by Dugès in 1830. Lallemand in 1824 invented his famous "*sonde érignes*" or "*sonde unissantes,*" the object being to unite the margins of the fistula, after previous vivification by the cautery. The alleged success of Lallemand, although contested, caused an enthusiastic adoption of these hooks, or "*érignes unissantes.*" Dupuytren constructed an instrument of this character, and Laugier a little later invented a double vaginal hook. Récamier constructed several uniting instruments, but their popularity was temporary, and soon they were altogether abandoned in favor of autoplasty.

In 1832 Velpeau proposed to close laryngeal fistulæ with a skin graft, recommending the same procedure for other fistulous openings. This recommendation was adopted by Jobert de Lamballe, and in 1834 he operated by elytroplasty or autoplasty of the vagina. He first revivified the fistula with a bistoury, then replaced the lost tissue by a cutaneous graft derived from one of the labia, the internal surface of the thigh, or the buttocks. This graft was sustained in contact with the fistula by a suture passed into the urethra. He obtained a good result, but subsequently numerous reverses marked the operation both in his hands and in those of Roux, Velpeau, Leroy, and d'Etiolles. Gerdy also invented an autoplastic method, which merits preservation for certain special cases. It consists in the detachment of two quadrilateral flaps from the borders of the perforation and the exact union of their bleeding surfaces.

None of the different methods, however, had given any but uncertain results, when Jobert proposed an operation which marked an epoch in the history of the cure of fistulæ. This was the operation of cystoplasty *par glissement*, or vaginal autoplasty by flaps. He had a series of successes, which were very extraordinary for the times. Jobert wrongly attributed these to the facility afforded for bringing the margins together and the absence of tension. In reality they were to be ascribed to details of technique which he considered accessory only but which from their influence were of capital importance in the result. They consisted in the obtaining of a good view of the operating field by means of flat retractors, freshening of a large surface of the borders of the fistula, and the insertion of many sutures. Those surgeons who, like Jobert, failed to appreciate the importance of these details, were not successful in their operations, and only its author had good results with cystoplasty *par glissement.*

In Europe the first enthusiasm excited by Jobert's publications was fol-

lowed by complete discouragement until toward the end of the year 1858, when a young American surgeon, Bozeman, exhibited in Paris a slight modification of the operation of his teacher, Marion Sims, of New York. This American procedure, which had previously been touched upon in some of its points by other physicians, and by Hayward, of Boston, in particular, consisted of the following improvements upon other methods. The semi-prone lateral position; the use of large specula of trough-like form which serve as depressors and at the same time as reflectors; revivification of a very much larger area than had been previously thought necessary, for the accomplishment of which he recommended a complete armamentarium of instruments; sutures with many stitches of silver wire (at the same time strong and aseptic); and a special permanent metallic catheter.

The extraordinary success obtained by Bozeman in the hospitals of Paris excited the enthusiasm of French surgeons. Follin and Verneuil in particular popularized the American method by their operations and practice. Three years later (November, 1861) Marion Sims himself came to Paris and operated in the service of Velpeau.

At the same time Baker Brown and Simpson obtained in London and Edinburgh similar successes, and Simon, of Rostock, modified certain manual details. He employed silk sutures, demonstrating that silver wire was not essential to the result; he formulated definite rules for vivification; and finally, in cases incurable by the usual procedure, he applied the method called colpocleisis or transverse obliteration of the vagina—an operation of which, in truth, Vidal de Cassis had conceived the first idea.

The therapeutics of urinary fistula in the female were henceforth established, and the more recent works on the subject have merely elaborated the descriptions.

If we review the history of the operations which have been applied to the cure of vesico-vaginal fistulæ, we shall easily distinguish several periods: 1st. The old period or that of experimental operations, which extends from Von Roonhuysen's attempt at suture to the first essays of Jobert; surgical knowledge then passed successively in evolution through the stages of the suture after revivification to cauterization, then to the use of instruments to promote union after revivification by caustics, and finally to autoplasty. 2d. A period of transition marked by Jobert's operation of cystoplasty *par glissement*, and by the indirect process of infibulation by Vidal de Cassis, followed by Bernard. 3d. A period of the renaissance of the suture—the old operation of Von Roonhuysen, to which has been attached the names of Hayward, Sims, and Bozeman in America; of Simpson and Baker Brown in England; of Simon and of Hegar in Germany; of Neugebauer in Warsaw; Follin and Verneuil in France, etc.

Operative Indications.—When is the best time to operate? Hegar and Kaltenbach have fixed upon the sixth to the eighth week after delivery. At this period the lochial discharge has disappeared, the slough has been elimi-

nated, and the margins of the fistula are sufficiently vascular and firm. Earlier than this we risk an unfortunate result by exposing our wound to a vaginal discharge, also from operation upon tissues too friable and over-gorged with blood; later, to the difficulties associated with retracted and sclerotic tissues. Age does not constitute a contra-indication. Simon has operated with success upon a child of eight years in whom the fistula was provoked by a large vesical calculus; Hegar has operated upon a woman of sixty, who had suffered from her fistula for thirty-five years.

A bad general condition is evidently unfavorable for the success of a plastic operation. Hegar, however, did not hesitate to operate upon a hemiplegic patient. In spite of the successes of Watson and Baker Brown, it seems to me imprudent to operate during pregnancy. The time immediately following menstruation is to be preferred.

Operation in all vesico-vaginal and urethro-vaginal fistulæ will relieve incontinence of urine by one of two methods: (1st) direct obliteration of the fistula; (2d) obliteration of the genital canal below the situation of the fistula, so as to incorporate it with the urinary reservoir. The last procedure is of course only a last resort.

Direct Obliteration of the Fistula.—A. Vaginal Route.—I shall not dwell upon cauterization, which for a long time was the surgeon's only resource and was practised by means of the most various agents. It is now reserved for small recent fistulæ, and particularly for those presenting an oblique canal. We use preferably the galvano-cautery, first inserting the non-heated platinum the whole length of the canal. Nitrate of silver is applicable where the opening is very narrow; it is a good auxiliary, too, to actual cauterization after the separation of the slough.

Intermediary between cauterization and operation by suture we place the process of revivification by caustics, followed by suture, sometimes designated as immediate secondary reunion. The following description is furnished by its principal exponent, Amabile, of Naples.

The woman being placed in the dorsal position, the buttocks are elevated, and the fistula is brought into view by means of a modified Sims' speculum fixed to the operating-table. The margin of the fistula is scarified for a distance of about two-fifths of an inch. The object of the scarification is simply to allow the caustic to act more energetically. Amabile uses sulphuric acid for this purpose. He repeats the cauterization at the end of three days, and follows with nitrate of silver to facilitate separation of the slough. At the end of about twelve days he has a granulating wound which he brings into apposition with an instrument called the "*griffes en rateau*" or rake-catch of Amabile. He leaves this in place for from five to seven days. It will be seen that we have here a veritable return to the archaic procedure of Lallemand, Laugier, and others. Experience does not justify it as a general method; at the same time it may be practised under special circumstances. For instance, it may be applicable where treatment is at-

tempted during the first days which follow the separation of the slough; we should then probably have direct union of the granulating surfaces; in such cases sutures seem to me preferable to the *serres-fines* or to the *greffes*.

Primary union of the previously vivified fistula is the operation which has been substituted for the preceding methods.

Preparatory Treatment.—To Bozeman belongs the credit for having suggested dilatation in cases in which narrowness of the canal and cicatricial bands are present. He produces the distention gradually by a series of ovoid hard-rubber balls used during several days. He aids their action by incision of the cicatricial tissues. With patience, the most surprising results may be obtained. Simon and his pupils prefer rapid dilatation. He first incises the fibrous bands and masses with the bistoury, and then dilates by introducing one after another specula of gradually increasing size. Local cocaine anæsthesia may be used. It is also desirable to overcome erythema, excoriations, and cystitis before proceeding to the plastic operation. This is effected by means of lotions, injections, and baths.

Where we have contraction or obliteration of the urethra we should first treat these conditions. For the first we may resort to divulsion or the long-continued use of the sound. In case of obliteration of the urethra we may do an operation analogous to that of external urethrotomy in the male; the cicatricial tissue is first to be excised, after which the vaginal mucous membrane, liberated by means of incisions and dissections, may be sutured about a permanent catheter so as to form a new canal.

Operative Technique.—First Stage—Examination for Fistula.—The position to be given to the patient will vary with the height of the orifice. The dorso-sacral position is available where the fistula is very low or where there is at the same time prolapse of the vaginal wall. As a rule, however, Sims' position or that of semi-pronation will be required. Where the fistula is located high up, the genu-pectoral position will be necessary. This possesses the drawback of being uncomfortable and of rendering the administration of the anæsthetic difficult, notwithstanding the use of special operating-tables. The patient is fastened to the table by Bozeman, and simply placed in position by Neugebauer, who has a self-retaining speculum held in place by a belt, also hooks and chains to which are suspended weights so as to stretch the parts included in the operative field.

General anæsthesia by chloroform has always been used for this operation. It is probable, however, that cocaine applied by compresses or by submucous injection might be used with success, and general anæsthesia be dispensed with. Two assistants are required: one to expose the vaginal wall and control bleeding, and the other to handle the sutures. The operation may be performed under continuous irrigation with lukewarm sterilized water; and we may, if necessary, use in the place of sponges moistened absorbent cotton carried by the forceps.

The fourchette should be depressed by a short and broad-bladed Simon's

speculum; a retractor can be used to elevate the anterior vaginal wall if necessary; a metallic sound introduced into the bladder may be used to bring the base toward the operator; finally, the cervix is fixed and brought down by Museux forceps.

Second Stage—Vivifying the Lips of the Fistula.—For this purpose a bistoury having a straight or angular blade is to be preferred. The scissors,

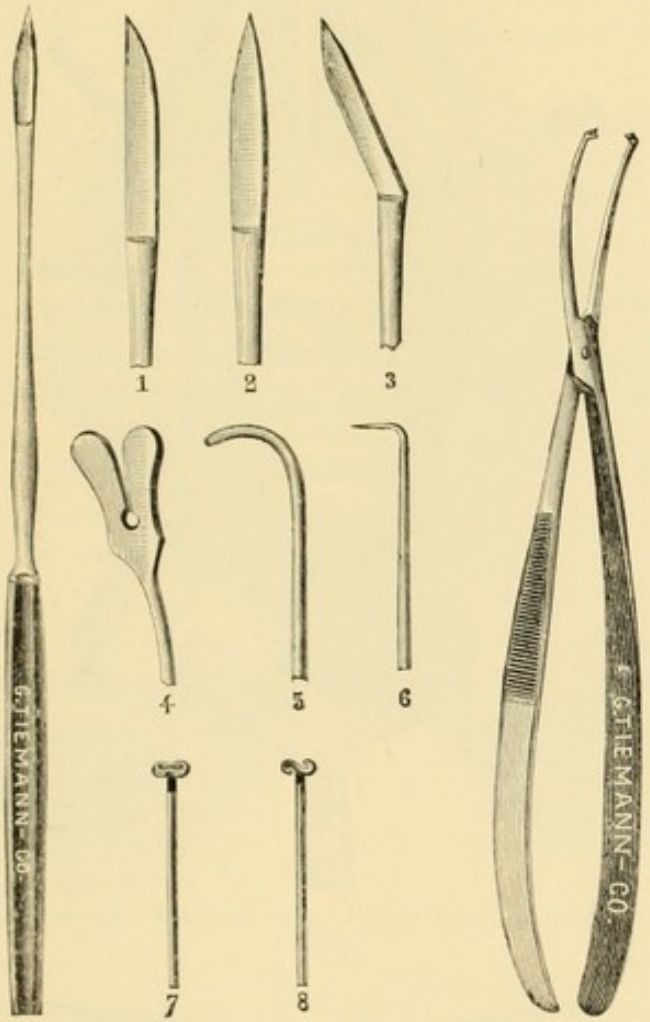


FIG. 481.—INSTRUMENTS USED FOR VIVIFICATION AND SUTURE IN VESICO-VAGINAL FISTULA. 1, 2, 3, Straight, convex, and bent bistouries; 4, spatula; 5, 6, blunt and pointed hooks; 7, 8, Coghill's wire twister, and Denouvillier's S-shaped wire twister; 9, Collin's spring forceps.

so ingeniously varied in curve by Sims, do the work more rapidly, it is true, but sometimes bruise the tissues. Denudation may be accomplished in two ways. In ordinary cases, in which the mucous membrane in the neighborhood of the orifice is in a healthy condition, we make an infundibuliform denudation, following the practice of Simon (Fig. 483, *m*, *n*). Simon takes no special precautions for the protection of the vesical mucous membrane, and the bistoury removes all of the cicatricial tissue. In the case of extensive cicatrices it is better to prepare for denudation according to the American method (Fig. 483, *x*, *y*). The bistoury, directed obliquely, should be in-

serted at about one-fifth of an inch from the edge of the orifice, in such a way that its point perforates the tissues at the line of union of the vaginal

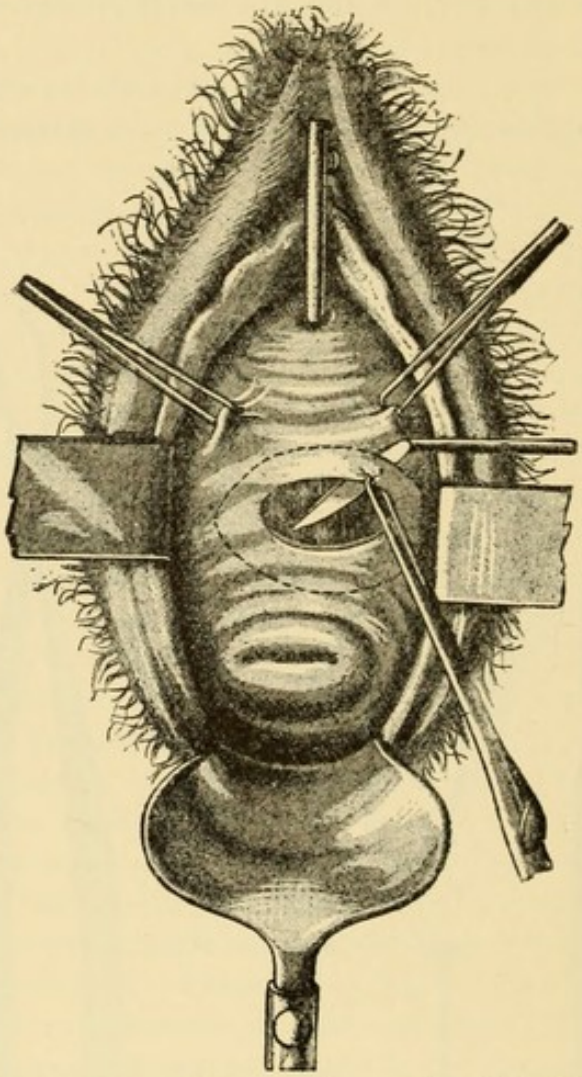


FIG. 482.—VIVIFICATION IN VESICO-VAGINAL FISTULA. (The tenaculum which holds down the cervix has been omitted.)

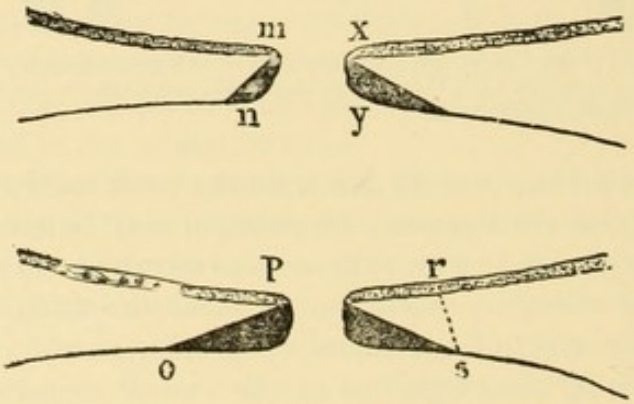


FIG. 483.—VIVIFICATION IN VESICO-VAGINAL FISTULA. *m*, *n*, Infundibuliform denudation with narrow base (Simon). *x*, *y*, Conical denudation with broad base (American method), saving the vesical mucous membrane; *p*, *o*, American method of denudation, showing the area of tissue preserved when a large mass of cicatricial tissue is freshened. In Simon's process this would be excised as shown by the line *r s*.

with the vesical mucous membrane so as to pass beyond the cicatricial tissue which is removed. The Americans consider it most important not to wound this tissue, as it bleeds freely.

In making the incision the mucous membrane is put on the stretch by means of tenacula and toothed forceps, a complete collar is outlined about the fistula and detachment is completed with the scissors (Fig. 482). Where the margins are hardened, bleed but little, and have but a moderate degree of vitality, the denuded surface is to be increased, the ring of mucous membrane being removed to a depth of about an inch. This American procedure has but one disadvantage—that of tension after the application of the sutures. In a small fistula, denudation should take an elliptical form, and should be directed so as to produce the least tension. Internal hemorrhage is guarded against by avoiding the vesical mucous membrane. Sometimes, however, the wounding of an arteriole is unavoidable; it is then better to

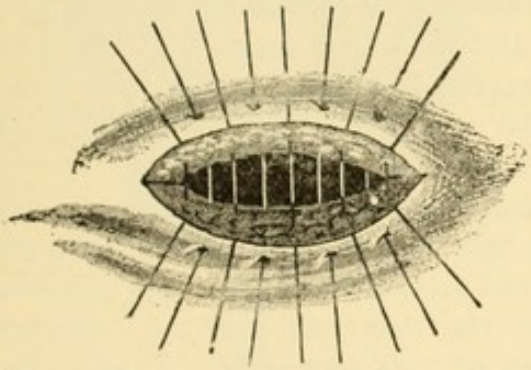


FIG. 484.—SUTURE OF VESICO-VAGINAL FISTULA; DEEP AND SUPERFICIAL SUTURES IN PLACE.

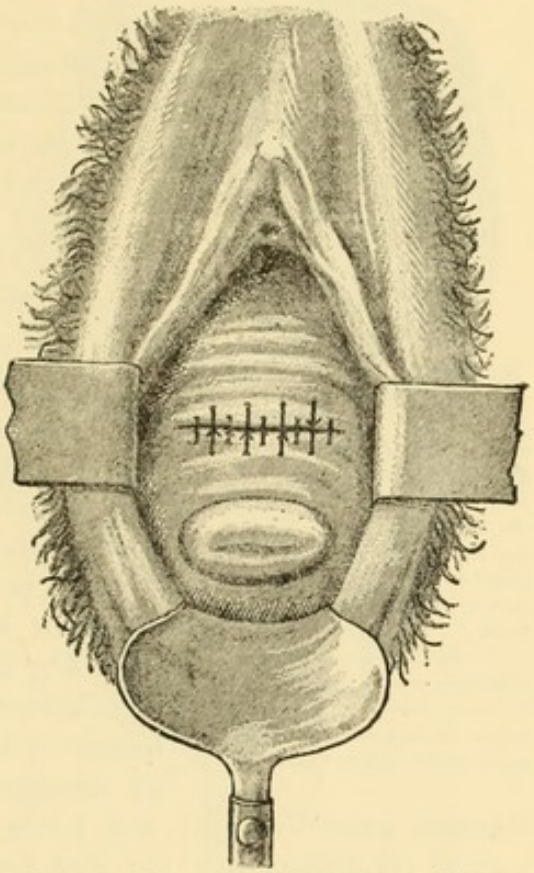


FIG. 485.—SUTURE OF VESICO-VAGINAL FISTULA; SUTURES TIED.

stop the bleeding by direct compression of the denuded surface by the fingers. If that does not succeed, it is better to trust to suture than to seize vessels in the wound. The same rules for vivification apply both to vesico-vaginal and to urethro-vaginal fistulæ.

When the fistula is situated near the cervix, it is well to incise the anterior lip of the cervix or even to remove a cuneiform segment so as to give access to the fistulous orifice. Then denude for a certain distance about the opening, as in the case of other fistulæ; and if there is too much tension, instead of making free incisions, it is better to use the scissors and separate the mucous membrane from the underlying tissues for a certain distance around the wound.

Third Stage—Suture.—Some operators use mounted needles, tubular needles, either Simpson's or Sims'; Startin's *chasse-fil* needle or Reverdin's needle. While convenient, all of these instruments make too large a wound. I myself use exclusively the fine flat Hagedorn needle, carried by my own needle-holder. Sutures of fine, strong silk or of silver wire are preferable to catgut, which is too rapidly dissolved, while the silkworm gut is too stiff.

First pass the deep sutures. Excluding carefully the vesical mucous membrane, pass your needle under the whole of the denuded surface, bringing it out about a tenth of an inch from the margin of the wound. The ends of the sutures should be immediately secured with forceps. To obtain exact closure, insert superficial sutures between the deep or supporting sutures. Use a very fine thread and bring it out as close to the margin of the wound as possible, tying it at once (Fig. 484). Then tie the deep sutures. If silver wire is used, it can be gently brought together and then twisted with a wire twister (Fig. 481). In passing the sutures we may use mouse-toothed forceps, blunt and sharp hooks, and a little forked instrument; a catheter is to be kept in the bladder. We prefer a transverse direction where it is possible to choose the line of the sutures. If the perforation is extensive, it may be best to give it the direction of the letter **Y**, or that of a double **Y** united by the stems (Fig. 488).

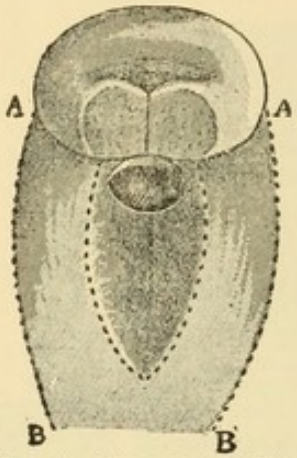
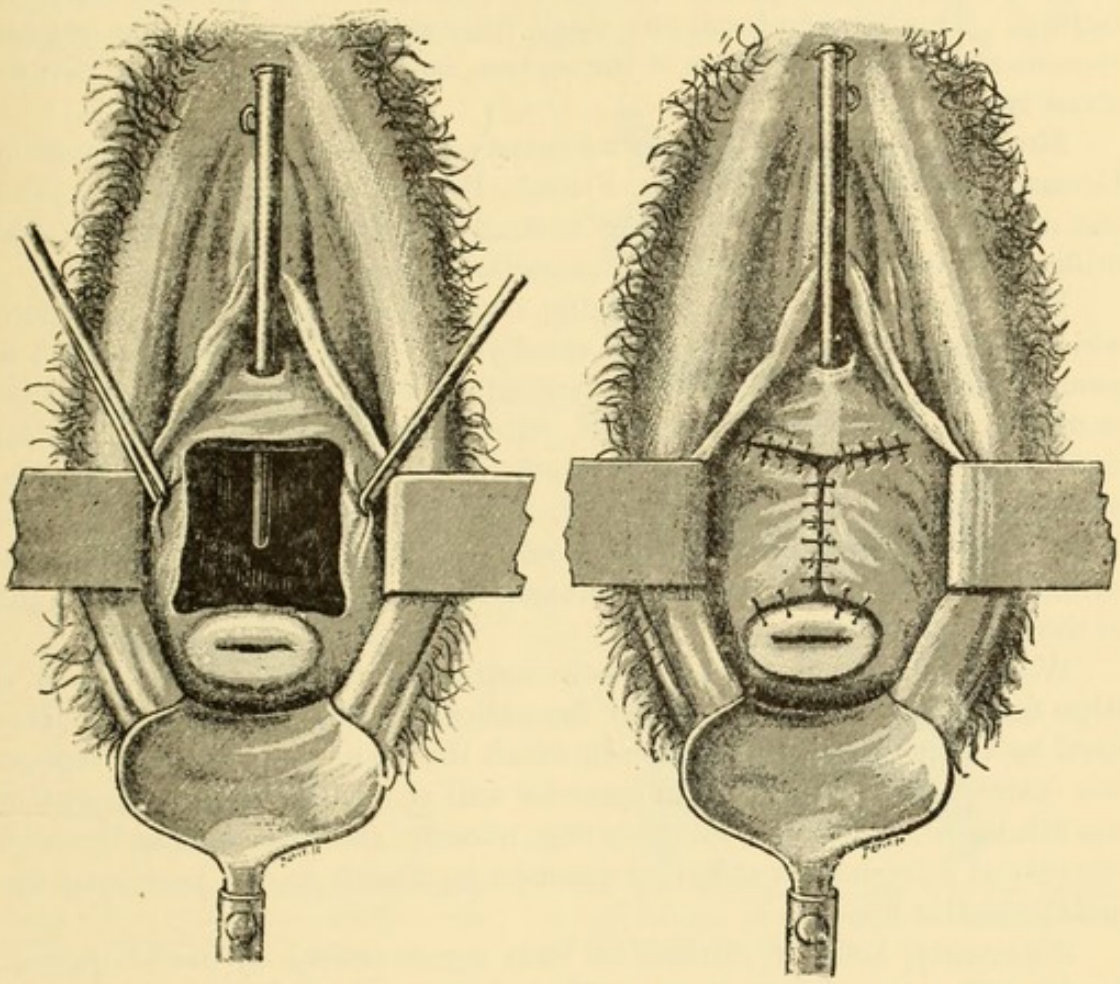


FIG. 486.—OPERATION FOR VESICO-VAGINAL FISTULA SITUATED NEAR THE CERVIX. Incision of the anterior lip in order to make the fistula more accessible. The inner dotted line shows the surface to be freshened around the fistula. The outer dotted line *A B* shows where the mucous membrane may be separated, when necessary to relieve tension. The patient is supposed to be in the genu-pectoral position (Emmet).

Various Modifications of the Operative Technique.—I have just described the general process of denudation and suture, which is, in its essential features, what Verneuil and Follin call the American method. Certain special conditions call for modifications of this technique. I shall describe them briefly, and shall indicate also certain peculiarities in the practice of different operators which should not be passed over in silence.

First Stage—Exposure of the Fistula.—In order to limit the number of assistants, several operators have invented self-retaining specula. Bozeman first constructed an instrument of this kind which has served as the pattern for a number of others. Neugebauer's apparatus is fixed to the patient's back by straps, and the hooks, chains, and weights serve to put the parts upon stretch without the aid of assistants. Simon depresses the cervix by passing loops of silk through the lips; these take up less space than forceps. The larger number of surgeons who fix the cervix, a detail which I consider indispensable, use for the purpose Museux forceps or ordinary extraction forceps. Forceps may also be used in the place of the tenaculum for fixing the mucous membrane in the neighborhood of the operative field.

Second Stage—Denudation.—If we have a very large perforation or if the margins are specially vascular, it is better not to denude the whole of the border of the fistula at once, but to denude and suture a limited portion at a time. If the case is very difficult, requiring much time, it is better to do a partial operation, and repeat it several times. The duration of the operation is an important consideration on account of the prolongation of



FIGS. 487 AND 488.—EXTENSIVE QUADRANGULAR VESICO-VAGINAL FISTULA, BEFORE AND AFTER FRESHENING AND SUTURE.

anæsthesia, which is prejudicial to the patient; and also on account of the fatigue to the operator; it is a matter not to be lightly passed over when we have in hand an operation demanding minute attention.

If two fistulæ are adjacent and separated by cicatricial tissue, they must be united; if the bridge of mucous membrane is flexible and has a good degree of vitality, we must endeavor not to injure it.

When the vagina is narrow and does not furnish tissue for a sufficient denudation, we may have recourse to a flap-splitting process, which is the basis for Lawson Tait's operation for perineorrhaphy and which was primarily applied to operation for vesico-vaginal fistula. I shall speak later of

the service which it has rendered me in the treatment of uretero-vaginal fistula.

When there is a very large perforation with a considerable loss of tissue, it may be necessary to have recourse to flaps derived from the vicinity, or autoplasty. This operation, often confounded with that of flap-splitting, was used by Jobert, Gerdy, and others. It found a warm partisan at a relatively recent period in Duboué, who proposed to incorporate it with the American method. This surgeon forms two small flaps at the expense of the vaginal mucous membrane by division of the septum, securing them with wire twisted about ivory buttons.

Since then this operation of autoplasty by division has been revived in Germany by von Herff, Sänger, Fritsch, Fenomenoff, and Walcher. The last named, who has described the technique at length, unites the vesical orifice with catgut, using silk for the vaginal wound.

With the methods by flap-splitting should be described the procedure which Mackenrodt has successfully employed. The anterior vaginal wall is rendered tense by means of forceps, and an antero-posterior median incision is made, passing through the fistula. After carefully separating the vesical and vaginal walls on each side of the fistula, he closes the vesical orifice, preferably with a tier suture. Then, as in vaginal fixation, he draws the body of the uterus into the vaginal wound and sutures the vaginal wall to the anterior face of the uterus, approximating as much as possible the lips of the vaginal opening.

We should add to the autoplastic operations that of obliteration of a large fistula by a plug formed from the vesical mucous membrane, as practised by Lannelongue. In a case in which the whole vesico-vaginal septum was destroyed, and in which the posterior wall of the bladder had engaged in the fistula, he utilized the obturator thus offered; and after having denuded the vesical mucosa for a sufficient distance, he fixed it to the previously denuded anterior lip.

Autoplasty, however, renders its most signal service in urethro-vesical fistulæ with a great loss of tissue. Marked successes of this kind have been reported by Houzel, by Polaillon, and by Fritsch.

Third Stage—Suture.—Sims, in twisting his suture, used a catch forceps having a right-angled extremity. This seized the two ends of the wire at the same time that they were made to engage in the groove of a long-handled shield. The shield was pushed by the left hand along the wire in contact with the mucous membrane; torsion was then effected by rotating the forceps upon its axis. Before removing the shield, he turned the wire in the direction of the vaginal outlet, so that its ends should not wound the posterior wall. Sims placed in the bladder a self-retaining permanent sigmoid catheter of his own invention. Bozeman brings the margins of the wound together by a special instrument called a suture-adjuster. It consists of a long steel shank carrying a little flat disc pierced by a hole in its

centre. Through this hole he passes the two ends of a suture; with these in the left hand he slides the disc down to the wound in such a way as to secure its perfect coaptation and to give to the wire a circular position, when it has only to be secured. Before the operation he prepares two or three small strips of lead, a millimetre in thickness and of a size adapted to the extent and form of the closed wound and hollowed out in the centre so as not to press upon its lips. He then pierces the leaden plate, punching in it holes to the number of his sutures, passing through each hole the two ex-

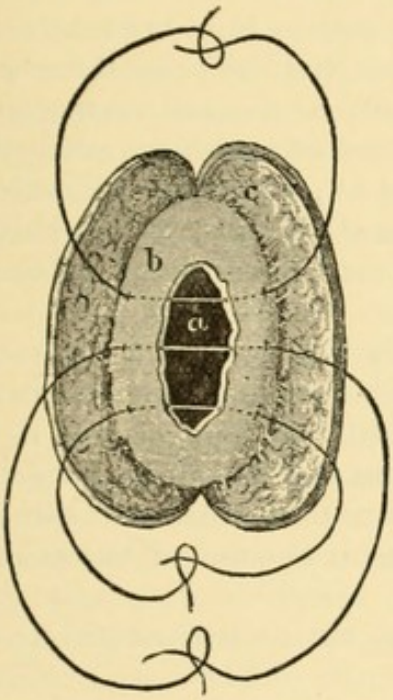


FIG. 489.—FLAP-SPLITTING OPERATION IN VESICO-VAGINAL FISTULA (WALCHER). *a*, Fistula; *b*, vesical wall; *c*, vaginal wall.

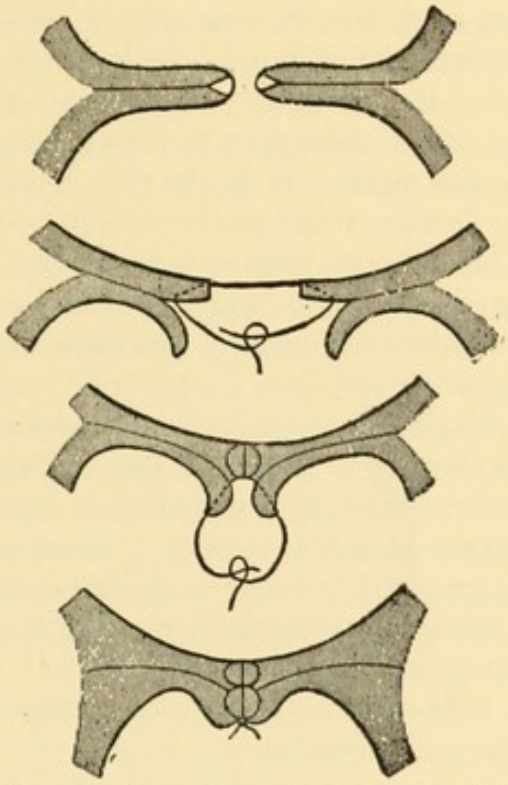


FIG. 490.—FLAP-SPLITTING OPERATION FOR VESICO-VAGINAL FISTULA. SCHEMA OF THE SUCCESSIVE STEPS OF THE OPERATION (WALCHER).

tremities of each separate suture, and then, bringing the plate into close contact with the vaginal wall, adjusts it with a special hook. He encloses the wires with the lead, somewhat after the manner in which rubber tubing is used. Sims' catheter is left in the bladder. The sutures are removed on about the tenth day, the patient being in the genu-pectoral position as for operation.

I am in the habit of inserting a deeply buried continuous catgut suture, which does not include the vesical mucous membrane, immediately after placing the silver sutures and before tying them, thus forming two layers—one deep, the other superficial. In this way I secure a more perfect occlusion, preventing the infiltration of urine during the first hours after the operation.

After-treatment.—The operation terminated, wash out the vagina with a

sublimate solution (1 : 2,000), and powder the line of suture with iodoform. Then place in the vagina a strip of iodoformed gauze to prevent wounding of the posterior wall by the silver wire or the silkworm gut, which are to be preferred to silk, as the latter absorbs the vaginal and uterine secretions. We do not require any more elaborate dressing than this, which need not be renewed until after the removal of the sutures. Except in case of special indications these should be removed on about the eighth day, with precautions against reopening the wound. I think the permanent catheter invented by Sims useful for the first forty-eight hours. I attach to it a rubber tube, having its free extremity in a boracic-acid solution, the urine being thus evacuated by siphonage without the introduction of air. Prolonged retention of the catheter is attended by danger of cystitis. It is better after the first two or three days to practise repeated catheterization every three hours day and night. If at the time of operation there be a vesical catarrh, or if this develop subsequently, it will be well to follow each catheterization with an injection of borated water, being careful not to produce too much distention of the organ, which is often much reduced in size. Catheterization should be continued for two days after the removal of the sutures, permitting urination upon the tenth or twelfth day.

Vaginal injections of sublimate solution may be used at this time night and morning. If a small aperture remain, touch the edges with the nitrate-of-silver stick, and spontaneous cicatrization will as a rule follow. If the opening is large, secondary union may be attempted by suturing together the granulating surfaces, having recourse again to the permanent catheter or to repeated catheterization. We should not resort to a second operation for at least a month after the first.

It is very important to keep the bowels free, but a restricted diet is not to be recommended.

If menstruation occurs shortly after the operation, as frequently happens, we simply renew daily the dressing of iodoform gauze placed in the vagina.

B. Supra-pubic Route.—This operation is applied in conditions where suture of a vesico-vaginal fistula offers no chance of cure. These conditions are found where there is an extensive slough of the urethro-vaginal septum, and where the vagina is largely filled up with cicatricial tissue, with marked alteration of the surrounding tissues. Adhesion between the fistula and the pelvis, complete loss of the anterior lips of the cervix—conditions which make wounding of the peritoneum during denudation probable—may also contra-indicate any effort at obliteration through the vagina. In such cases attempts have been made to expose the fistula by a supra-pubic incision, which facilitates the liberation of the edges of the opening and the application of sutures to the movable surfaces, which can be approximated without tension.

Trendelenburg, who first conceived this idea, approaches the fistula through the bladder. He makes a hypogastric incision, and, from within

the bladder, separates the vesical and vaginal walls, all around the fistula, sufficiently to permit the apposition and union of the edges of the orifice under favorable conditions. This is done by interrupted catgut sutures. This method has succeeded in vaginal and cervical fistulæ. Quite recently Duplay has modified it by suturing separately the vaginal wall with silk and the vesical with catgut, instead of employing a single layer of sutures in the wall of the bladder. In any case the incision made in the bladder, in order to gain access to the fistula, should be sutured completely.

Bardenheuer does not open the bladder. He carefully separates the peritoneum covering the posterior surface of the bladder as far as the vesico-uterine cul-de-sac, then separates the vesico-vaginal partition to beyond the fistula, which he sutures with care. The operation is thus made entirely extra-peritoneal. Von Dittel, on the contrary, opens the peritoneum as in an ordinary laparatomy, incises the vesico-uterine cul-de-sac, and then proceeds in the same manner as Bardenheuer.

Whatever method may be employed, it is prudent to drain the space of Retzius by a small tube or a small strip of sterilized gauze, which should be removed after forty-eight hours. A self-retaining catheter is left in the bladder for eight days after the operation.

Indirect Closure of the Fistula.—Finally, there are cases in which all attempts at direct closure fail. These conditions determine total obliteration of the genital canal. In order, however, to obliterate the vagina without risking the production of hæmatometra or retention of the menstrual blood, the opening between the bladder and the vagina must be of large size; it may even have to be increased in size. Obliteration of the vagina, which is the operation to be chosen, and which I shall describe, has received the name of colpocleisis; that of obliteration of the vulvar orifice as practised by Vidal de Cassis, and to which we are exceptionally obliged to resort, the name of episiorrhaphy, a better name than that of episiostenosis. It is easy to apply to these the principles which I shall indicate for occlusion of the vagina.

The honor of reviving the indirect operation belongs to Simon, who has also established the technique.

First Stage—Denudation.—We should try to locate the obliteration as high as possible, as this guards against incontinence better than where the denudation is carried to the neighborhood of the urethra. It will be necessary to bear in mind, however, that to secure union the denudation must be made in vascular tissue, and to establish this condition it may have to be carried completely to the vulva. Vidal de Cassis made a practice of denuding the labia majora, but the objection to that is that it is difficult to obtain complete anterior union. In operating, remove a ring of mucous membrane about seven-tenths of an inch broad, carrying the dissection from above downward, putting the parts on the stretch with the aid of the forceps. The dissection of the posterior wall will be facilitated by having an assistant

place a finger in the rectum, while that of the anterior wall will be aided by placing a sound in the bladder. The surface of the wound should be carefully evened with the scissors.

Fritsch has proposed to accomplish this denudation by division after a simple circular incision.

Second Stage—Suture.—Large Hagedorn needles threaded with silk should be passed under the whole of the wounded surface from below upward, then from above downward. Care must be used that neither the bladder, rectum, nor peritoneum are perforated.

The first suture facilitates the remainder of the operation by assisting comparison of the parts to be united. Care should be used in placing the sutures, to avoid overlapping. Several superficial sutures will be required (Figs. 491 and 492).

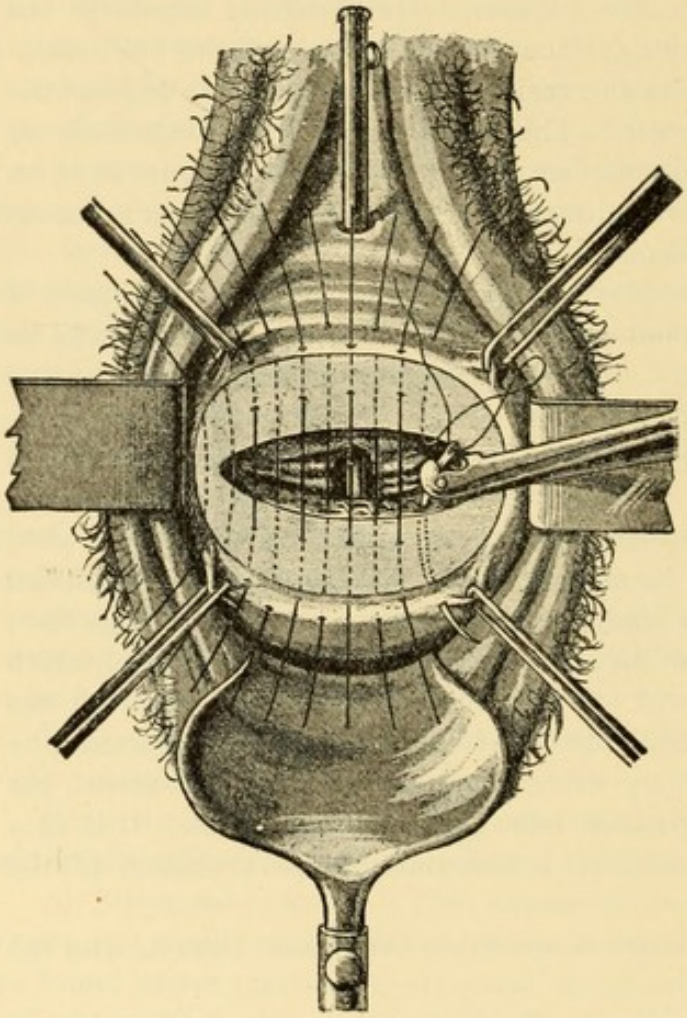


FIG. 491.—OCCLUSION OF THE VAGINA, OR COLPOCLEISIS: VIVIFICATION AND SUTURE.

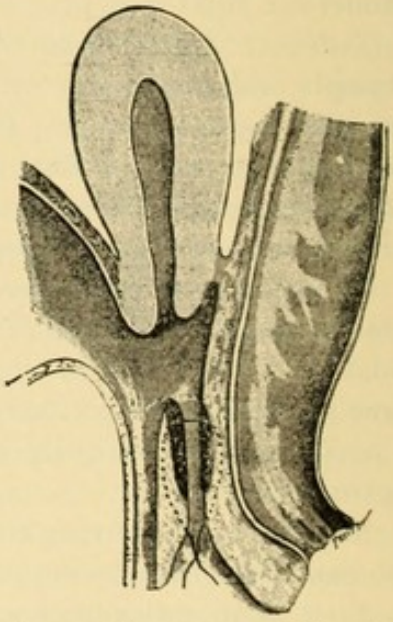


FIG. 492.—COLPOCLEISIS. (Schematically drawn.)

In order to appreciate the importance of this operation, we should not lose sight of the miserable condition to which the woman is otherwise abandoned. Colpocleisis is often a valuable resource, although attended by inconveniences of its own; impregnation is impossible, and coitus cannot be practised as a rule, unless in the exceptional case in which the obliteration is very high in the vagina. The menstrual blood may excite vesical catarrh

and the contact of the cervix with the urine produce a metritis. Sometimes we have a pyelonephritis, and very frequently vesical calculi.

When the neck of the bladder is injured so as to cause incontinence of urine, obliteration of the vagina alone is not sufficient to prevent constant dribbling. For the relief of such cases, it has been proposed to transpose the office of a urinary reservoir from the bladder to the rectum. In addition to colpocleisis a recto-vaginal fistula is established. Baker Brown first performed this operation on a patient presenting a vesico-vaginal and recto-vaginal fistula, with almost complete obliteration of the vagina and destruction of the neck of the bladder and urethra. Maisonneuve in 1851 purposely produced a recto-vaginal fistula after obliteration of the vulva. In

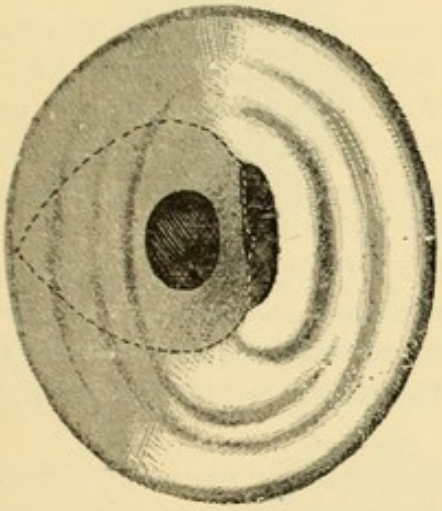


FIG. 493.—JUXTA-CERVICAL FISTULA; VIVIFICATION.

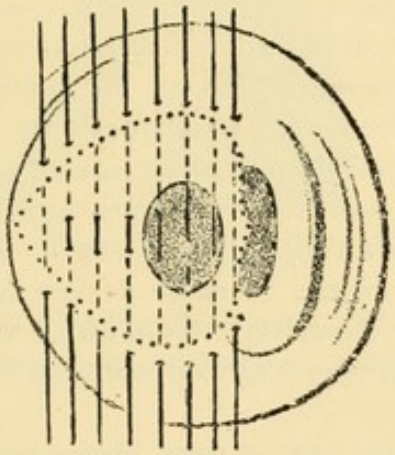


FIG. 494.—JUXTA-CERVICAL FISTULA; SUTURE.

this case he hoped that the sphincter ani would retain the urine, which would of course have to pass per anum; but the fistula closed spontaneously, and an attempt to establish a perineal fistula was followed by death.

Rose adopted this operation under the title of rectal obliteration of the vulva. He begins by establishing a permeable artificial recto-vaginal fistula a short distance above the anus, incising the recto-vaginal septum and carefully uniting the two mucous membranes. Cazin and Schröder have resorted to this operative procedure, which is not altogether free from danger. Serious complications have followed from the presence of intestinal gas and fecal matters in the vagina; further, we have in the recto-vaginal fistula itself a tendency toward spontaneous obliteration. Nevertheless, Fritsch knew of two patients operated upon by this method, who passed their urine through the anus without the least inconvenience. One of these women, operated upon four years ago, was laundress in his clinic, and in no way suffered from the existence of her cloaca.

CERVICAL FISTULÆ.—Urinary fistulæ implicating the neck of the uterus are of two distinct varieties. In the first the fistula is simply tangential to the vaginal portion, which is more or less implicated in the destructive

process. According to Jobert these should be included with vesico-vaginal fistulæ under the name vesico-utero-vaginal fistulæ, and subdivided into two varieties, superficial and deep, according as the destruction of the anterior lip of the cervix is partial or complete. This nomenclature is, however, essentially defective. It is better, I think, to include these with fistulæ of the cervix under the name of juxta-cervical fistulæ, reserving the name intra-cervical fistulæ for perforations which are rather erroneously called vesico-uterine fistulæ. Juxta-cervical fistulæ are not to be confounded with fistulæ simply located in the neighborhood of the cervix which remains intact. One is in such a case sometimes obliged to incise the anterior lip in order to accomplish the denudation or even to remove a **V**-shaped segment (Fig. 486).

I. *Juxta-cervical Fistulæ* (Syn. *vesico-utero-vaginal*).—In the superficial variety, obliteration may be secured by a good denudation, but this offers here special difficulties, for posteriorly it must be to the sclerosed anterior lip of the cervix, which forms the inner boundary of the fistula. Anteriorly, the denudation must be carried to the upper part of the vesico-vaginal septum or even to the urethro-vaginal septum. The density of the tissues constitutes a very serious obstacle; it is better, especially in the neighborhood of the cervix, to make a very large denudation, and without hesitating to remove cicatricial tissue which will interfere with union. It is better to vivify a very large surface than to have the result doubtful (Figs. 493, 494, and 495).

In the case of deep juxta-cervical fistulæ, we may not have room for denudation or to bring together the lips of the wound; denudation of the partially destroyed anterior lip presents special dangers from its proximity to the peritoneal vesico-uterine cul-de-sac, which may be fixed by cicatricial contraction. Hegar's case, in which he obtained direct union, must be considered a happy exception and an example which it would be difficult to follow.

Deep juxta-cervical fistulæ which do not lend themselves to direct suture must be otherwise operated upon. The posterior lip of the cervix may be sutured to the anterior or vaginal lip of the fistula in such a way that the uterus opens into the bladder (Fig. 496). This operation might be called vesical hysterocleisis, to distinguish it from hystero-stomatocleisis, where the lips of the cervix are sutured together. In this operation the denudation should not be carried from the cervix to the vaginal wall, on account of the danger of wounding the peritoneum. The cervix may be turned completely into the bladder, when the prominent posterior cul-de-sac may simulate a posterior lip. Denudation here would certainly penetrate the peritoneal cavity.

II. *Intra-cervical Fistulæ.*—According to A. Martin, this variety is more frequent than is supposed, but it has a tendency to spontaneous recovery when not very large and when the ureter is not involved. As a first step,

the orifice must be exposed by dilatation of the cervix with the laminaria tent. If the opening is small and the fistulous tract of considerable length,

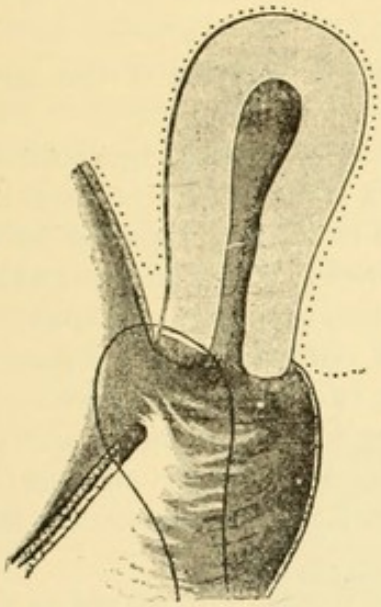


FIG. 495.—SUPERFICIAL JUXTA-CERVICAL FISTULA; VIVIFICATION. (Schematic.)

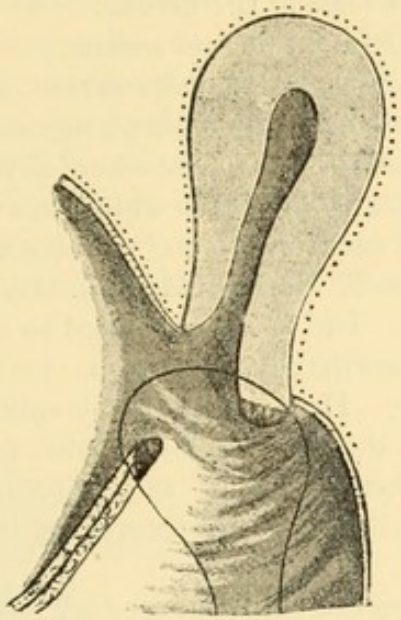


FIG. 496.—DEEP JUXTA-CERVICAL FISTULA. (Schematic.)

we may try cauterization with the red point of a thermo-cautery (or, better yet, a galvano-cautery), repeated several times at intervals of eight days.

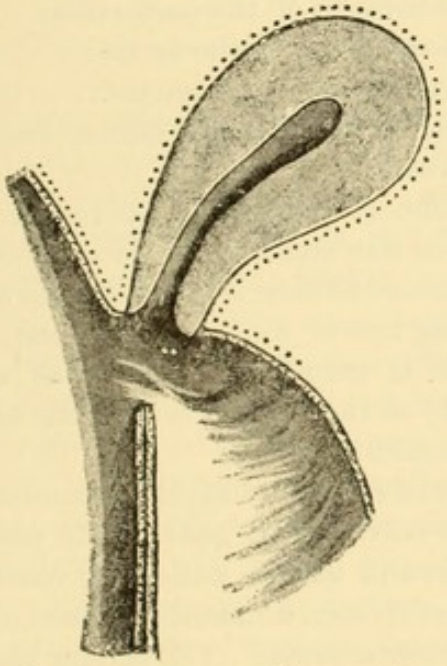


FIG. 497.—DEEP JUXTA-CERVICAL FISTULA. The posterior lip of the cervix and the posterior cul-de-sac are, as a result of retroversion of the uterus, situated upon a prolongation of the vesico-vaginal wall.

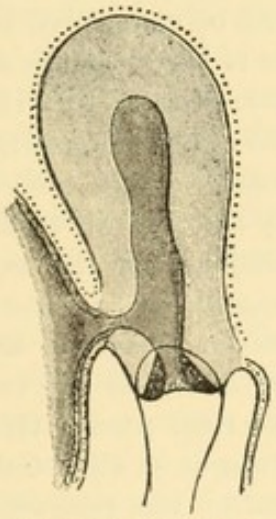


FIG. 498.—INTRA-CERVICAL FISTULA; HYSTERO-STOMATOCLEISIS. (Diagrammatic.)

Many other caustics have been tried, among others the nitrate of silver. Neugebauer has obtained by cauterization 15 recoveries in 133 cases, but he

has also had one death from this method of treatment. If the cauterizations fail, we shall have to have recourse to one of the two following operations for closing the fistula:

1. Denudation and suture.

2. Cystoplasty by dissection of the anterior portion of the cervix and suture according to Follet's method.

Denudation and suture were first successfully practised by Jobert of Lamballe (1849), in a case which was for a long time unique. Simon has done but one such operation. Successful cases have been reported by Emmet, Kaltenbach, Lossen, Martin, Müller, Schröder, Neugebauer, Zweifel, and Sänger. The last has resorted to an ingenious procedure, a veritable trachelo-syringorrhaphy, analogous to Emmet's operation. The fistula opened laterally. He commenced by splitting the two lips of the cervix; then he sutured the side on which the fistula was located, as in Emmet's operation; then, in order to establish an adequate cervical opening on the mucous lining of the cervix to the external mucosa, he sutured the other side.

When the fistula is very high and in the median line, access is difficult. Follet, Wölfler, and Champneys have practised cystoplasty successfully with direct suture of the vesical perforation exposed by a preliminary operation. Follet first dilates the urethra so as to introduce the finger; the cervix is then brought to the vulva, the anterior cul-de-sac of the vagina incised, and the bladder dissected away in the neighborhood of the perforation. This is then united by sutures, with the aid of the finger in the urethra. This bold procedure was inspired by Jobert's cystoplasty by locomotion; it is associated with danger of penetrating the peritoneum, but this cannot under good antisepsis be considered a serious drawback.

Otto v. Herff makes a median section of the cervix up to the fistula, after which the bladder is detached from the uterus for a distance of about two-fifths of an inch, which gives a freshened surface, composed of an anterior and a posterior half, each half containing one of the orifices of the divided fistulous tract. The freshened surface is then sutured as in an anterior elytrorrhaphy. If the suture gives way at the vaginal orifice, the fistula is vesico-vaginal and should be treated as such.

As a last resort we have hysterocleisis, better named hystero-stomatocleisis or suture of the two lips of the cervix (Fig. 498). The menstrual discharge then passes into the bladder, and uterine colic may result when the opening is small. Courty has, however, seen a number of cases in which menstruation was performed without inconvenience. The patient should be told that the operation entails sterility, although the existence of an orifice so small that only a small probe can be introduced has sufficed for impregnation, as in a case reported by P. Deroubaix.

Uretero-vaginal and Uretero-cervical Fistulæ. — For a long time the obliteration of this variety of fistula was regarded as beyond the

resources of art; but at the present time we have several operations applicable to the uretero-vaginal fistula.

1. *Method of Direct Obliteration—Simon's Method.*—As a first step, an artificial vesico-vaginal fistula is produced, by the side of the ureteral fistula. The sound is then passed into the ureter through this opening, and the ureter is opened up for the distance of about three-fifths of an inch of its intra-parietal portion. The borders of this incision are prevented from reunion by the daily use of the sound. When permanent cicatrization has been secured, the vesico-vaginal fistula, which is now some distance from the extensive denudation and transverse ureteral opening, is closed by sutures.

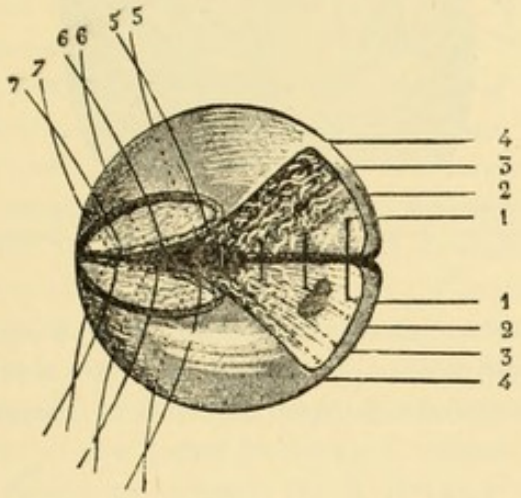


Fig. 499.—Operation for Intra-cervical Urinary Fistula; Sänger's Method.

Dührssen's Method.—Dührssen has successfully employed a method very similar to the preceding. A sound having been introduced into the ureter through the fistulous opening, an oblique incision is made in the vaginal wall passing through the fistula, and the two lips of the wound are dissected. Just beyond the fistula the bladder is opened for a short distance, the partition which separates ureter and bladder is divided, and vesical and ureteral mucous membranes are sutured together, thus establishing a large communication between the ureter and the bladder. The vesico-vaginal fistula just formed is then closed by the classical procedure.

Landau's Operation.—Landau also creates a vesico-vaginal fistula where one does not already exist, by an oval excision. He then passes a small elastic catheter into the ureter, securing it by passing its opposite extremity into the bladder through the urethra. Placing the patient in the genu-pectoral position, he then denudes the vaginal mucous membrane around the fistula. In closing the wound he passes his sutures in a direction parallel with the catheter, which is left in place for several days. Bandl also has adopted a modified form of this operation in two cases. He obtained recovery after several attempts, but not without having, in one case, to replace his sutures which penetrated the ureter.

Schede's Operation.—Schede has performed the buttonhole operation, removing about four-fifths of an inch of the vesical mucous membrane, in the direction of the affected ureter. The ureteral fistula was found under a

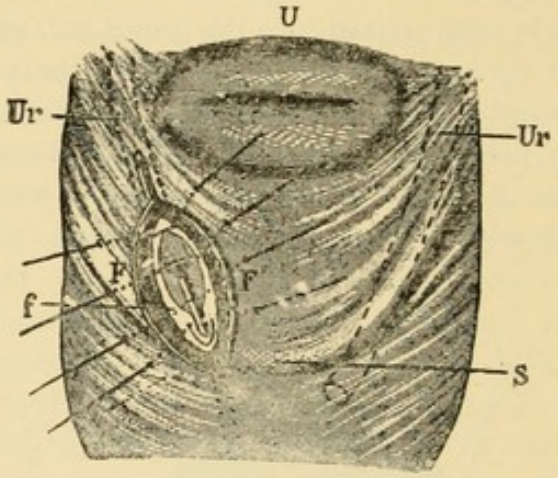


FIG. 500.—LANDAU'S OPERATION FOR URETERO-VAGINAL FISTULA. *U*, cervix; *Ur*, course of the ureter; *S*, fold of vagina corresponding to the inter-ureteric ligament; *Ff*, vesico-vaginal fenestra through which may be seen the sound passing into the ureter.

fold of mucous membrane at the bottom of a cicatricial depression in the neighborhood of an old fissure of the cervix. He sutured the vesical and the vaginal mucous membranes about the line of the excision, so as to pre-

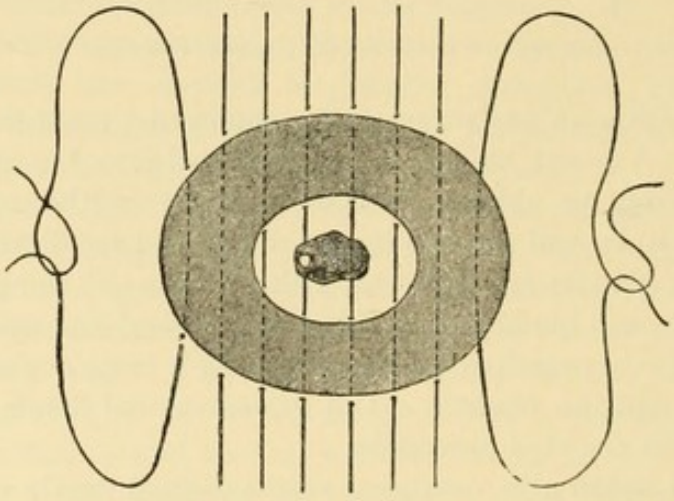


FIG. 501.—SCHEDE'S OPERATION FOR URETERO-VAGINAL FISTULA. (Schematically drawn.)

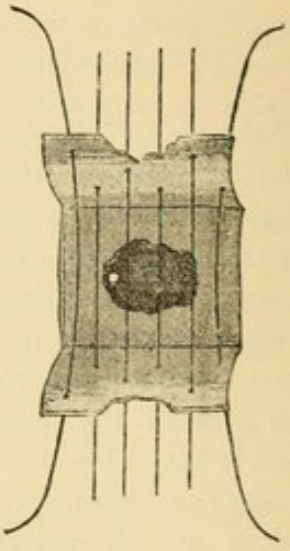


FIG. 502.—OPERATION BY SPLITTING FOR URETERO-VAGINAL FISTULA.

vent its reclosure; a catheter was then introduced through the artificial opening into the ureter, its opposite extremity being carried into the bladder and out through the urethra. After this, an annular denudation is done about the fistula, leaving intact in its immediate neighborhood a zone of mucous membrane of about three or four millimetres diameter. As a result, after suturing, the edges of the fistula, covered with intact mucous mem-

brane, were turned into the bladder, forming a gutter-like depression, at the extremity of which the ureter opened. Recovery followed after a series of complications.

There is another procedure analogous to denudation which has been resorted to twice by Trélat without catheterization of the ureter. It seems to me also that the preliminary formation of a vesical fenestra and the introduction of the ureteral sound is not as essential in this case as in Landau's operation.

Operation by Splitting.—In a case of uretero-vaginal fistula where the patient had been operated upon already eleven times by the ordinary procedure, I was able to establish the diagnosis by introducing Pawlik's ureteral sound to the depth of twenty-one centimetres. The vesico-uretero-vaginal orifice was small, so that it would barely admit the sound. I performed the operation of division recommended by Gerdy and applied by Blasius, Dubouć, Collis, von Herff, Walcher, and others to the ordinary vesico-vaginal fistulæ. I believe that it served here a special purpose by allowing the replacement of the ureteral orifice in the bladder without danger of inclusion in the sutures. I proceeded in the following manner: Placing the patient in the genu-pectoral position, I made a transverse incision in the neighborhood of the fistula, carrying it about three-tenths of an inch beyond the fistula upon each side. I then made a vertical incision at each extremity, so as to give to the whole the form of the letter H (lying sidewise I), and dissected up the margins of the transverse incision for a distance of three-tenths of an inch, so as to obtain two small flaps from the septum. When the flaps were raised, the small orifice of the fistula was seen at the centre of the bleeding surface. On applying the one flap to the other above this opening, they came together without the least effort. They were carefully united by three deep silver-wire sutures and three superficial sutures. After suturing, the location of the fistula was marked by a small depression. The sutures were removed on the eighth day. Recovery was complete. This method has the advantage of extreme simplicity. In cases in which the fistula is very large and the duplication very important, we can bring the flaps together by the aid of pierced shot compressed over the wire.

Hergott, of Nancy, without completely adopting this operation, has followed its main feature in dissecting out the ureter for the extent of three-tenths of an inch and turning it into the bladder. The ureter opened on one of the lips of the fistula, and was of a size which admitted a small bougie. In the case of a large uretero-vaginal fistula in which you can obtain the exact position of the ureter, it is as well to limit the operation to this division of a single lip of the orifice. It frequently happens, however, as in my case, that at the time of the operation the orifice cannot be detected, so that it will be necessary to carry the division over the whole circumference of the fistula.

2. *Method of Ureteral Implantation.*—The procedures which I have just

described, and which are indicated in special cases, have been somewhat abandoned; the tendency being to give preference to various methods of anastomosis of the fistulous ureter and the bladder.

a. Uretero-vesical Anastomosis by the Vaginal Route. — This method should be the first attempted, as it is extremely benign. P. Segond has successfully employed the following technique in two cases: He has denuded the mucosa below the vaginal orifice of the fistula, and then attached at this point a flap taken from the bladder wall. The ureter is thus transplanted into the vesical diverticulum formed in this way.

Mackenrodt owes two successes to a similar procedure. A sound introduced through the urethra pushes out the vesico-vaginal wall just at the side of the fistula. This wall is divided transversely at that level for a distance of two or three centimetres, and the fistula is circumscribed by a deep incision which includes the entire thickness of the vaginal wall. This forms a flap shaped like a myrtle leaf, at the centre of which the fistula opens. This flap is dissected close to the fistula, and is then turned down so that its vaginal face becomes intravesical. The operation is completed by suturing the edges of the flap to the lips of the vaginal wound.

Tuffier proceeded as follows in a case in which a small vesical perforation existed on the right and a uretero-vaginal fistula on the left: He divided the fistula by an incision extending through half the circumference of the external part of the fistula, in order to mobilize the ureter. When this incision had extended several millimetres it entered the peritoneum, which was tamponed with iodoform gauze. The internal vesical part of the fistulous orifice was extensively denuded, and the ureter was attached to the bladder by a double layer of sutures; uretero-vesical, of catgut; vaginal, of silkworm gut. A self-retaining catheter was placed in the bladder; the sutures were removed on the eleventh day, the patient being completely cured.

b. Uretero-vesical Anastomosis by the Abdominal Route.—This was successfully done almost simultaneously by Novaro and Bazy, who gave it the name of uretero-cystoneostomy. Bazy at first attempted to perform the ureteral anastomosis by the transvesical route without opening the peritoneum, but two successive failures led him to approach the ureter by a transperitoneal laparatomy as Novaro had done, and as I have successfully done in a recent case. Bazy carries out the operation as follows: The patient is placed in the Trendelenburg position, and the abdominal wall is incised for a distance of twelve to fifteen centimetres beginning above the pubis. The intestines are held back by a compress and the abdominal wall is retracted, freely exposing the field of operation. The peritoneum is incised in the direction of the ureter, then the latter is divided about one centimetre above the bladder, and the vesical end is resected. A male sound or a Chassaignac's curved trocar is then introduced through the urethra, its blunt end pushing out the bladder wall near the lower end of the ureter; an incision at least one centimetre long is made through the wall of the bladder. When

this has been done, a No. 14 red rubber bougie is placed in the ureter, and drawing this into the bladder, emerges through the urethra. The ureter is united with the bladder by interrupted catgut sutures, which include the entire thickness of the ureteral and vesical walls. The peritoneum is closed by a continuous catgut suture, and a Mikulicz tampon is left in contact with the field of operation.

Novaro does not place a bougie in the ureter, but practises the following manœuvre, in order to assure an extra-peritoneal course of the stream of urine in case the sutures give way: After having carefully sutured the pelvic peritoneum at the level of the incision made in order to reach the ureter, he separates the vesical peritoneum from the pubis to the region where he has placed his sutures, and through the space thus made he passes a strip of sterilized gauze, which assures extra-peritoneal drainage of the urine if it makes its way through at the level where the sutures have been inserted.

Nitzel fixes the portion of bladder, as near to the ureter as possible, to the pelvic wall by several coarse catgut sutures, in order to avoid traction of the bladder upon the grafted ureter. He fixes the ureter which has been introduced into the bladder by two layers of catgut sutures, the deep layer including only the ureteral and vesical mucous membranes, the superficial taking in the muscular walls Then, in order to imitate as nearly as possible the normal entrance of the ureter into the bladder, he makes an oblique canal four centimetres long in the vesical wall, around the ureter.

H. A. Kelly does not suture the bladder to the pelvic wall, but carefully frees it at the level of the pubis, so that it can easily be drawn backward in front of the ureter.

All these procedures have the advantage of leaving the ureter extra-peritoneal, and thus protecting it from intestinal adhesions which might constrict it. In this way they are, as Nitzel remarks, superior to the methods employed by Krause and by Veit, in which the ureter remains free and intra-peritoneal for a certain distance near the bladder.

Many uretero-vesical anastomoses have now been reported, and the results obtained have been most encouraging. In any case I consider this operation, which re-establishes the ureter in the performance of its physiological functions, far superior to implantation into the rectum or colon. The occasional successes following the latter procedure should not make one oblivious of the dangers to which it exposes the patient and of the disastrous results which have followed its employment by skilful experimenters.

As I have previously said, I believe that there is one formal contra-indication to all transperitoneal attempts at uretero-vesical anastomosis, namely, infection of the ureter, kidney, or bladder; for this procedure demands the conditions necessary for a perfect primary union, in order to succeed and not to expose the patient to the gravest dangers. In these cases and after failure to secure an anastomosis by the vaginal route, I should not hesitate to employ the method of indirect obliteration, which I shall now describe.

2. *Method of Indirect Obliteration.*—This operation has been applied to uretero-vaginal fistulæ when direct denudation or anastomosis has failed. It consists in either the obliteration of the genital canal below the fistula or the extirpation of the kidney to which the perforated ureter belongs. The first plan would possess the fewest objectionable features, were it possible to perform hystero-stomatocleisis or obliteration of the vaginal portion of the cervix; but this occlusion, to be free from danger, would have to be lateral and not terminal. Now, we know that, on the contrary, the portion of the canal between the fistula and the bladder will tend to contract and to become obliterated. Theoretically, we might attempt the production of an artificial vesico-cervical fistula, which would permit the evacuation of the urine accumulated in the uterus, or we might establish an artificial ureter in the place of the segment obliterated. Both of these attempts have been made by Zweifel without success. We must therefore renounce hysterocleisis, and substitute obliteration of the vagina, or colpocleisis, after the establishment of an artificial opening between this canal and the bladder. This is the plan which has been followed, too, by Hahn. He carefully united the mucous membranes of the superior lip of the artificial opening and sutured the inferior lip to the posterior vaginal wall, in order to assure permanency of the vesico-vaginal outlet. The patient's husband subsequently desired the reopening of the vagina, and the artificial vesico-vaginal fistula persisted, while the ureteral opening had spontaneously closed. Kehrer has recently published an interesting observation: he very justly remarks that a mere incision is not sufficient to assure permanency of the opening between the vagina and bladder, but that it is necessary to excise a portion of the septum, a disc about four-fifths of an inch in diameter, and then carefully unite the mucosa of the bladder and vagina.

Obliteration of the vagina is consented to by women with reluctance, and it frequently happens that after the operation they demand a reversion to the condition of their former infirmity. It is apparent that nephrectomy may be preferred, in spite of the dangers of removing one kidney where the patient may already have a certain degree of unrecognized bilateral ascending nephritis. This operation was first proposed by Simon. It was done by Zweifel in 1878, and then by Credé; so that in 1889 at least eleven cases had been operated upon, including that of Treub. Before determining upon the operation, it is very important to assure yourself of the condition of the other kidney. The urine should be taken from this kidney directly by catheterization of its canal, and examined chemically and microscopically.

Gravity of the Operation; Operative Accidents; Results.—I shall consider here only the direct operation for the ordinary urethro- and vesico-vaginal fistula. These operations can be considered absolutely benign, although it adds a little to the gravity if the fistula is near the cervix, and consequently near the uterine arteries, ureter, and peritoneum.

Verneuil has published the proportion of cases in his practice in which

operation has been followed by death. The number was five out of eighty. We must call attention to the fact that the most of these cases antedated the period of antisepsis; the percentage is at the present day much smaller. Hegar and Kaltenbach have lost but a single case in a series of eighty.

Wounding of the posterior wall by the brutally forcible use of the speculum deserves mention only because it has once been observed by Courty; it is easy to see that peritonitis might follow such a procedure.

Fatal primary hemorrhage can result only in the most unfavorable circumstances, in the case of hæmophilia for instance. Horteloup has reported a case from the wounding of an extraordinarily developed uterine artery. This is, however, exceptional, although in any case hemorrhage may be serious during the operation, either in the case of denudation of the lateral vaginal wall, where the veins are largely developed, or if the operation is done at a time when the slough has not yet separated, or finally if the vesical mucous membrane is invaded. Direct compression followed by suture are the best measures for its arrest. It constitutes, however, one of the conditions unfavorable for primary union.

Secondary hemorrhage takes place from the third to the fifth day. I consider it always due to some operative defect. The remedy is the tampon. If the hemorrhage is into the bladder, it might pass unperceived at first, and the cavity become distended with clots before it can be controlled. Fragments will be discharged by the urethra with distressing tenesmus, and the decomposition of the residue will be fatal to the success of the suture. We should aid their expulsion by frequent vesical irrigation, and, if the distention of the bladder is considerable, should not hesitate to dilate the urethra and to break up the clots with a blunt curette. Lastly, if the hemorrhage continue, it will be necessary to remove the sutures and search for the bleeding vessel *per vaginam*.

Wounding or inclusion of the ureter is evidenced by lumbar pains, vomiting, and fever. In this case we should hasten to remove the suspected suture, as the complication may be very grave. The suture may cut through the ureter, however, causing a sudden explosion of uræmic symptoms.

The infectious complications—phlebitis, pyæmia, lymphangitis, and diphtheria—formerly rare, are now quite the exception. Peritonitis may result from wounding of the peritoneum during denudation or by the sutures in the absence of antiseptic precautions, or where a concomitant pyelitis or cystitis produces subsequent infection of the wound.

Calculi or calcareous incrustations have formed in the bladder in the neighborhood of silver-wire or silk sutures which have cut through the tissues and fallen into the bladder. It should not be forgotten that, in the majority of patients suffering from fistula, the urine is altered by sympathetic inflammation of the bladder, which may have extended to the pelvis or even to the substance of the kidney itself. These conditions favor the formation of cal-

culi. As these are, however, always phosphatic and very friable they are easily broken up and removed by the lithotrite.

The results of surgical interference are altogether remarkably satisfactory. It can be said that no case is absolutely incurable by either the direct or indirect method. It is true that this last procedure substitutes a deformity for an infirmity, or necessitates the sacrifice of one of the kidneys. Many failures are due to an imperfect diagnosis. I operated upon one woman upon whom eleven unsuccessful attempts had been made to obliterate a small

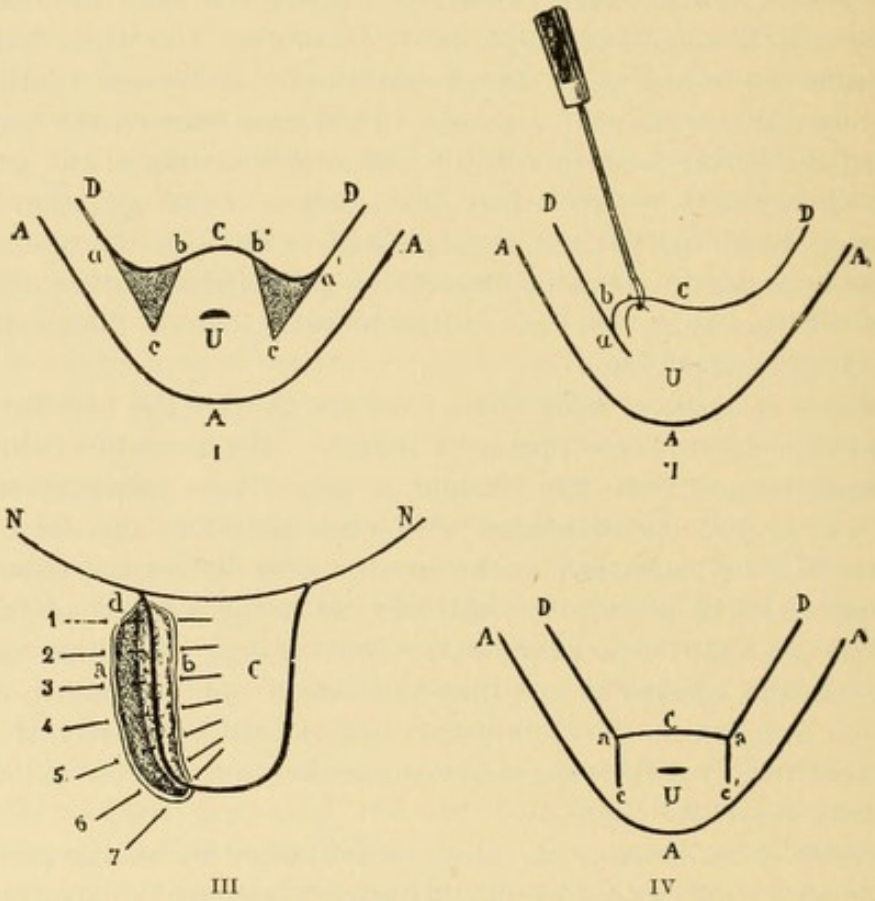


FIG. 503.—PAWLIK'S OPERATION FOR DIMINISHING THE CALIBRE OF THE URETHRA. I, Urethral region as seen when the patient is in the genu-pectoral position; II, extent of the denudation to be made, estimated by traction with a hook; III, denudation; IV, result obtained. *A*, Pubic arch; *C*, projection of urethral canal; *D*, posterior depression of the pubis; *U*, meatus urinarius; *a*, *b*, *c*, *a'*, *b'*, *c'*, outlines of the juxta-urethral denudation.

fistula in the anterior vaginal wall. I satisfied myself that these failures were due to the fact that the ureter had opened into the fistula, and I then performed the flap-splitting operation by which the ureteral orifice was turned into the bladder; recovery was immediate.

Incontinence of urine often persists for a long time after complete union of the fistula, so that the patient continues to lose urine involuntarily, and does not believe in her recovery. A number of anatomical conditions will explain this result. Loss of tonicity in the vesical sphincter and of the muscular coat of the urethra from disuse may be mentioned, as this factor plays an important rôle in the normal retention of urine in the female.

Several lines of medical treatment have been followed to remedy this condition—injections of strychnine, the hot douche, electricity, etc. Schatz has recourse to a special pessary. All pessaries, and in particular that of Dumontpallier, may diminish the incontinence by light pressure upon the urethra. Undeniable success has been obtained by means of a small plastic operation for the purpose of bridging the urethra and partly effacing its calibre. The urine then accumulates until present in sufficient quantity to overcome the obstacle. Schröder practised two lateral denudations with the object of elongating and displacing the canal of the urethra. Pawlik removed two lateral cuneiform fragments in order to produce lateral traction upon the urethra, and bend it so as to diminish the patency of the canal. His method is as follows: Seizing the urethra with a tenaculum, he displaces it as far as possible to either side, marking the points which correspond to this displacement (Fig. 503). Having outlined his denudation he proceeds to make two parallel incisions between the points. The orifice is then drawn with a hook toward the clitoris, and the point marked to which it can be displaced. The incision is then carried forward, taking care to give it a slightly concave shape interiorly, so that after the suture the external urethral orifice shall not be too constricted. Having completed the outline, denudation is done and tissue removed at the side of the urethra so as to give a somewhat deep wound; the sutures are then placed drawing the urethra toward the clitoris, the sutures being directed obliquely as they approach the urethral orifice, and at the posterior portion being inserted antero-posteriorly. Pawlik operates in the genu-pectoral position, and uses carbolized silk, powdering the line of his sutures with iodoform. He does the second operation upon the other side after cicatrization of the first, and recommends frequent emptying of the bladder. He has obtained several good results by this method.

Fecal Fistulæ.—I include under this common title both recto- and entero-vaginal fistulæ.

Recto-vaginal Fistula: Etiology.—Delivery is the most frequent cause. Compression is not, however, the determining cause, as in the case of urinary fistula. Recto-vaginal fistulæ are a more immediate result of traumatism; they ordinarily depend upon an extensive rupture of the perineum cicatrized inferiorly in the location of greatest depth, but leaving a perforation above where the thinness of the septum permits the two mucous membranes to come into contact and to unite in such a manner as to insure its permanency.

Among the rarer causes are: Wounds of the vagina by the forceps or cephalotribe, gangrene of the septum due to prolonged retention of the head, direct traumatism by a foreign body violently introduced or retained for a sufficient length of time to produce ulceration and laceration in the course of a vaginal hysterectomy. This complication is especially to be feared in cases of pelvic suppuration, due to streptococci, situated in Douglas' cul-de-

sac and running an acute course. Finally, ulceration due to various other causes, such as abscess affecting either the vagina or rectum so as to produce an abnormal communication between them. These perforations are sometimes above the sphincter. Dermoid cysts and the cysts of extra-uterine pregnancy, if situated in Douglas' cul-de-sac and invaded by suppuration, may produce an opening between the vagina and rectum by evacuating into both simultaneously. These fistulous tracts are not, however, counted in the class of fistulæ proper previous to the cicatrization of their margins.

Pathological Anatomy.—I shall here consider only those fistulæ which can be called cicatricial, excluding such abnormal recent communications as are due to fresh wounds, or such as are of cancerous origin, where the fistula is but a phenomenon consecutive to a pathological process; also purulent fistulæ in the stage of evolution.

Verneuil classifies fistula from the standpoint of location, as: Recto-vulvar, the orifice being on the vulva or fourchette; inferior recto-vaginal, the orifice being in the lower part of this canal; and finally, superior recto-vaginal, in which the fistula opens in the vicinity of the cervix in the posterior cul-de-sac. These are rare and usually consecutive to the evacuation of an old collection in Douglas' cul-de-sac or vaginal hysterectomy.

The dimensions are variable. Recto-vulvar fistulæ commonly consist of but a small opening; the fistulæ of the inferior part of the vagina also are often very narrow, the septum being at times thinned at a certain point so that they are apparently merely punched through, and are frankly ostial or labiform or in other cases canaliculated, having an oblique direction in the substance of the wall, their vaginal orifice being at times concealed by a kind of valve formed by the posterior vaginal border, which is more or less irregular and serrated. Fistulæ opening in the posterior cul-de-sac may have very large dimensions, being often consecutive to a large slough caused by the pressure of a tumor which subsequently opened into the two canals. I have observed one in a case of fœtal cyst which would admit the thumb. When the fistula consists of a canal, it is the vaginal mucous membrane which is reflected and lines it.

The margins of the fistula are ordinarily hard and sharply defined. Cicatricial bands may also divide the vagina connecting these with vesico-vaginal fistula due to the same difficult labor.

Symptoms and Diagnosis.—The passage of gas and fecal matters is the pathognomonic sign for the clinician, and the most distressing symptom for the patient. The discharge of these matters is not, however, absolutely constant, and may fail altogether if the direction of the fistula be oblique and the stools solid. With diarrhœa, however, it is always present. An intense vaginitis develops where the phenomenon is constant. With the finger one is able to demonstrate a recto-vaginal fistula if it have any size; while the speculum, aided by the sound and the rectal touch, is always sufficient for its discovery. Sims' position is the most convenient for this examination.

If necessary, an enema of milk may be made to filter through the orifice, where it is situated behind a fold or hidden in a cicatrix.

Prognosis.—We have here a condition which is not very amenable to treatment, even when it is of apparently slight importance; for the difficulties in the way of recovery do not depend upon the extent of the lesion. The most difficult cases are those complicated with multiple cicatrices in the vagina.

Cases of spontaneous cure have been reported; this takes place quite frequently in recto-vaginal fistulæ following vaginal hysterectomy, but these occurrences are exceptional, and in a general way it may be said that recto-vaginal fistulæ are cured only by surgical interference.

Treatment.—Although it would at first seem that direct suture of the fistula through the vagina would be the simplest operation, this is not at all so; in fact, only a small raw surface can be obtained in this way, and success is much less certain than when the indirect method is employed. This consists in including the perforation in a large area of denudation involving the perineum. We may then state that in the great majority of cases, operation for recto-vaginal fistula should consist of a slightly modified colpo-perineorrhaphy, that the perineal route is the better, the vaginal being only exceptionally taken.

Operation by the Perineum.—The older surgeons contented themselves with a vertical incision of the perineum up to the fistula, leaving to nature the process of cicatrization, and performing a complementary operation if necessary. Later, section of the perineum was regarded as the first step in immediate perineorrhaphy; it merely transformed the recto-vaginal fistula into a complete perineal tear, which was then treated as such. Isolated reports of this method are given by Ricord, Demarquay, and Baker Brown. Richet was the first in France and Simon in Germany to establish it as a method; since that time it has found many partisans. Recently the popularity of Lawson Tait's flap-splitting method has given a wider field to perineorrhaphy; this process indeed possesses the great advantage of large surfaces furnished at small expense, which can be brought together, and permits of mobilization of the rectum, and destroys the parallelism between the rectal and vaginal orifices of the fistula, as these are glided past each other.

Before this process of perineorrhaphy became popular, the whole series of operations, which will be described later (see Lacerations of Perineum), had been used. Thus Schauta employed Hegar's triangular vivification process, being careful to include the fistula and join its edges by buried catgut sutures. Chrobak also praises this process. But I repeat, Lawson Tait's operation, which may be applied in nearly every case, is the operation to be chosen.

The attempt has been made to formulate the indications for the process to be adopted in operating according to the situation of the recto-vaginal fistulæ, or according to the condition of the perineum. These indications

doubtless possess a value, but they serve chiefly as a guide to the amount of tissue to be divided, and may assist in deciding whether there should be a preliminary vertical section of a small cutaneous flap which is sometimes

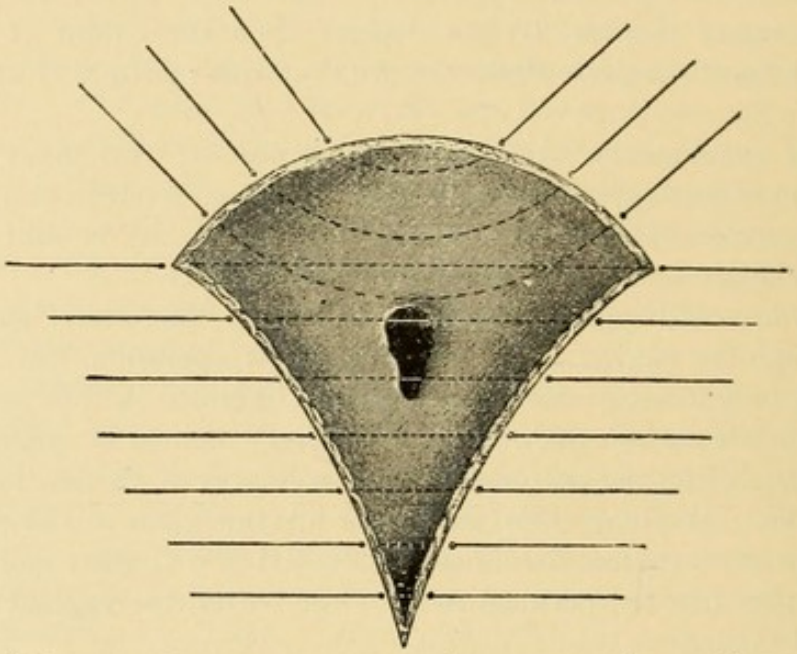


Fig. 504.—Hegar's Process of Colpo-perineorrhaphy as Applied to the Cure of Recto-vaginal Fistula.

interposed between the fistula and the perineum, or section of a flappy non-muscular but perhaps somewhat thickened perineum.

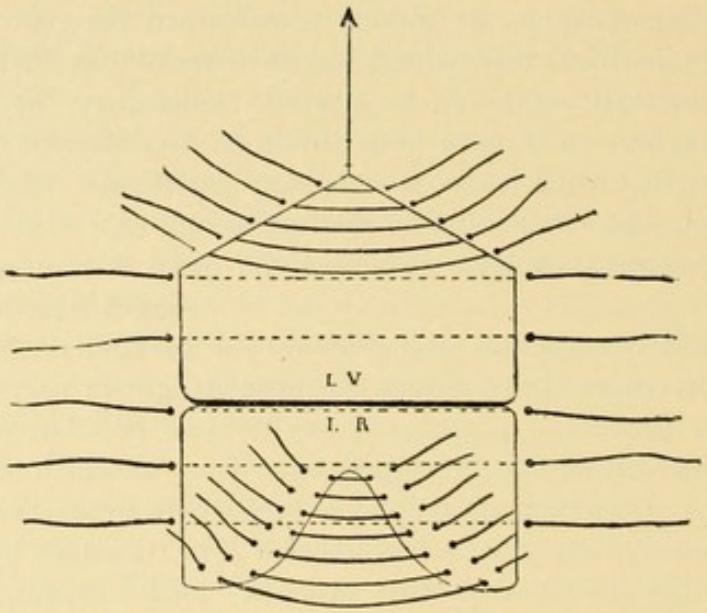


Fig. 505.—Sutures of Rectum, Vagina, and Perineum after Vertical Section and Division of the Perineum. (Schema.) *L R*, Rectal flap with Lauenstein suture; *L V*, vaginal flap.

The next step is the choice between two variations in the method of performing perineorrhaphy.

(*a*) Should the perineum be too thin or not substantial enough to deserve

consideration, it may be incised up to the fistula, after which Lawson Tait's operation for perineorrhaphy should be adopted. Then I hold that we should follow Sänger's example, and when the fistula extends far up (Figs. 506, 507) suture the rectum alone with stitches of silk introduced after the method called by Lauenstein's name, which this surgeon borrowed from Lembert's method for uniting serous membranes.

This isolated suture of the rectum appears to me to be useful only when the recto-vaginal wall has been incised to a considerable height; in other cases auto-plastic division will sufficiently mobilize it, and it can thus be drawn down low enough to render special suture of the rectum unnecessary.

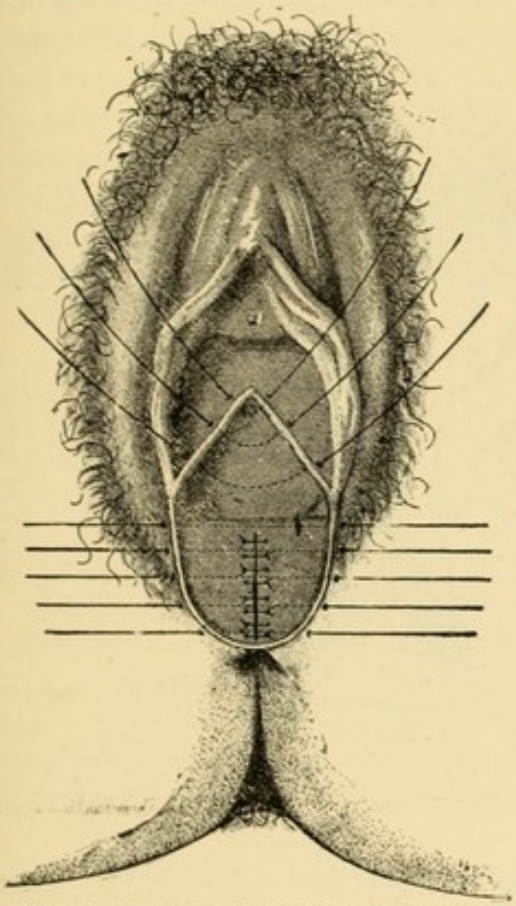


FIG. 506.—SUTURES AFTER VERTICAL SECTION AND DIVISION OF THE PERINEUM. The rectal flap is sutured. The stitches in the vagina and perineum have not yet been tightened (Sänger).

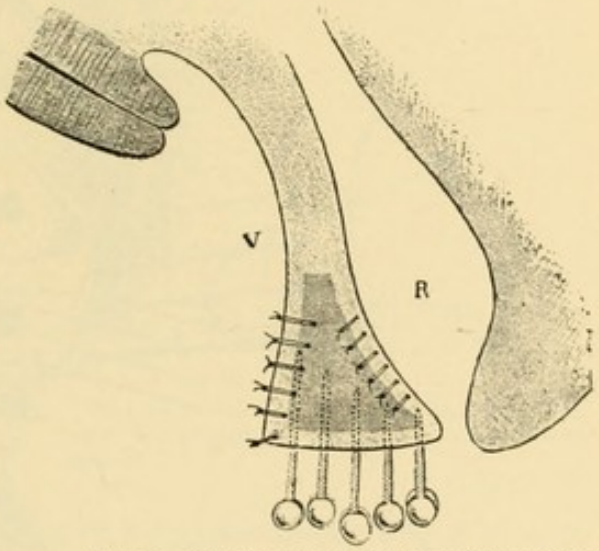


FIG. 507.—SUTURES AFTER VERTICAL SECTION AND DIVISION OF THE PERINEUM. Shows arrangement of sutures when operation is finished.

(*b*) Should the perineum be firm and resistant, and the fistula be situated above the sphincter, which is almost intact, to begin the operation by section of the perineum would possess more drawbacks than advantages. Lawson Tait's method for incomplete laceration of the perineum should be adopted, by first splitting the perineum and then the recto-vaginal wall to above the fistula. Before suturing the perineum it would be well to close the rectal orifice by inserting a series of Lembert-Lauenstein sutures (Fig. 508) from the side of the wound. The vaginal orifice is to be sutured from the vagina, the sutures all to be made with fine silk. Sänger has obtained many good results with this process.

There are some exceptional cases in which the fistular orifice is situated as high as the posterior vaginal cul-de-sac. Following Sänger's example we

might make a large and deep division of the perineum by means of a bi-ischiatic division, pushed to just above the fistula, and traversing the levator ani, and not hesitating to make a wound large enough to contain both fists. This operation was described above under the name of transverse perineotomy. I think it preferable to then suture the fistula on the vaginal side, after having freshened it. The perineal wound may be a trifle nar-

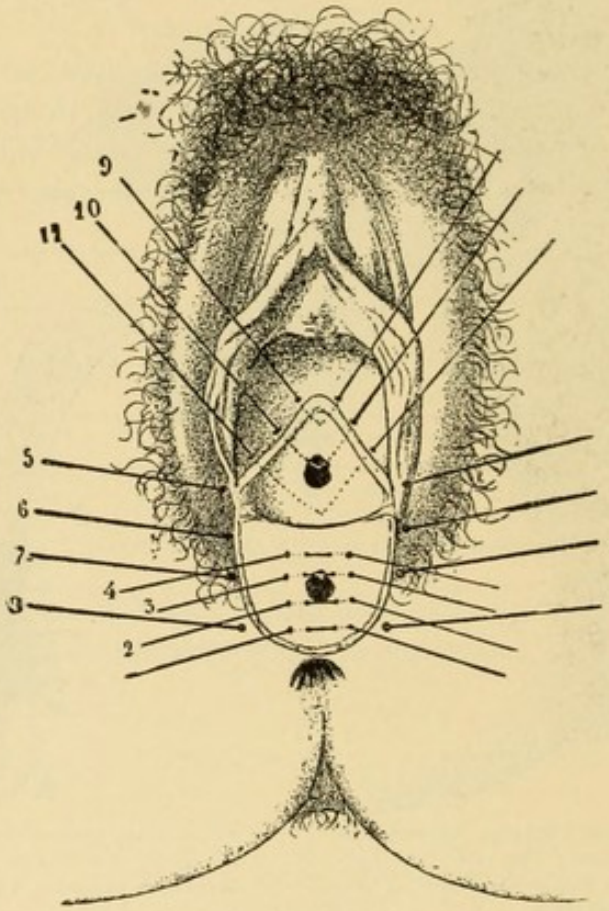


FIG. 508.—SUTURES OF VAGINA, RECTUM, AND PERINEUM AFTER SIMPLE SPLITTING OF THE PERINEUM, WITHOUT PRELIMINARY VERTICAL SECTION. 1, 2, 3, 4, Buried sutures of Lauenstein (silk) closing rectal orifice; 5, 6, 7, 8, deep stitches (silver) for uniting perineal surfaces; 9, 10, 11, vaginal stitches (silver) the loops of which pass in front of the vaginal orifice which they are to close (Sänger).

rowed, but its middle portion should be kept open by means of wads of iodoform gauze. To this process Sänger owed his successful results in a case in which the situation of the fistula was exceptionally high.

To it may be compared the process first described by Alph. Guérin, then by Quénu and Félizet. Quénu follows Guérin's example; in addition he secures relaxation of the sphincter ani by incising it posteriorly and joining the mucosa above it. Félizet does not suture the vaginal orifice, but opens the rectal orifice as far as the anus by incising from above downward all the posterior flap found by the division; this manœuvre seems to me to possess no advantages.

Operation by the Vagina.—This is the one to be resorted to in the case

of small fistulæ not complicated by cicatrices which interfere with the extensibility of the vagina, when the perineum is nearly intact, and the fistula situated so high up that to reach it by the perineum would require a great destruction of tissue; but as I have already observed, the chances of success by this method are less. It is, however, preferable to operation by the rectum. The vulva is more easily distended than the anus behind, which is the opposing coccyx; the vaginal mucosa is firmer, lends itself better to freshening, and bleeds less. Finally, and most important, there is less chance of infection.

Simple Freshening with Loss of Substance.—The patient is placed in the dorso-sacral position, and the vagina stretched apart by means of an upper flat blade and lateral retractors. The parts near the fistula are fixed by forceps. The recto-vaginal wall may be lifted by an assistant's finger, or simply supported by a tampon of iodoform gauze. The surgeon would better not soil his fingers by inserting them in the rectum, no matter what care may have been taken to disinfect them by irrigation with a borated solution.

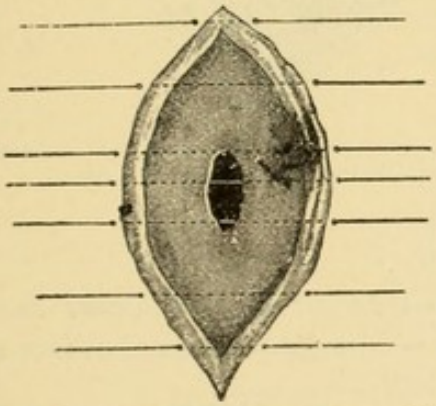


FIG. 509.—OPERATION FOR RECTO-VAGINAL FISTULA. Freshening with loss of substance per vaginam. Deep sutures.

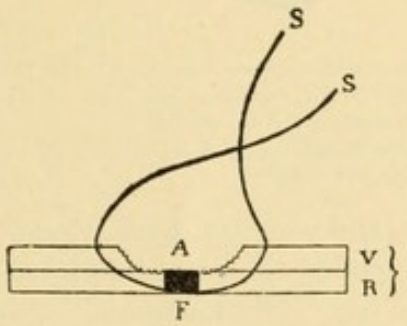


FIG. 510.—OPERATION FOR RECTO-VAGINAL FISTULA BY VAGINAL FRESHENING. Course of deep sutures.

The denudation is made very deeply, and the lining membrane of the fistula, if there be one, dissected as far as the rectum (Fig. 509). Sutures are inserted going as deeply as to the rectal mucosa (Fig. 510), and passing beneath the whole extent of the wound, which is funnel-shaped. The superficial sutures which include the mucosa only and which alternate with the preceding are then inserted; these are first tightened and then the deep sutures. Silver wire is preferable on account of its being more easy to keep it aseptic. The ends are protected by a lead tube which is crushed over them and cut off level above. Care must be exercised to keep the line of suture in the direction in which there will be the least traction; this in large perforations is usually the transverse. Should the perforation be very large and in the immediate neighborhood of the cervix, Simon's example should be followed and the anterior lip freshened and united with the inferior border of the fistula; the menstrual flow will then occur through the rectum.

Autoplasty by Flap-Splitting.—This method of denudation, first used for vesico-vaginal fistulæ by French surgeons, and recently adopted in Germany, and which I have already described, according to Walcher has also been applied to cases of recto-vaginal fistula. Sänger owes a brilliant result to its use. His technique is similar to that used by Walcher. He adds a protecting suture on the side of the rectum. This is his method of procedure: The index finger

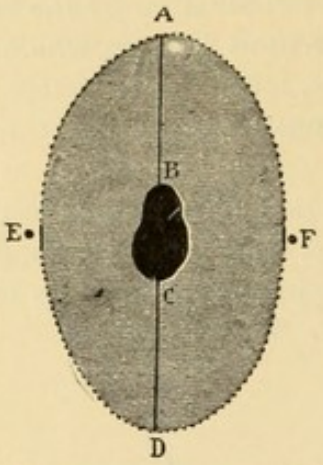


FIG. 511.—OPERATION FOR RECTO-VAGINAL FISTULA THROUGH THE VAGINA. Autoplasty by flap-splitting. *A*, *D*, Vertical incision; *A*, *E*, *B*, *F*, outline of the split area (Sänger).

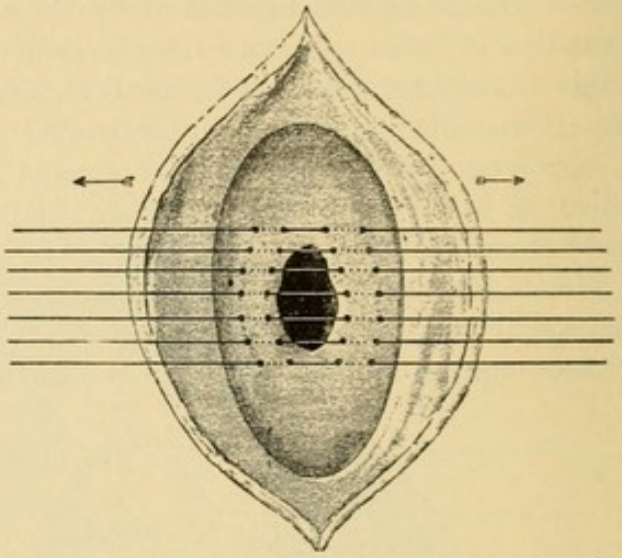


FIG. 512.—OPERATION FOR RECTO-VAGINAL FISTULA. Autoplasty by flap-splitting. Insertion of deep stitches.

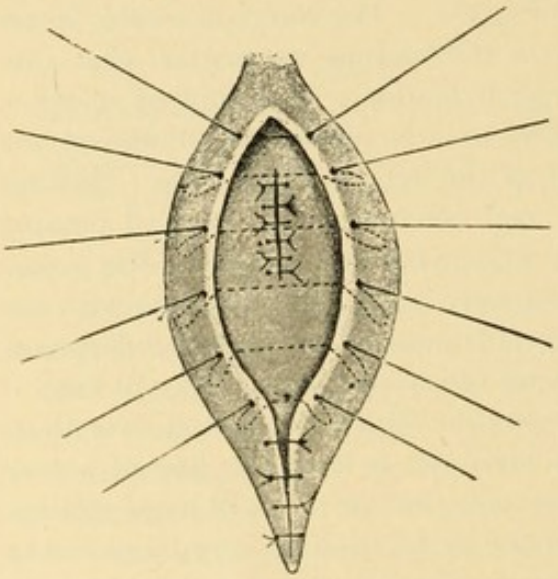


FIG. 513.—OPERATION FOR RECTO-VAGINAL FISTULA. Autoplasty by flap-splitting. Suture tightened around the rectal orifice. Deep sutures of vaginal orifice not yet tightened (Sänger).

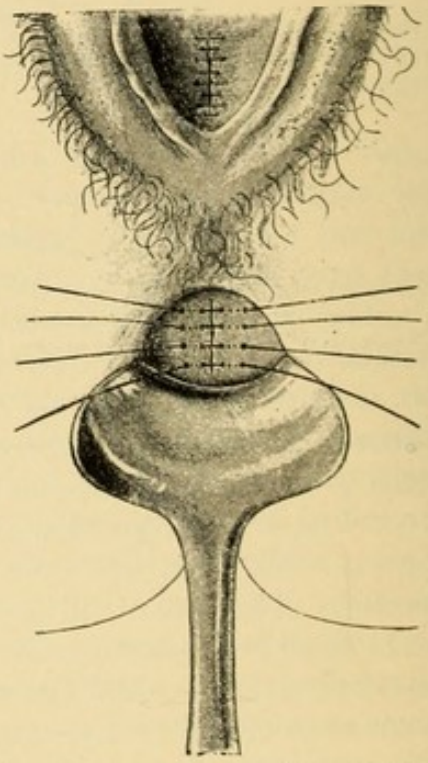


FIG. 514.—OPERATION FOR RECTO-VAGINAL FISTULA. Autoplasty by flap-splitting. Vaginal sutures in place. Insertion of protecting sutures around rectum (Sänger).

is introduced within the rectum, the operating field exposed and kept upon the stretch by suitably arranged forceps. A vertical incision extending beyond the fistula, both above and below for about three-fifths of an inch, is made in the median line and goes to the rectal mucosa (Fig. 511). The vaginal flaps are detached around the fistula. When the edges of these flaps are retracted, the fistula is in the centre of an elliptical denuded surface.

The rectal perforation is closed by from six to eight buried sutures of fine silk, inserted according to Lauenstein's method (Fig. 508). The two vaginal flaps are then sutured above the fistula by deep stitches (Fig. 513) with silkworm gut, and superficial stitches (Fig. 515) with silk. Sänger inserts a final series of protective stitches for the rectum, to prevent fecal

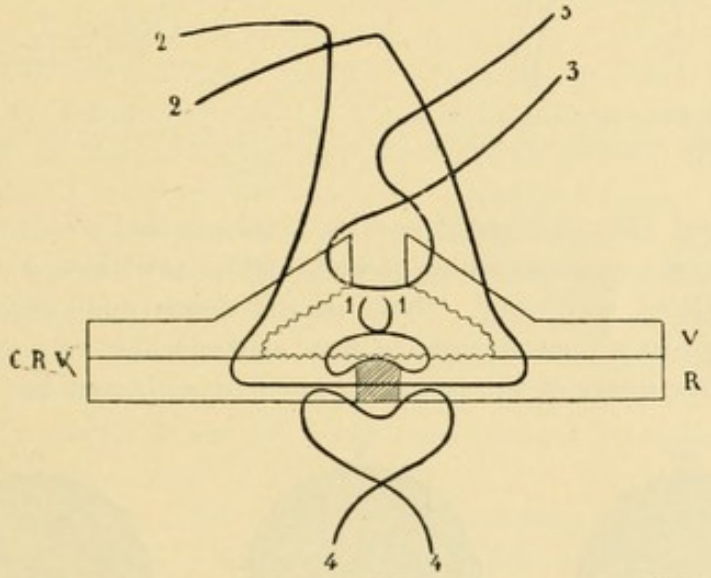


FIG. 515.—OPERATION FOR RECTO-VAGINAL FISTULA. (Schema to show arrangement of sutures.) 1, 1, Sutures buried beneath the rectal surface of the fistula; 2, 2, deep vaginal sutures; 3, 3, superficial vaginal sutures; 4, 4, protecting sutures for the rectum (Sänger).

matter from oozing between the united surfaces. To apply them he puts the patient in the Trendelenburg position and dilates the rectum. The exposed fistula is then sutured without further denudation by stitches of fine silk (Figs. 514 and 515). Sänger's patient was completely cured at the end of sixteen days.*

Autoplasty by Gliding.—This process, which was suggested by the older surgeons, has more recently been used successfully by Fritsch and Le Dentu for small fistulæ situated high up in the vagina, and very recently by P. Segond for a large fistula in the posterior cul-de-sac. It is a true autoplastic process, consisting in a vaginal flap cut from above the fistula which we slide down before it like a curtain (Figs. 516 and 517). First a curved incision

*Sänger lays especial stress upon the method of suture of the fistulæ (Lauenstein's suture). There should be no hesitation in increasing the number of sutures in order to make the union more exact. Chinese silk boiled in five-per-cent carbolic solution and preserved in a 1 : 500 bichloride solution, he considers preferable to catgut which is liable to be too rapidly absorbed.

A B is made along the upper border of the fistula *F*. The mucosa is detached below this incision a short distance to *C*. A second more deeply curved incision is made at *A D B*, at a small distance from the fistula, and, if necessary, a small crescent-shaped strip formed of indurated cicatricial tissue is excised from between the two incisions. The upper flap is then drawn down and sutured to the inferior border of the wound, the stitches passing beneath the denuded surface. By this process

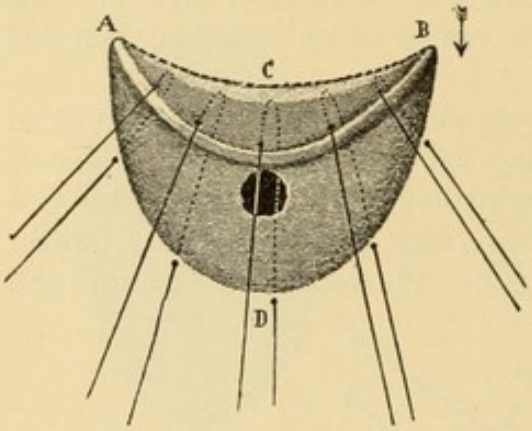


FIG. 516.—OPERATION FOR RECTO-VAGINAL FISTULA. Autoplasty with a flap. Arrangement of flaps and sutures (Fritsch).

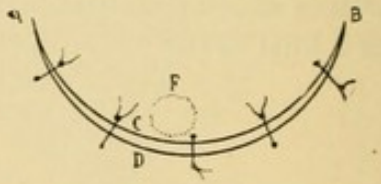


FIG. 517.—OPERATION FOR RECTO-VAGINAL FISTULA. Autoplasty with a flap. Stitches tightened (Fritsch).

Fritsch obtained four successful results. Sänger had a failure. Le Dentu successfully used a process which is identical in principle, but which differs in some details of technique. This is the description which he gives of *autoplasty by gliding, with superposed flaps and valvular arrangement:*

1. The index finger of the left hand covered with a rubber glove is intro-

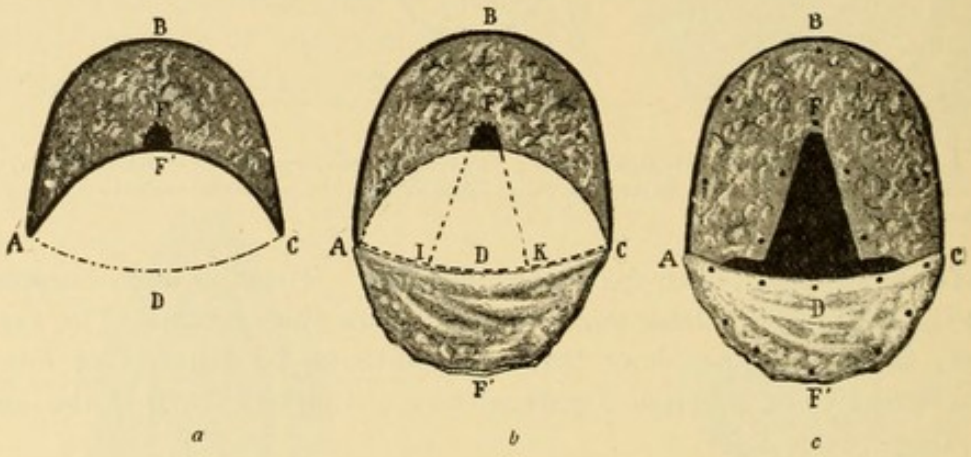


FIG. 518.—OPERATION FOR VESICO-VAGINAL FISTULA BY AUTOPLASTY AND FLAP-SLIDING. Arrangement of flap and of denudation (Le Dentu).

duced into the rectum. This precaution renders it possible to use the same finger during the course of the operation without the risk of infecting the wound. The recto-vaginal wall, which is pushed toward the vagina and spread out, can thus be more easily handled. Other means may be used to obtain the same result. The finger of an assistant, or even one of Petersen's small balls slightly distended, may be used for the same purpose, with this difference, that by using his own finger the surgeon will be better able to

judge of the thickness of the wall and the course of his dissection. This will explain why the use of the rubber glove is the best method.

2. With a sharp-pointed bistoury the curved line of incision *A B C* is to be traced, about two-fifths of an inch above the fistula; then the curved line *A F' C*, which should pass along the lower border of the fistula. The vaginal mucosa is then to be denuded throughout the whole extent of the crescent outlined by the incisions *A B C* and *A F' C* (Fig. 518, *a*).

3. The vaginal mucosa to be dissected from above downward from the incision *A F' C* to a line represented (Fig. 518, *a*) by the dotted line *A D C*. The *D* of this curved line representing the base of the dissected flap should be a good two-fifths of an inch below the fistula, so that the distance *F' D* shall be equal to or very slightly less than *B F*.

4. The flap *A F' C D* being turned toward the anus (Fig. 518, *b*) there remains a large denuded surface formed in part by the denudation *A B C F'* at the expense of the vaginal mucosa, and partly by dissection of the flap *A F' C D*. The operation essentially consists in raising this flap and uniting its denuded surface to the freshened surface *A B C F*; but if this sliding process were all, a cul-de-sac would be formed at the base of the flap in which the matters discharged through the fistula would be deposited. It is therefore necessary to destroy this cul-de-sac, which is done as follows:

5. With the scissors the triangle *F I K* (Fig. 518, *b*) is cut from the tissues situated above the fistula. On each side the upper flap is liberated along one-half of the lines *A I* and *K C* (Fig. 518, *c*). By this means the rectum is widely opened below the fistula and there is no longer a cul-de-sac between it and the base *D* of the flap *A D C F*.

The sutures are now to be inserted, a proceeding which demands great care. There should be at hand a dozen rather fine silver wires, threaded at both ends into fine, slightly curved needles. According to the extent of the fistula, from five to eight of these wires will have to be used, more if the dimensions are very great. They are inserted as follows:

6. A needle carrying a wire is to be entered at *B* on the superior flap, and brought out at *F* after having traversed the thickness of the flap without, if possible, infringing upon the rectum. Then the points *D* (base) and *F'* (apex) of the inferior flap are to be traversed with each needle (Fig. 519, 1). Then drawing upon the two ends of the wire and pushing back the inferior flap, its posterior denuded surface is to be adapted to the anterior denuded surface of the superior flap. To maintain them in position it is only necessary to put two Galli tubes on the ends of the wire, crushing the superficial one, but being careful not to tighten the wire. Otherwise from tumefaction of the flaps the tubes would become buried in the tissues and perhaps cause ulceration and perforation.

Or the wires may be twisted around a little wad of iodoform gauze placed between their free extremities, upon the anterior surface of the inferior flap (Fig. 519, 2). In any case there must be no torsion of the wires

directly above the flap without the interposition of iodoform gauze, so as to avoid the wrinkling which would diminish the surfaces to be united. Either the use of the tubes of Galli, or torsion around a little piece of gauze will stretch these surfaces and thus increase the chances of success. All the wires are successively inserted in the same manner.

The sutures once inserted, the inferior flap will be found to quite cover the superior flap (Fig. 519, 3). The fistula is entirely suppressed, and the

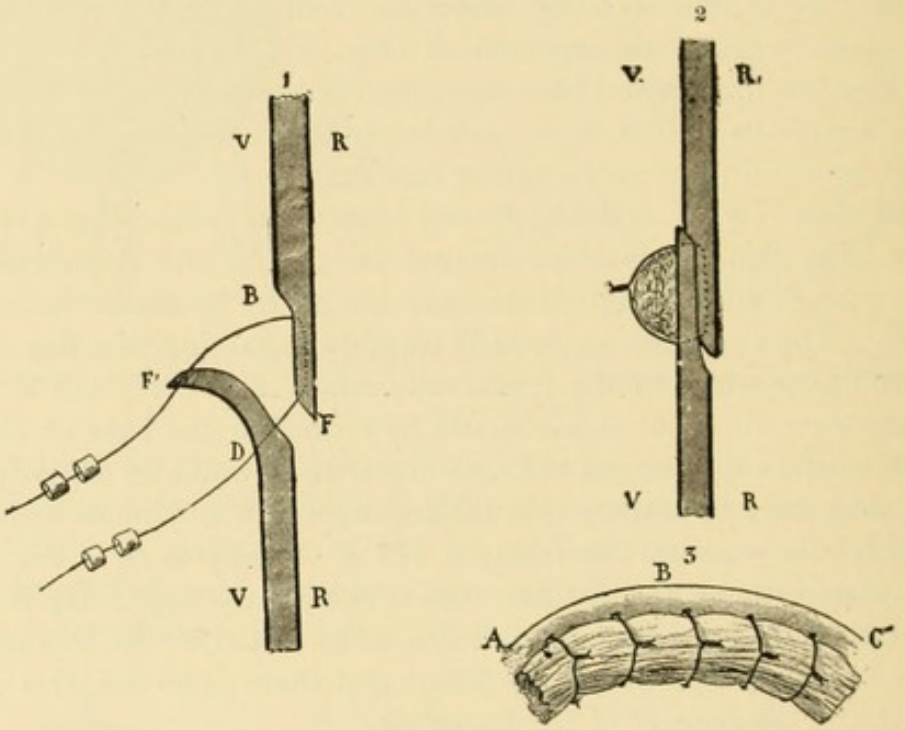


Fig. 519.—Operation for Recto-vaginal Fistula by Autoplasty and Flap-sliding. Arrangement of sutures (Le Dentu).

rectal mucosa, which forms the posterior surface of the superior flap projecting slightly beyond the line of union on the rectal side, forms a little valve over which the gases and fecal matter glide naturally toward the rectum, and cannot get into the vagina by slipping between the flaps.

P. Segond's method consists in "removing the portion of the rectum situated below the fistula without involving the perineum, freeing the portion above the fistula, and drawing it down to the anus." It includes the following steps:

1. The anus is dilated manually, slowly, rhythmically, and as completely as possible. By proceeding in this way the mucous membrane is not torn, a large dilatation is obtained, and the sphincter always regains its function.

2. The intra-anal cylinder of mucous membrane is liberated by dissection. A circular incision is made through it, two or three millimetres above the muco-cutaneous junction. This precaution is indispensable in order that the ultimate line of suture may be concealed in the anal depression. After making the incision the mucosa is dissected off, by a series of small snips with the scissors, over the entire region of the sphincter. The muscle

is then kept from contracting by two retractors, and the entire thickness of the rectal walls may be seized for the succeeding step.

3. The recto-vaginal septum is split in order to mobilize, lower, and resect the rectal segment below the fistula. The splitting of the recto-vaginal partition as far as the fistula may be accomplished by the finger alone. The course of the fistula is then divided with a bistoury, separating it into two independent orifices, a rectal and a vaginal. Then seizing the anterior rectal

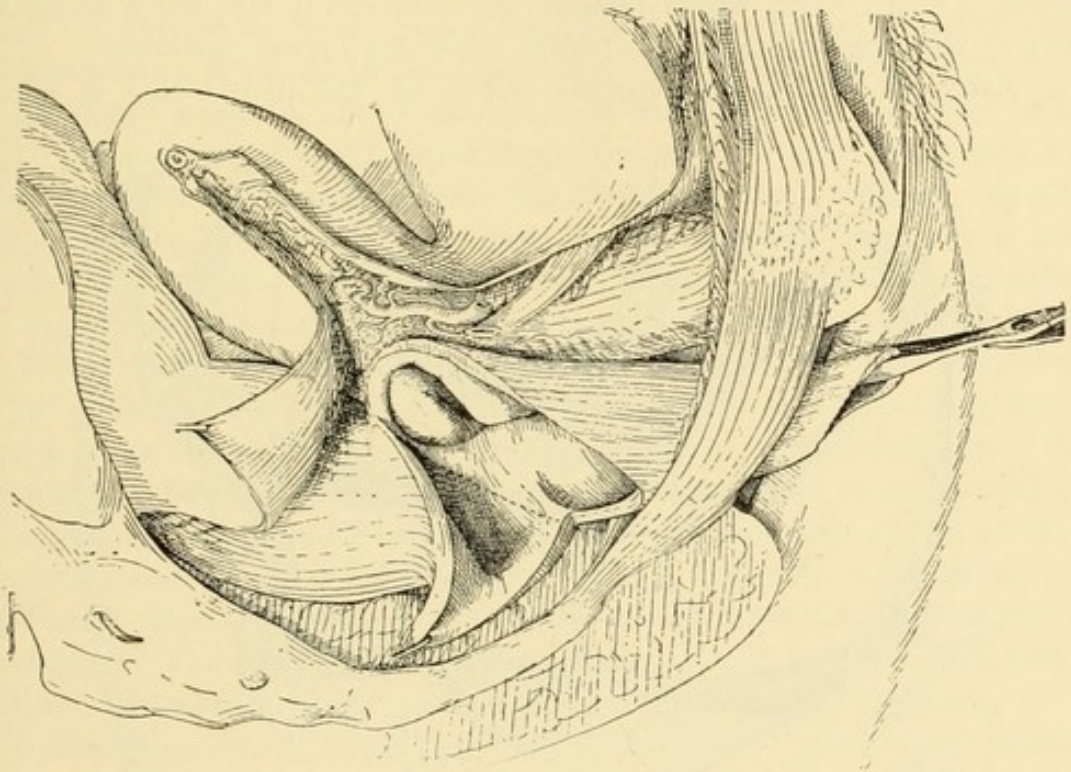


FIG. 520.—OPERATION FOR RECTO-VAGINAL FISTULA BY SLIDING FLAP (SEGOND). Antero-posterior section showing manner of resecting rectum. Portion to be removed is grasped by forceps.

wall above the fistulous opening with the fingers, the splitting of the septum is continued without the aid of cutting instruments, at the same time exerting traction downward until the portion of the rectum corresponding to the upper border of the rectal opening of the fistula is sufficiently lowered to allow it to be sutured to the border near the muco-cutaneous junction at the anus. This step of mobilization is aided by fixation of the uterus by a Museux forceps previously introduced through the vagina. The rectum is lowered by successive tractions and the peri-rectal separation is accomplished with the thumb-nail. This manœuvre is possible, however high the fistula may be situated, and the thick peritoneum of Douglas' cul-de-sac may be pushed back without danger of laceration. As the anterior rectal wall is drawn down, the lateral and posterior portions of the mucous membrane of the rectum become folded and stand out, but this should be overlooked at first as these portions are freed, after the separation of the anterior wall is complete, sufficiently to overcome this condition and allow accurate apposition after resection of the segment below the fistula. This resection must

be oblique from above downward and from before backward, from above upper border of the rectal orifice of the fistula in front to a point above the postero-superior border of the sphincter, varying in distance from the latter with the amount resected, that is, with the height at which the fistula is situated (Fig. 520).

4. The rectum is sutured to the anus with braided silk in the usual manner; however little the recto-vaginal flap may be drawn upon, it is prudent to insert a small drain which insures the removal of the fluids which may collect in that region during the two or three days after operation.

5. After freshening the vaginal orifice of the fistula this is sutured

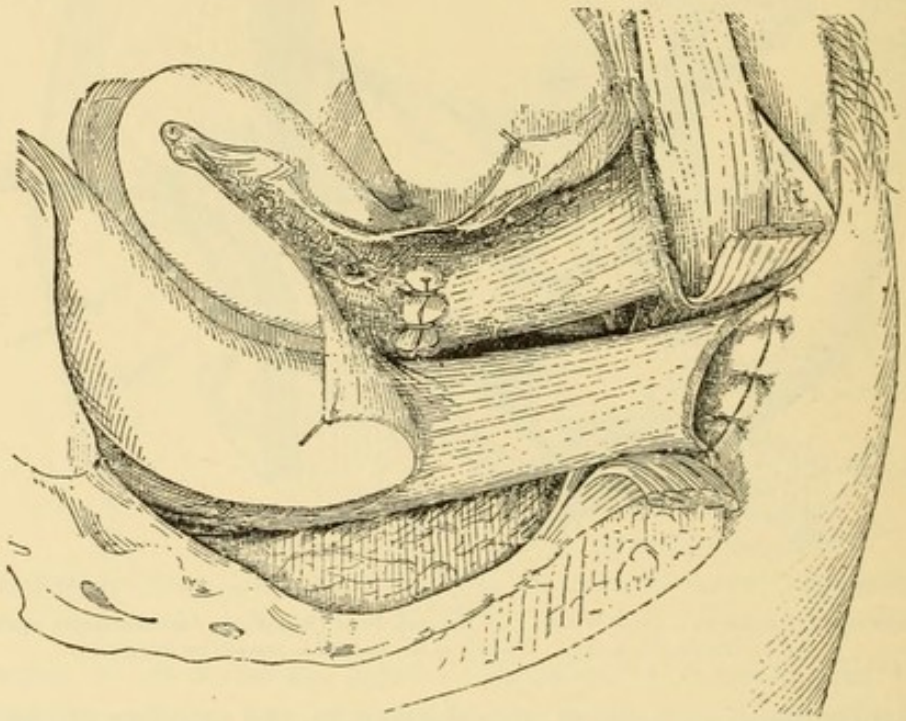


FIG. 521.—OPERATION FOR RECTO-VAGINAL FISTULA BY SLIDING FLAP (SEGOND). Operation completed. Showing anal suture uniting segment of rectum which has been drawn down to skin, and three stitches closing vaginal orifice of fistula.

through the vagina. This might be dispensed with since the rectal communication has been obliterated and the rectal blind blocks up the vaginal window; but it is preferable to close the vaginal opening with several catgut sutures (Fig. 521), so that the utero-vaginal secretions cannot enter the wound.

6. The dressing is very simple and consists in tamponing the vagina with iodoform gauze, placing a rubber tube in the rectum to allow the escape of gas, and applying an aseptic compress to the ano-vulvar region, keeping this in place by a T bandage. The rectal tube is removed at the time of the first passage, the small drain in the recto-vaginal wound after forty-eight hours, and when the sutures are removed about the eighth day, the cure is complete. A daily movement of the bowels must be assured after the first

day without regard to the rectal sutures, which should, however, be cleaned after each evacuation.

Operation by Rectum.—Fistulæ located in the upper part of the vagina sometimes resist all efforts toward obliteration by this passage. In some cases, too, the recto-vaginal fistula coexists with a vesico-vaginal, and the incision of the cicatricial masses necessary to expose the rectal perforation may result in incontinence of urine by allowing relaxation of the vaginal walls. It will be better in these cases to attack the fistula from the rectum.

The woman is placed in the genu-pectoral or in the Sims position. As a preliminary measure, forced dilatation of the sphincter ani must be practised. Having overcome its resistance, the rectal cavity is exposed with a short speculum and retractors, and the borders of the fistula are seized and immobilized by the forceps and tenacula. Continuous irrigation is of service in removing the blood during denudation. The operation is aided by the finger in the vagina. The suturing is to be done in a special manner. We follow Simon's example, inserting the needle in the immediate vicinity of the rectal wound, directing it in such a way that it will emerge into the vagina one-fifth of an inch beyond the margins of the perforation. Sometimes it will be easier to place the suture per vaginam by an inverse order of procedure. Care must be taken to avoid the inclusion of the rectal mucous membrane in the wound, where it has a tendency to insinuate itself. We should employ silver wire and rubber tubing, as in the case of the vaginal suture. The extremities of the wires are placed in the rectum and covered by a strip of iodoform gauze, which projects through the anus.

Preliminary and After-treatment.—In the way of preliminary treatment to prepare the patient for the operation, there should be repeated purgation, enemata, half diet, and careful antisepsis of the vagina and rectum. It would be well to add antisepsis of the intestines by the administration of naphthol and the salicylate of bismuth.

The dressings consist of powdered iodoform and antiseptic gauze renewed every few days. A catheter must be used at first to prevent any flow of urine on the vulva and the sutures.

Is it necessary to constipate the patient? Several authorities maintain that it is, and give opium for from ten to twelve days after the operation, trusting that by this time the cicatrix will be strong enough to resist solid stools. Other surgeons, dreading the effect of this ordeal, prefer to administer laxatives. In this case, however, the liquid matters are apt to enter the line of the sutures and infect the wound. Hegar recommends the following, which seems to be a judicious plan. He thoroughly purges the patient before the operation, then puts her upon a rigid milk and broth diet during the first three days; on the evening of the fourth day he gives a small dose of calomel, and the following morning a glass of purgative mineral water; after the second stool he arrests further evacuations by a little opium. He repeats the treatment every forty-eight hours.

Metallic sutures are left in place for fifteen days if they do not cut through. They are always to be removed from the side where they are twisted and fixed. Where silk sutures are used, they become infected at the end of eight days, and cannot be retained much longer without provoking inflammation.

ENTERO-VAGINAL FISTULÆ.—We here include all communications between the vagina and the intestine, the rectum excepted. According to their size and the quantity of the matters to which they give passage, such a fistula may be called an abnormal vaginal anus or a stercoro-vaginal fistula. One of the first of the cases published was by MacKeever. Others followed by Roux, Casamayor, Ashwell, Breitzmann, Simon, Demarquay, and others. L. H. Petit has collected all the cases scattered through literature, and published them in an exhaustive monograph upon the subject.

Etiology.—In the great majority of cases the lesion originates in rupture of the posterior cul-de-sac during labor. An intestinal loop passes through the perforation, becomes adherent, and sloughs more or less completely either by the rapid process of strangulation or more slowly by ulceration. Direct traumatism may produce it, but this cause is excessively rare. The same is true of wounds made by the surgeon during operations, such as vaginal hysterectomy. Suppuration of a dermoid cyst or of the cyst of extra-uterine pregnancy opening into the vagina or intestine are exceptional causes. As to the perforations due to cancer, these do not belong to the list of permanent lesions, to which this study is limited.

Pathological Anatomy.—The posterior cul-de-sac is the almost exclusive location of this abnormal opening. Breitzmann and Dahlmann have, however, seen a fistulous opening in the anterior cul-de-sac. The lower part of the ileum is the portion of the intestine most often implicated; fistulæ of the sigmoid flexure are also observed. The aperture is apt to be very large where the entire intestinal loop sloughs, or it may be double, separated by a spur; this is, however, rare. At other times it consists merely of a small hole. Cicatricial bands are sometimes found in its vicinity, producing contraction of the vaginal canal. The cervix will be altered by metritis provoked by the constant infection of the vagina, which will be itself in an inflamed condition.

The lower segment of the intestine tends to atrophy and to become obliterated; in the case reported by Casamayor it had been transformed into a solid band. Sometimes we find coincident vesico-vaginal fistula. If the fistula is completed by the intermediation of a cystic cavity, it may be called an ileo-cysto-vaginal fistula.

Symptoms.—Where the aperture is very large, the greater part, if not the whole of the fecal matters may be passed into the vagina. In a word, there then exists a vaginal anus. The discharges appear about two hours after eating, and have the appearance of partially digested food mixed with bile, and the consistence of *purée*. The character of the stools and the time

of their discharge are valuable indications of the site of the intestinal perforation. The vaginal opening can be detected by the touch or is easily discovered by exposure with the speculum and retractors, placing the patient successively in various positions.

Where the perforation is very small, sometimes several examinations may be neccessary for its discovery.

Menstruation is often suppressed. This has been attributed to impairment of the general health. The patient often suffers from inanition due to imperfect absorption of food. MacKeever cites a case, however, in which the woman became pregnant.

A very small fistula may recover spontaneously under the influences of good hygiene and minute attention to cleanliness. If the perforation is large, the lesion is usually permanent and the patients die of exhaustion. Petit, however, cites two exceptional cases in which, after the sloughing of a loop of the small intestine, recovery followed.

Diagnosis.—This depends first upon the existence of fecal matters in the vagina; when assured of the existence of an abnormal communication, it remains to determine its precise location. In searching for the aperture, the probe is carried into the folds of the mucous membrane. If not found the cervix may be dilated and the examination extended.

The site of the intestinal perforation will be determined by the character of the matters discharged. Where the small intestine is implicated, these will be liquid, and of a greenish or yellowish hue; they will also present undigested food, such as the leguminous foods, which are not attacked by the digestive juices. The stools appear in from two to three hours after eating where the perforation is in the terminal part of the ileum. Where the discharge occurs earlier, the site of the perforation is supposed to be higher up. Where the discharge is later, of a more nearly solid consistence, and having a fecal aspect, the perforation may be in the sigmoid flexure.

We should examine with care into the condition of the orifice, guarding against the error of regarding the neighboring uterine cervix as a second fistulous tract. Where there are two openings separated by a spur, the upper one is the one which gives passage to the discharges; the direction and the permeability of the two openings should be ascertained by careful probing with a flexible sound. If the vagina is too narrow to admit of this examination, injections of milk may be used or progressive dilatation in one or two *séances* with section of the cicatricial bands. Rectal touch assists the probe in determining the intestinal aperture, as it assures us at least of its location beyond the reach of the finger.

Treatment.—Where we have a very small fistula with only a slight discharge of fecal matters, and evidently implicating the intestine laterally, we may try cauterization with the thermo-cautery, as in the case of recto-vaginal fistulæ. After several ineffectual efforts we can then resort to denudation and suture.

When the perforation is terminal and the whole of the matters are passed into the vagina, we have quite a different state of things. The operative plan here indicated is that which has been followed with success by O. Weber and C. von Heine. It consists in the re-establishment of the digest ive tube by section of the spur so as to transform the vaginal anus into a stercoral-vaginal fistula; then the obliteration of this by denudation and suture.

For section of the spur, these authorities used Dupuytren's enterotome. Verneuil recommends simple long catch forceps; in order to render the compression less forcible and the sloughing less rapid he advises covering the jaws of the forceps with rubber tubing and then increasing the compression gradually from day to day by means of the ratchet catch on the handles.

In case we cannot obtain a result by this method, we are, I believe, justified in performing laparatomy in order to detach the two adherent portions of intestine from the vaginal cul-de-sac, suture the latter, then vivify and unite the two segments of intestine. This operation is the only rational procedure for an entero-uterine fistula. If the inferior segment is obliterated or much contracted, the superior segment may be united to the most accessible portion of the large intestine; the advances of abdominal surgery at the present day having made practical this procedure, which when inaugurated by Roux was considered a rather venturesome operation.

The procedure conceived by Jobert is fraught with quite as much danger; it consists in detaching the superior segment and inserting it through an opening in the recto-vaginal septum, thus bringing it into the rectum.

Colpocleisis or obliteration of the vagina below the fistula, after having created a large communicating opening between the vagina and rectum, was suggested to Simon by his analogous operation for the cure of vesico-vaginal fistula. This can only be serviceable after previous obliteration of the uterus by hystero-stomatocleisis.

Casamayor's operation is preferable. It consists in the production of a passage for the transmission of matters into the rectum, below the vaginal fistula. To obtain this result he introduces one of the blades of a long curved forceps into the intestine through the fistula, the other blade he introduces into the rectum; he then brings the two together, and after assuring himself that nothing is included between them but the walls to be divided, they are closed. A slough is the result, and after its separation the fecal matter passes directly into the rectum. In one case, however, the discharge by the vagina continued, and the patient succumbed a month later.

Verneuil has proposed a modification of Casamayor's operation, which is as follows: (1st) by the help of a curved trocar, he perforates the recto-vaginal wall about one-fifth of an inch below the fistula, and passes a rubber tube through the opening made; (2d) in the same way he perforates the ileo-rectal wall about one inch above the first puncture, passing through it a second rubber tube; (3d) he unites the two rectal ends; this forms a loop whose two

ends pass out through the vagina, one by means of an artificial anus, the other below it, leaving between them the portion of wall which is to be divided. The rubber tubes are now tightened, and cut through the tissue.

Verneuil has not yet had occasion to put his ingenious method into practice. We therefore do not know whether the establishment of a rectal opening is sufficient to induce obliteration of the vaginal perforation.

CHAPTER XXXVIII.

VAGINISMUS.

Definition and Classification.—Vaginismus or vaginodynia (spasmus vaginæ) consists in an abnormal hyperæsthesia of the external genital organs, which may induce spasmodic contraction of the constrictor (sphincter) of the vagina and of the other muscles of the pelvic floor. There are three distinct classes of the malady, or, better, three particular types.

1st. Hyperæsthesia with contraction.

2d. Hyperæsthesia without contraction.

3d. Contraction without hyperæsthesia.

The first of these three is by far the most frequent, and the last the most rare.

An attempt has been made to base the classification on the seat of the malady, and to distinguish inferior vaginismus from spasm of the sphincter vaginæ, and superior vaginismus from spasm of the most interior and the most inferior of the fibres of the levator ani. I do not think that this distinction should be preserved clinically, for contraction of the lower part of the vagina is very unusual. As to essential or idiopathic vaginismus, it probably does not exist; only the point of origin of the reflex may remain unknown.

Historical Review.—Though Marion Sims drew the most complete clinical picture of vaginismus and gave it the name which it still bears, it would be unjust to give him the entire credit for its recognition. In 1834 Huguier devoted many pages to the study of spasmodic action of the sphincter vaginæ and established an analogy between it and similar conditions of the anus. Certain valuable notes on the affection are scattered through the writings of many authors—Dupuytren, Lisfranc, Hervez de Chégoin, Scanzoni, Kiwisch, and Simpson. All of these writers have described hyperæsthesia of the vulva and spasmodic contraction of the vaginal sphincter, but their vague ideas have now no precise nosological value.

Since Sims' description, many papers have appeared relating to both the etiology and the treatment of the affection; among which I will particularly mention those of Debout and Michon, Charrier, Scanzoni, Visca, Putegnat, Lutaud, Trélat, Daude, Gallard, Budin, Verneuil, Leroux, etc.

Etiology and Pathogeny.—Two conditions are necessary for the production of vaginismus: (1) great nervous excitability, and (2) some irritation of the external genitals which serves as a starting-point for the exaggerated reflexes on the part of the sensory and motor nerves, thus producing hyper-

æsthesia and contraction. The majority of women affected with vaginismus are young, nervous, and at times hysterical, but it is false to conclude that hysteria is a necessary condition without which vaginismus cannot exist. The irritation of the external genitals has its origin for the most part in the beginning of the conjugal relation and the first attempts at intercourse. Schröder has described a peculiar condition of the vulva in certain women, in whom it is placed far toward the front of the symphysis, so that the urethra and the navicular fossæ are directly presented to the penis, and are hence compressed against the bone during the first efforts of coitus. In some cases the urethra becomes dilated, and its orifice so enlarged that an imperfect copulation becomes possible through it. Excoriation results, and the hyperæsthesia becomes so acute that the lightest contact is excessively painful.

There are other women in whom the hymen, though normal, is particularly rigid; and others in whom its orifice is large enough for the introduction of the penis without laceration. In any of these cases in which there is a pushing back or dilatation of the membrane it thickens, inflames, and becomes very sensitive. Loss of erection in the male or premature ejaculation may be causes of vaginismus, for they also interfere with the destruction of the hymen.

Vaginismus in women after defloration may be due to inflammation of the carunculæ myrtiformes from some irritation, and is also noticed where the vulva presents fissures.

Small polypoid tumors of the urethra or hernia of the urethral mucous membrane, irritated by coitus, produce the same effects. Fissure of the anus may at times cause a sphincteralgia of the vagina from irradiation of the pain and reflex contraction. It has also been asserted that an affection of the uterus, especially erosion of the cervix, might have the same result; and cases of superior vaginismus from disease of the uterus and ovaries have been described. I think that this is a veritable abuse of language, and that the name vaginismus has often been wrongly attributed to the simple phenomena of pain without vulvar hyperæsthesia and to the movements of defence which result therefrom.

All the preceding factors relate to the usual type of vaginismus in which the hyperæsthesia is accompanied by contraction. In other less common instances this latter symptom is lacking; this is observed especially in young virgins who have never attempted coitus, but in whom the suspicion of onanism is not wholly absent. Gosselin has described cases in which the hymen was very sensitive. E. Martin, Sr., attributes great importance to gonorrhœal infection transmitted to young women in their first intercourse.

Pathology.—As is usual when the nervous system is chiefly involved, the symptoms are wholly out of proportion to the lesions. In this respect, vaginismus resembles fissure *in ano*. Most often we find signs of inflammation about the vulva, the hymen, or its caruncles. There may be fissures, syphi-

litic or otherwise, of the anal and vulvar orifices, polypi or vascular tumors of the urethra. At times there is nothing to be found. The dilatation of the urethra which is occasionally present is the result of attempts at heterotopic coitus.

Symptoms.—In the ordinary type of the affection there is hyperæsthesia with contraction. The origin of the symptoms is most often at the moment of intercourse, which has been performed either in a brutal or, on the contrary, in a hesitating and clumsy manner. There are, however, many cases in which the symptoms appear very late, after the woman has been married a long time. The pain is the principal symptom and has given to the affection the name of neuralgia, neurosis, or hyperæsthesia of the vulva. It is at times limited to exact points or zones, which are relatively restricted to the internal surface of the labia minora, the fourchette, or to certain caruncles in the vicinity of the urethral orifice; in other cases the sensitive area comprises the whole of the vulvar surface.

There is no doubt that there exists a clinical type in which there is hyperæsthesia without contraction, but such cases are rare. The sensitiveness of the parts may reach such a degree that the simple touch of a feather is insupportable; more often, however, the little finger may be introduced, and it appreciates that there is a spasmodic contraction provoked by the pain, but this is not always present. The spasms may involve the adjacent muscles; the anal sphincter especially may become so hard as to be taken for a tumor by the patient (Sims). Verneuil admits that the contraction is not in the sphincter vaginæ, whose fibres seem too scattered and feeble, but in the transverse perineal muscle and in the whole muscular mass of the perineum, and it may also extend to the urethra. A sensation of weight and pain in the perineum renders the effort of walking difficult. The centre of the tetanic contraction is at the entrance of the vagina or a little above, but the levator ani may also be involved, and then the cramp extends deeply.

Coitus is impossible, and sterility is hence the rule, yet fecundation has been observed, the semen thrown upon the vulva making its way into the vagina by capillarity. The spasm may cease during pregnancy and reappear after delivery. Benecke has reported a case in which parturition was difficult because of the spasm; but labor usually produces the complete disappearance of all the morbid phenomena.

Neuralgic pains have been observed at many other points of the body. The general condition suffers by the continuance of the pain and the moral preoccupation, so that these patients rapidly become hypochondriac.

Diagnosis.—Vaginismus should not be confounded with simple pain on intercourse, or dyspareunia, which is a phenomenon of almost all diseases of the genital organs.

Imperforate hymen and atresia of the vagina are easily recognized on inspection, and they also coexist with absence or retention of the menses.

Simpson and Hildebrandt have described under the name of "penis cap-

tivus" a contraction of the levator ani, which a woman occasionally has the power of producing voluntarily. It is only a physiological curiosity, and altogether different from vaginismus. When this contraction assumes the character of a pathological process, it has been called superior vaginismus. It is most often a contraction without hyperæsthesia, and has been ascribed, without proof, to opposition to fecundation.

The very rare affection described by Breisky under the name kraurosis vulvæ, which signifies contraction of the vulva, should not be confused with vaginismus. Kraurosis occurs in women who have passed the menopause, and is characterized by two symptoms: the presence on the vulva of brown, extremely sensitive spots; and the fibrous transformation of the perivulvar subcutaneous tissue.

Treatment.—The indications are to diminish the morbid hyperæsthesia and to destroy the lesions which are its immediate cause. The first care of the physician should be to remove every incentive of sexual excitement. Then an antispasmodic treatment may be begun, and here hydrotherapy and bromide of potassium render efficient service. With these may be joined the local application of cocaine, suppositories of opium and belladonna, etc. But the capital indication is to abolish the local affection which is the starting-point of the reflexes. Vulvitis should be treated with sitz baths, frequent application of Goulard's lotion, boric-acid solution, borated or iodoformed vaselin, light cauterization in the fissures with nitrate of silver solution (1:20), iodoform in powder, etc. Then any lesions of adjacent parts should be sought out and removed. If there is a fissure of the anus, the sphincter should be stretched; if there is a urethral polyp, it should be excised, etc.

The thickened and inflamed hymen, incompletely torn or reduced to only a trace of its original extent, is often the origin of the pains, although it is not the only one, as Simpson maintained in his first publications. Its excision will frequently produce a cure. This little operation is easily done with a pair of curved scissors after the application of cocaine, and a hem suture produces immediate reunion of the small wound. At the end of a few days progressive dilatation should be begun; the patient should take a sitz bath and introduce a series of bath specula of gradually increasing diameter. If attempts at intercourse remain painful after this, the vagina must be forcibly dilated under anæsthesia. We proceed as in the case of fissure of the anus; the middle and ring fingers of each hand are introduced into the vagina, and by pressure at different points the greatest possible distention of the orifice without tearing the skin is produced.

We no longer practise section of the internal pudic nerve as proposed and performed by Simpson, and but few surgeons employ Sims' section of the vaginal sphincter. To perform this the patient is chloroformed and two fingers of the left hand are introduced into the vagina. Then with a bistoury the superficial fibres of the bulbo-cavernosus are divided on either side of

tne median line to a depth sufficient to relax their tension, the incision being carried from half an inch in the vagina to the border of the skin. After the section, Sims dilated the orifice strongly and tamponed it with cotton, which was changed to a large glass dilator on the following day; this was worn nearly continuously at first, and later left in place two hours at night and two hours during the day for many weeks until all danger of contraction had passed.

The following procedure by splitting and eversion of the mucous membrane, which I have originated, has given me most satisfactory results. The patient being anæsthetized, the hymen is first excised with scissors, and then

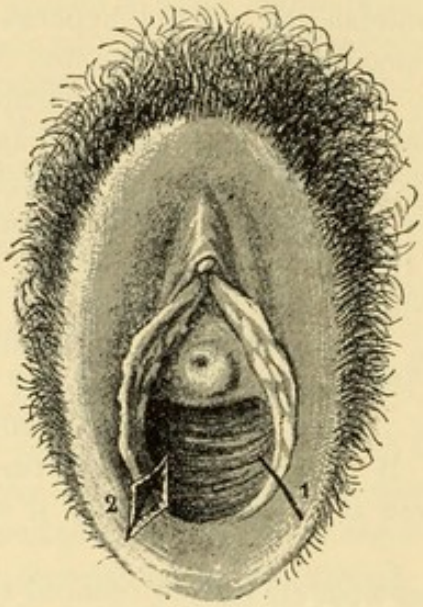


FIG. 522.—OPERATION FOR THE RELIEF OF VAGINISMUS. 1, Incision perpendicular to the margin of the vulva at the junction of the fourchette and labia minora; 2, separation of the edges of the incision after section.

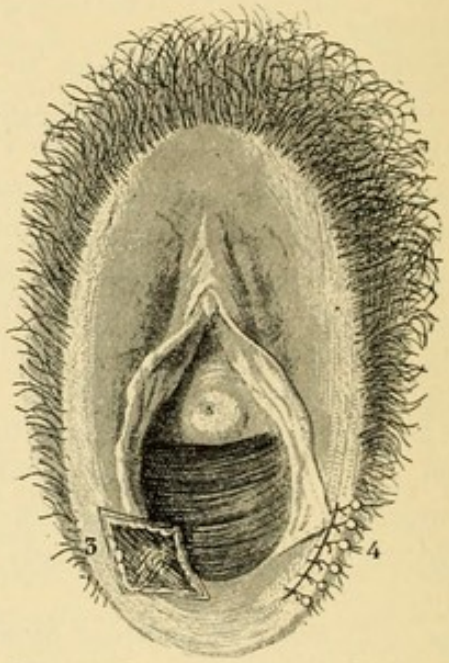


FIG. 523.—OPERATION FOR THE RELIEF OF VAGINISMUS. 1, Retraction of the edges of the incision after subcutaneous dissection; 2, suture of the incision with line of union parallel to the margin of the vulva.

the vulva is stretched with the fingers. A lateral incision is made on each side at the junction of the lower and middle thirds of the vulvar orifice (Fig. 522). This incision, three to four centimetres long, extends a little farther below than above the line of insertion of the hymen and forms a cross with it. The incision exposes the sphincter vaginæ and divides its superficial fibres to the extent of two or three millimetres. The lips of the wound are dissected, so as to cause their separation, thus giving the original incision the form of a lozenge whose long axis is parallel to the border of the vulvar orifice. The operative wound is then closed, so as to obtain a line of suture, which crosses the direction of the original incision at right angles, and which is situated outside of the point which was occupied by the hymen. The suture draws the vaginal mucosa to the level of the lower angle of the primary incision (Fig. 523). In this

way a sagittal incision has been made on each side of the vulva, followed by a transverse suture, an operation analogous (though directly inverse) to transverse flap-splitting followed by sagittal suture, which Lawson Tait employs in perineorrhaphy. The vulva is thus enlarged and the vaginal mucosa is everted slightly, so as to remove from the friction of coitus the region from which the reflex actions arose.

The sutures of the two large incisions should be of silkworm gut or silver wire, and should penetrate only the mucous membrane. The first suture unites the upper and lower ends of the original incision. The small wound resulting from removal of the hymen is closed by a continuous catgut suture.

I will also mention the use of electricity, with which Lomer claims to have obtained great success.

These patients are generally anæmic and need a tonic regimen. Great attention should be paid to the mental condition of certain women, especially where there is a tendency to lunacy by inheritance. Change of air and scene should be prescribed wherever possible.

CHAPTER XXXIX.

LACERATION OF THE PERINEUM.

Etiology and Pathogeny.—The perineum is a resistant fibro-muscular floor which closes in the abdominal cavity below and supports the weight of the contained viscera. Viewed from within it has the appearance of a very wide funnel with attachments to the pelvic wall, pierced eccentrically at its anterior part by the orifice for the passage of the vagina. Viewed from without it is reduced to the space comprised between the fourchette and the anus, forming the base of a triangular pyramid; its base answering to the skin and the inter-crossing of the sphincter muscles of the anus, the constrictor vaginæ and the transversus perinei, while its apex is lost in the recto-vaginal septum. Along one of its sides runs the vagina, its lower portion reenforced by the hymen or its vestiges, while the other side is tangent to the rectum. The lateral parts of this perineal prism have for their support the deep internal borders of the levator muscles of the anus attached to the side of the rectum, and forming by their intricate arrangement a support for the whole region.

At the time of parturition the vulva gives passage to a fœtus, whose diameters are in excess of the canal through which it passes. This could not happen were it not for two factors, the thickening and softening of the tissues caused by the marked venous congestion toward the end of pregnancy, and the elasticity of the muscular and cutaneous planes. When one of these elements is absent, the perineum either gives way or tears. This accident may be due to various circumstances: To exceptional rigidity of the tissues in a woman who becomes a mother at an advanced age, or who presents especial narrowness of the vulva; excessive volume of the fœtal head or a posterior position which has not been reduced; too rough passage of the head and shoulders; narrowness of the pubic arch; a too perpendicular position of the sacrum, which allows the head to be carried backward, as in the flat or rachitic pelvis; ill-applied forceps; too hasty version, etc. Traumatism of different forms may be the cause of perineal laceration, but this is not a common origin for the accident.

In parturition it is not the cutaneo-mucous investment of the vulvar commissure which forms the chief obstacle to distention of the part, but fibres of the muscles which lie immediately beneath. These fibres are the constrictor of the vulva; according to H. A. Kelly, they are the most internal portion of the levator ani at their insertion into the rectum; Budin attaches less importance to the muscular fibres, and sees in the hymen the

chief cause of rigidity of the vulva. The laceration of the hymen may play the rôle of a scissor cut in tearing cloth, but it does not seem that the tear in the superficial soft parts can be the initial phenomenon; it is more likely, I think, to be subcutaneous rupture of the mucles. This deep rupture may be the only one if it permits the parts to dilate sufficiently, and instead of a visible tear of the perineum there is only that loss of power which plays so important a part in the production of genital prolapse. When the fourchette is not elastic enough, even after the rupture of the muscular fibres below, it gives way in its turn, and the visible laceration is produced. This happens most often on the left side near the median line, and varies in extent from a simple tear in the integument to a division of the anal orifice, reaching up to a high point on the recto-vaginal septum.

The mechanism of central ruptures, which are very rare, is similar: The head is badly directed, and passes backward to the middle of the perineum, which it distends and causes to tear; then after the delay of a few minutes which follows the momentary diminution of the distention, it reascends a little and then directs its passage toward the vulvar orifice, in passing through which it may cause another rupture of greater or less extent. At times the child may pass by the central opening.

Pathology.—The following description is applicable only to old and cicatricial lacerations. The laceration is most often found at the fourchette and a little to the side of the median line, and is called incomplete when it does not involve the anal sphincter.

There are two degrees of incomplete laceration, in one of which the fourchette alone is torn, while in the other the tear is deeper and involves the muscular planes, without rupturing the sphincter ani. The vulva appears to be elongated posteriorly, and is wide open, and at the fourchette there is a soft cicatricial surface. If the lesion is of long standing, there is almost always a slight degree of cystocele and uterine prolapse.

In the complete form the vulvar and anal orifices are thrown together so as to form a cloaca, about which there are prominent folds of mucous membrane. The recto-vaginal septum is rounded in a full curve, or like a pointed arch with doubly curved sides, and at its apex there is often a small triangular portion of rectal mucosa, which hangs like a pendant. The posterior column of the vagina may be isolated by a double laceration which gives it the aspect of a uvula, but more commonly the laceration has passed to the left side of this projection. The cicatricial tissue deforms the parts in a varying manner, one of the borders of the opening being thick and the other thin, or a number of bridles may stretch across it (Fig. 524). The division of the tissues may reach up to the posterior cul-de-sac of the vagina.

At the lower edges of the laceration the parts are drawn upward by the action of the levator ani, and on the sides there may be a small depression corresponding to the stump of the sphincter.

There are two degrees of complete rupture, according as the sphincter

and the anal orifice alone are torn or the recto-vaginal septum is also divided. This distinction is of value to the operator, for the repair of the septum requires modification of the surgical treatment.

It is usual to find deep ruptures of the cervix with complicating metritis accompany those of the perineum, and Thomas claims that the vagina also remains in a condition of subinvolution. Cystocele and uterine prolapse are often observed in this condition.

Diagnosis.—Examination by touch and speculum reveals the deformities

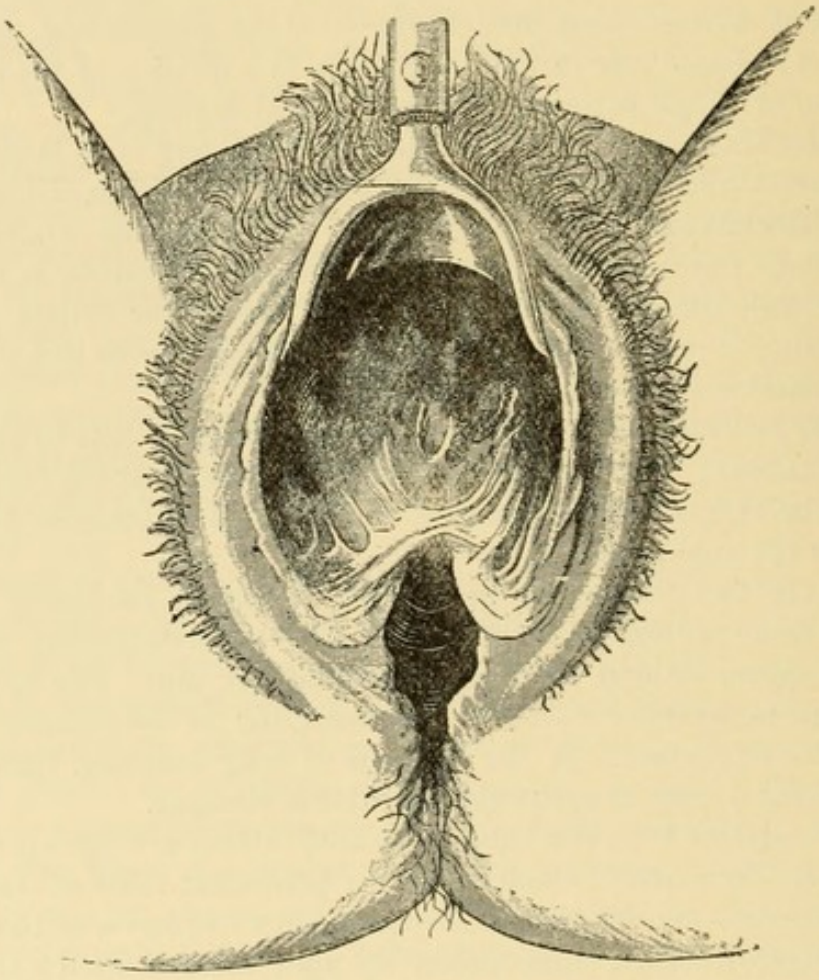


Fig. 524.—Complete Rupture of the Perineum Involving the Recto-vaginal Septum.

which I have described. To practise this exploration, the patient should be placed first in the dorso-sacral and then, if necessary, in the genu-pectoral position, and the region displayed by means of a large anterior blade and lateral separators.

Symptoms.—The rational signs vary according to the extent of the laceration. In the incomplete form all the symptoms are attributable to the gaping of the vulva, which favors the formation of cystocele, uterine prolapse, and also metritis. It is not uncommon to see these patients suffer from great difficulty in walking, and vague pains which are due to the enteroptosis,

and are to be referred to the disturbance of the uterine equilibrium from loss of the perineal support.

In complete laceration there is incontinence of gas and liquid fæces, even when the solid portions of the intestinal contents are well retained. Certain patients, however, are able to retain the gas when they are in the horizontal position, even when the entire sphincter has been ruptured.

Prognosis.—This lesion is a serious one, although the patient may not suffer from destruction of the sphincter, for it renders her incapable of exertion, easily fatigued, and predisposed to prolapse of vagina and uterus, and the development of metritis.

Treatment.—Recent Lacerations of the Perineum.—Should the repair of the injury be left to nature, which is capable of accomplishing it in many circumstances; or should we aid and direct this healing process, which is often defective or insufficient, by immediate suture? This matter has been much disputed, especially during the time when ignorance of the benefits of antisepsis and asepsis rendered success very doubtful. In certain cases it is better not to interfere; for instance, if the patient is very much exhausted and one lacks the necessary assistants, etc.; but such contra-indications do not concern the operation itself. Every lesion should be repaired at once, wherever it is possible. Cures have been obtained in this way, even when the tissues appeared to be much contused and ill adapted for primary union. This conduct also avoids the necessity for a late operation, which would be far more complex, and also shuts the door against infection. Spontaneous cicatrization, which is possible in the case of every superficial laceration, is the great exception when the tear has been deep.

The simplest and easiest plan of uniting the laceration is the hem suture on superposed planes, which re-establishes the previous condition of the parts by taking advantage of the fresh surfaces of the laceration. This suture is far better than the use of serre-fines, which are not strong enough for anything more than slight tears of the cutaneo-mucous fold of the fourchette. As the procedure is very rapid, local anæsthesia with cocaine is sufficient, applied superficially or by means of the hypodermic syringe. The catgut sutures disappear of themselves, and do not require to be extracted. The patient should have her thighs maintained in apposition, and be forbidden to sit up in bed during the first fifteen days, and the parts must be carefully kept clean with sublimate solution and iodoform in powder.

When the surgeon has not interfered immediately, should he perform secondary immediate union during the first month, as has been proposed, either by bringing the granulating surfaces together or by scraping off the fleshy granulations with the cutting curette? Success has been obtained in this way, but I think that it has more defects than advantages, and that it is better to wait until the local congestion has disappeared and the woman is in condition to endure an operation.

Verneuil has advised immediate secondary union even in old cases, and

employs the thermo-cautery for the purpose of freshening the surfaces, suturing them after the fall of the eschars. This procedure must not be confounded with angular cauterization of the laceration analogous to the method of Jules Cloquet in fissures of the palate, which has been used in certain cases to diminish the extent of a tear involving the recto-vaginal septum, which I have employed at times with success.

Old Lacerations of the Perineum. *Historical Review.*—The first operation for the repair of the perineum with sutures was performed by Guillemeau, a French surgeon, in the seventeenth century. In the following century La Motte, Smellie, Noel (of Rheims), Murenna, and Saucerotte attempted it with more or less success. More recently Dieffenbach, in Germany, advocated a method which has served as a model for many procedures, and has been perfected and introduced into France by Roux. The characteristic of Dieffenbach's method consists in a large denudation of the surfaces to be united, and in liberating incisions, of which we find a trace in Mercier's, and Baker Brown's division of the sphincter; the capital point of Roux's method was the quill suture, employed for a wound which was much larger than those customarily closed in this manner. With Langenbeck a new method arose, called perineo-synthesis, based upon a combination of denudation and autoplastic division, which has given birth in France to the methods of Demarquay, Richet, Le Fort, Marc Sée, and Polaillon; and in Germany to those of Simon, Wilms, Staude, Bischoff, Hegar, Hildebrandt, Freund, and others.

In America Marion Sims in the year 1855 applied to the repair of the perineum the same simple and precise principles which had guided him in the treatment of vesico-vaginal fistula. Freeing the operation from all useless complications, especially the different planes of suture, he repeated the procedure of Roux, carried the denudation higher up, and employed metallic sutures. This was a great improvement, preceding and preparing the way for his pupil and friend Emmet. The originality of the latter's method consists in the suture employed, which has for its object the exact coaptation of the wound surfaces as one closes a purse, and also in the care with which the sphincter is reunited by a special suture of its divided ends, by the application of a sub-sphincteric thread very deeply and obliquely from behind forward. This procedure, which is derived from Marion Sims' and improves it, has been generalized in France by Judes Hue and adopted by Verneuil, Trélat, and the majority of surgeons.

It might be thought that the operative technique had arrived at the highest point of simplicity; but Lawson Tait perfected the method of John Duncan and Simpson, and reduced the operation to a rapid division or splitting of the recto-vaginal septum followed by the application of a few sutures, which altogether requires only from five to ten minutes to accomplish. This has been quickly adopted in both America and Germany, with or without modifications.

I shall not attempt to describe each of these various methods, but shall limit myself to the principal ones, giving references enough to the literature of the subject, so that the other methods may be readily found.

Incomplete Lacerations.—All of the procedures of colpo-perineorrhaphy which I have described in the chapter on Genital Prolapse find there their special application. There is only a difference in degree and great similarity

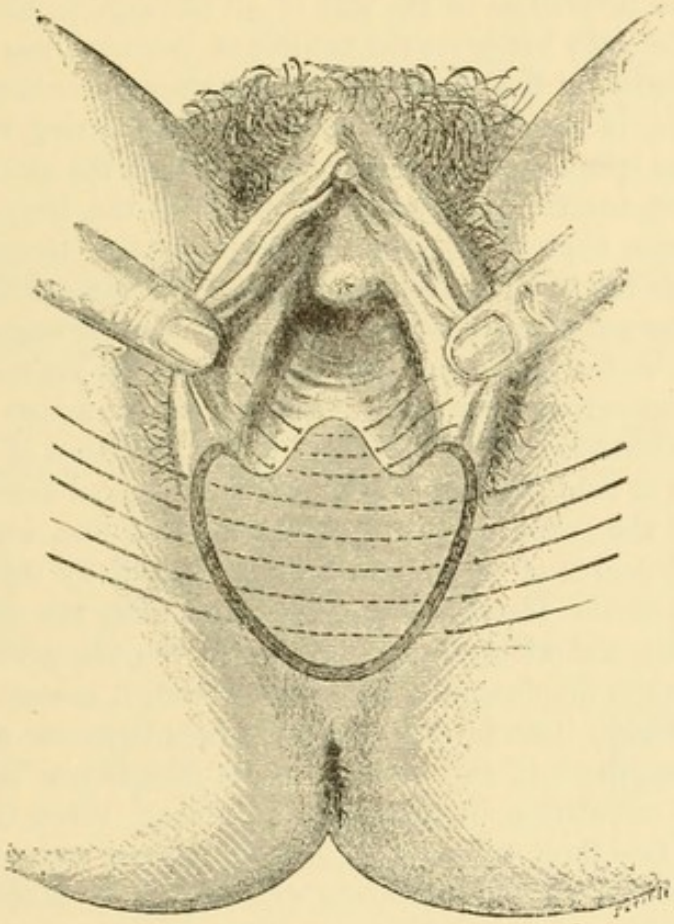


FIG. 525.—INCOMPLETE RUPTURE OF THE PERINEUM; PERINEORRHAPHY. Simon's method.

between relaxation of the perineum, which is one of the most important elements in the production of prolapse of the vagina and uterus, and these incomplete lacerations. In the first case the skin resists and there is no external cicatrix, while in the second the opposite is true; but there is one factor common to both; the tone of the deep muscular plane has been strained, the fibrous framework of the parts has been irremediably overdistended, and the static condition of the uterus has been similarly modified. Relaxation of the perineum may thus be considered as an actual subcutaneous laceration. By seizing the recto-vaginal septum between finger and thumb introduced into the rectum and the vagina, it is evident that the fleshy pyramid which separates these canals has diminished in size and consistence. This coincides with the wide shape of the intact fourchette, the gaping vulva, more marked when the patient is placed in the semi-prone

position of Sims, the lessened depth of the anal orifice and the unusual breadth of the perineum, which is enfeebled and lax.

Emmet's Method.—[As the admirable method of this distinguished author has not been clearly described in any of the more recent works on gynæcology, I take the liberty of substituting the following description for that of Professor Pozzi.

To lessen the difficulties in the way of an intelligible description, I will briefly review Emmet's views on the subject of perineal tear. He believes the term "laceration of the perineum" a misnomer and only allowable where the sphincter ani is involved. He denies any supporting function to the perineal body, as it can be clearly demonstrated that the uterus is supported and swung from above, like every other organ in the body, and, with the vagina and rectum, kept in position by the connective tissue and fascia of the pelvis. This fascia is in close connection with the cellular and connective tissue of the pelvis, and is attached alongside the vagina and rectum, so as to prevent undue prolapse of the bowel from the sigmoid curve to the anus. While supporting the vagina, it exerts lateral traction with the effect of preserving the natural curve, and keeping the two sides in close contact.

The grooves or sulci formed by the flattened vaginal sides are the result of the lifting of the posterior wall up to the anterior one, while at the same time the needed degree of lateral traction is exerted by the fascia. If we trace the course of the fascia forming the sulci from the starting-point at the superior strait, and alongside the vagina to the point where that canal pierces the muscular diaphragm at the pelvic outlet, it is seen to be reflected on to these muscles. This fascia binds the whole muscular mass in a common sheath, strengthens it, and, so long as its integrity is preserved, maintains the pelvic circulation in normal equilibrium. When the fascia gives way the vessels lose their support, no longer continue tortuous, become engorged, and give rise to the symptoms well known to accompany cases of neglected laceration.

To understand the mechanism of laceration it is necessary to recall certain points in the arrangement of the perineal muscles. On the outer side of each levator-ani muscle, and extending along its attachment, the transverse perinei are inserted and extend backward and outward to the ischia. Normally their action binds more firmly together the muscular floor of the pelvis; but as soon as the levators are separated in front, the transverse perinei can only draw them more apart, as curtains may be drawn apart below, while united above. In injuries to the pelvic floor, a force comes into play by which the fascia is torn and the levator-ani muscles in front widely separated; this may occur without injury to mucous membrane or skin. Consistent with this belief, the object of Emmet's operation is to catch up the retracted fascia at such a point and manner as to take up its slack throughout the pelvis. By his procedure the posterior vaginal wall is lifted upward and forward in contact with the vesico-vaginal septum, the everted

tissues at the vaginal outlet are rolled in and the separated levator muscles brought together so that the woman becomes apparently perfectly normal.

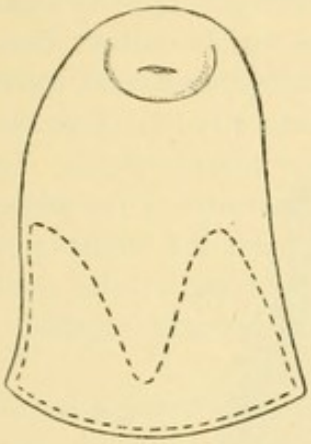


FIG. 526.—COLPO-PERINEORRHAPHY BY EMMET'S METHOD. Posterior wall of vagina showing area of denudation.

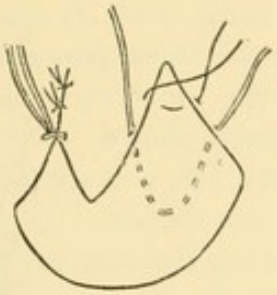


FIG. 527.—DEEP AND SUPERFICIAL LATERAL SUTURES IN PLACE AND TIED ON LEFT SIDE.

The first step in the operation is to determine, as closely as may be, the degree of retraction of the fascia along the sulcus on either side of the

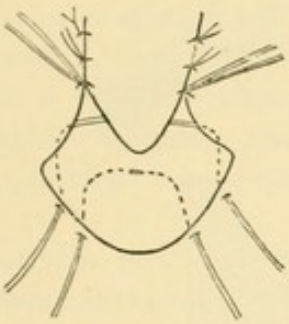


FIG. 528.—LATERAL SUTURES TIED, SKIN SUTURES IN PLACE.

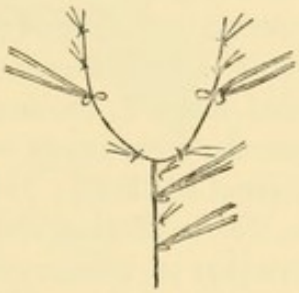


FIG. 529.—ALL THE SUTURES TIED.

vagina. With the patient on her back, the limbs flexed, find a point in the middle of the projecting mass within the vagina, pick it up with the tenacu-



FIG. 530.—EMMET'S SCISSORS.

lum, draw it forward and upward toward the neck of the bladder, and two folds will be seen leading up to a point within the sulcus on each side. These points indicate the limit of retraction, and show clearly that the portion of the vagina above is still properly supported. This triangular-shaped

tongue or portion of rectocele drawn forward by the tenaculum forms, after the operation, the posterior wall of the vagina; and all the mucous surface below it is to be denuded. The tenaculum holding it is to be replaced by a stout thread to form a landmark and be held by an assistant. Then a tenaculum is hooked into the caruncle on either side, and lateral traction made by assistants. A gutter-shaped, triangular surface is thus formed on either side of the canal, with its apex running into the lateral sulcus. Then drawing down with a third tenaculum hooked into the centre of the posterior vaginal wall at the muco-cutaneous junction, you have the whole surface to be denuded clearly shown. By approximating the crest of the rectocele and the two caruncles, you see how the parts will be brought together when the sutures are introduced.

In inserting the sutures, begin at the apex of the triangle in each sulcus, and put them in about a quarter of an inch apart until the loop in the centre of the rectocele is nearly reached. Then a suture is inserted just behind the caruncle on the right side, dipped into the denudation in the rectocele, and brought out at a corresponding point on the left. This "crown suture" draws the crest of the rectocele near the caruncles, closes the sides of the vaginal outlet, and brings together the levator-ani muscles. Three or four other sutures are passed in a similar direction below this, as in an ordinary perineum operation. Emmet prefers sutures of silver wire. They are tied in the order of their insertion. The line of union when all is complete is like a rounded letter **Y**, the branches of which are completely hidden in the vagina, while the stem bends over at a little more than a right angle, on the external perineal surface.]

Lawson Tait's Method for Incomplete Ruptures.—The description here given follows that of Sänger, who has made some unimportant modifications in it; the method is also applicable to simple relaxation of the perineum, although open to the objection that it then leaves a pouch behind the reconstituted perineum.

Sänger advises that the rectum be first tamponed with cotton, sponge, or iodoform gauze covered with vaselin and furnished with a thread; in this way the posterior vaginal wall is pushed forward. Two fingers are also placed in the rectum while an assistant stretches the operative field as much as possible, by drawing the sides of the vulva toward the ischial tuberosities; thus the posterior vaginal wall is displayed to a very large extent. To form the flap, Tait uses pointed scissors, elbowed like those of Roux. One point is inserted from before backward in the median line of the posterior commissure of the vulva at the muco-cutaneous junction, and the recto-vaginal septum split to the depth of about a half or three-quarters of an inch, first on the left side and then on the right. At the ends of the transverse incision thus formed, two vertical cuts are made up to the point where he wishes the posterior commissure to be; the three incisions roughly have the form of a quadrilateral which lacks its upper side [or better a semicircle following

the muco-cutaneous junction]. The horizontal side is from 2 to 3 cm., and the two vertical sides from 3 to 5 cm. When the flap is sharply drawn upward by tenacula and the edges of the wound well separated, such bands as still need to be divided in order to give a smooth and sufficiently large wound are readily seen and cut. The vivified surface then has the form of

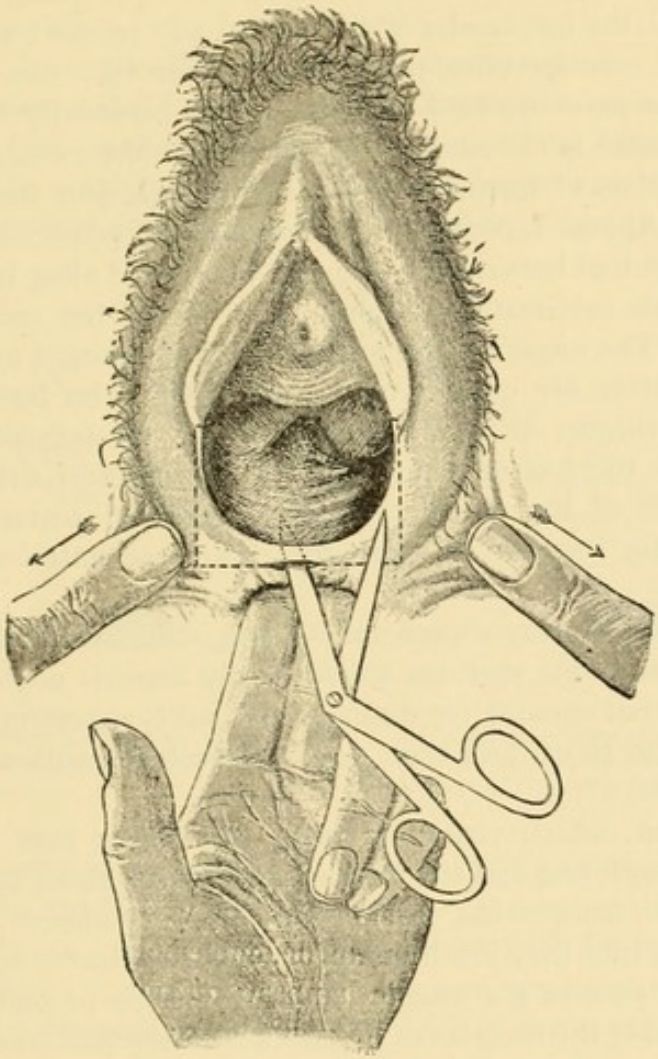


FIG. 531.—INCOMPLETE RUPTURE OF THE PERINEUM; PERINEORRHAPHY. Tait's method.

a quadrilateral with obtuse angles; surrounded on three sides by the skin, it gives insertion by its fourth to the mucous cap resulting from the splitting of the recto-perineo-vaginal septum. That the flap may not be too thin, the septum must be split exactly in the middle, which is facilitated by the control of the fingers placed in the rectum. On the borders the incision is carried deeply into the cellular tissue of the perineum and the labium majus. The denudation may be completed in about half a minute; and if the surface so obtained is not smooth but covered by small irregularities, these may be removed by the scissors.

The bleeding is ordinarily quite free but is venous; when small arteries

are cut, they merely require forceps and torsion. Sänger never employs ligatures. Occasionally he has tied the bleeding points with fine catgut when torsion and forcipressure were not sufficient; but the apposition of the lips of the wound is sufficient usually to assure control of the hemorrhage.

The sutures are passed under the control of the index and middle fingers of the left hand placed in the rectum; the point of a Peaslee's needle enters the tissues within the left border of the wound, and passes transversely across to emerge at the corresponding point on the other side, the skin not being included at either point by Lawson Tait, though personally I do not exclude this; a silver suture is introduced into the eye of the needle, which is then withdrawn in the usual manner. Four are enough, and they should penetrate the recto-vaginal septum a little beyond the point where it has been divided; they are tied between the flaps of the wound after it has been carefully washed with sublimate solution (1 : 1,000) and the rectal tampon has been removed. The edges of the wound are then brought together; but as the sutures of silver are obliged to emerge through the line of union, it is not exactly rectilinear, although between them the apposition is perfect. Toward the anus there often remains a fold which corresponds to the lower transverse border of the denudation on the vaginal surface, the layer of mucous membrane forming an open fold or crease anteriorly, or a small rosette.

Tait does not use any superficial sutures. Sänger thinks it better to employ them; for if one operates antiseptically there is no need, he says, of keeping the external opening for drainage, as Tait is accustomed to do. The silver wires are cut short, and their ends are fastened with a shot, which is crushed over them.

[Silkworm gut, which possesses many advantages over silver wire, is now commonly employed, and the sutures are entered about one-eighth of an inch from the skin margin, but otherwise as described above. They are tied in the same order that they are inserted, from the sphincter upward. A few superficial catgut sutures are usually needed to insure perfect coaptation of the skin edges and of the remains of the flap at the new posterior commissure.]

The dressing consists of insufflation of iodoform and iodoform gauze which envelops the silver sutures. During the first three days the catheter must be used; on the seventh the superficial sutures are removed, and on the fourteenth the deep series; then the patient may leave her bed. [See also after-treatment of complete laceration, many details of which are applicable here.]

Martin has modified the suture in a way which I consider very advantageous. Instead of silver at separate points, he employs juniper catgut, and a continuous suture on superposed planes; the operation is thus very rapid and the coaptation perfect.

Complete Ruptures of the Perineum.—The triangular denudation of Simon has been adopted and perfected by Hegar. He starts with the principle

that, if the perineum has been torn from three surfaces, the suture should be made in three directions, taking in successively the vagina, the rectum, and the skin. Hegar makes a denudation which has the shape of a butterfly with extended wings, its body corresponding to the recto-vaginal septum. He does not split the septum, but merely excises the cicatricial tissue and the mucous membrane to obtain a sufficient wound surface for the purpose of perfect coaptation.

The following are the different steps of the operation:

Method of Simon-Tegar: First Step.—Denudation.—To expose the field of operation in the most complete way, an assistant lifts up the anterior vaginal wall with a large retractor, while the surgeon seizes the posterior wall with the toothed forceps above the point *x* (Fig. 532). Hegar intro-

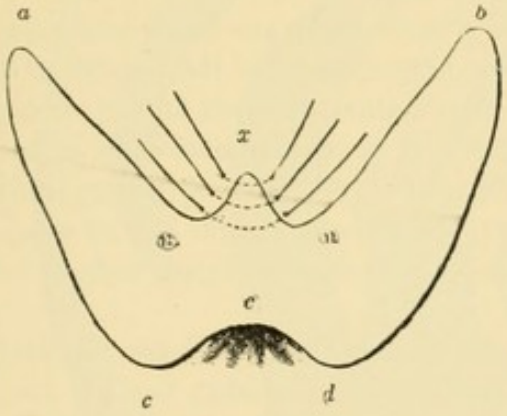


FIG. 532.—COMPLETE LACERATION OF THE PERINEUM; PERINEORRHAPHY. Simon-Hegar method; denudation.

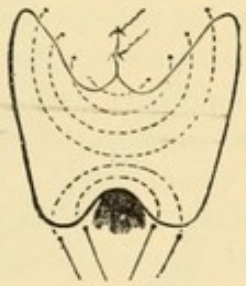


FIG. 533.—COMPLETE LACERATION OF THE PERINEUM; PERINEORRHAPHY. Simon-Hegar method; vaginal and rectal sutures.

duces into the rectum, especially if there is prolapse of the rectal wall, a sponge soaked in chlorine water and secured by a string, to prevent soiling the skin with fæces. The skin is then seized with forceps at the points which correspond to the extremities of the new perineum; that is to say, anteriorly on the internal surface of the labium majus at *a* and *b*, and behind near the border of the anus at the points *c* and *d*; these points are stretched apart, and the dissection begun in the triangle *n x n*. The point *x* is situated in the middle line of the posterior vaginal wall, and at a distance of 2 cm. above the point *e*, which represents the extremity of the triangle vivified on the rectal surface. By the excision of the small mucous triangle with its apex directed toward the posterior vaginal pouch, the projection of the extremities of the flaps is prevented, which would otherwise take place when the sutures are tightened, and the apposition of the lateral portions of the denuded surface in the median line is much facilitated. Moreover, by this method greater solidity is given to the recto-vaginal septum, for the points *x* and *e* on the vaginal and rectal surfaces represent the highest points of the line of denudation, and are farther removed from each other than they

would be if *x* were at the middle of a straight line between *n* and *n;* and this increased thickness assures the prevention of recto-vaginal fistula.

Starting from the points *n*, *n*, a curved incision is made, convex forward, directed upward and outward, reaching to the points *a*, *b*, which when united form the new fourchette; these points are situated on the internal border of the labium majus at the level of the lower caruncles. From here the incisions *a c* and *b d* are traced, from 3 to 4 cm. in length, which by their union form the raphé of the new perineum; these incisions are directed downward toward the point where the anus will be formed, and from this point the lines *c e* and *d e* are bent inward; they are best made with the scissors. The edges of the flap thus marked out are freed with the bistoury by cutting about 3 mm. with the knife, held flat, and the portion of tissue so circumscribed is then dissected off and the denudation completed.

Along the lateral portions of the wound there are many important veins which are at times injured, and the hemorrhage is then quite free; the bleeding points may be compressed with a small tampon of wet cotton, or if necessary by forceps for a few minutes; it is seldom necessary to tie them. When forcipressure has been employed, the portions of tissue which have been compressed between the jaws of the forceps should be cut away before tying the sutures, the exact apposition of the flaps sufficing to stop the hemorrhage completely.

As Hegar remarks, when the operation is performed for the first time, the fault is usually committed of making the denuded surface too large, which uselessly extends the wound surface and increases the difficulties of exact reunion. The other fault, of denuding the surface to be united in such a way that the points *c*, *d* are situated too far outward, should also be avoided, for then there is great difficulty in bringing the lines *c d* and *e c* exactly together (Fig. 532).

Second Step. Suture.—When the wound has been equalized, we begin by suturing the edges of the triangle *n x n* (Fig. 532). For this purpose Hegar uses curved needles in a needle-holder. The needle enters the mucous membrane 3 mm. from the border of the wound, passes transversely through the whole extent of the denuded surface, and emerges 3 mm. outside of the opposite edge. If the triangle *n x n* is very large, too great a mass of tissue must not be included in the suture, but the needle goes through a portion of the wound, and omits part of its extent in the median line; in this way the apposition of the two sides is better secured.

When the vaginal suture has been completed, a few sutures are taken in the rectum. Here the needle is passed 2 or 3 mm. from the border of the freshened surface from below upward; after traversing a certain extent of the tissue, it is drawn out, seized anew by the needle-holder, and passed through a corresponding point of the opposite surface, and then directed from above down and out toward the skin; the ends of the threads hang in the rectum. Instead of passing the sutures as I have described, a needle may

be used on each end and passed from above downward, and from within outward on either side of the lateral portion of the denuded surface. As it is very difficult to remove metallic sutures from the rectum when they are very short, Hegar consequently employs catgut or fine silk for the rectal sutures and abandons them altogether.

The sutures may be fastened in either of two ways:

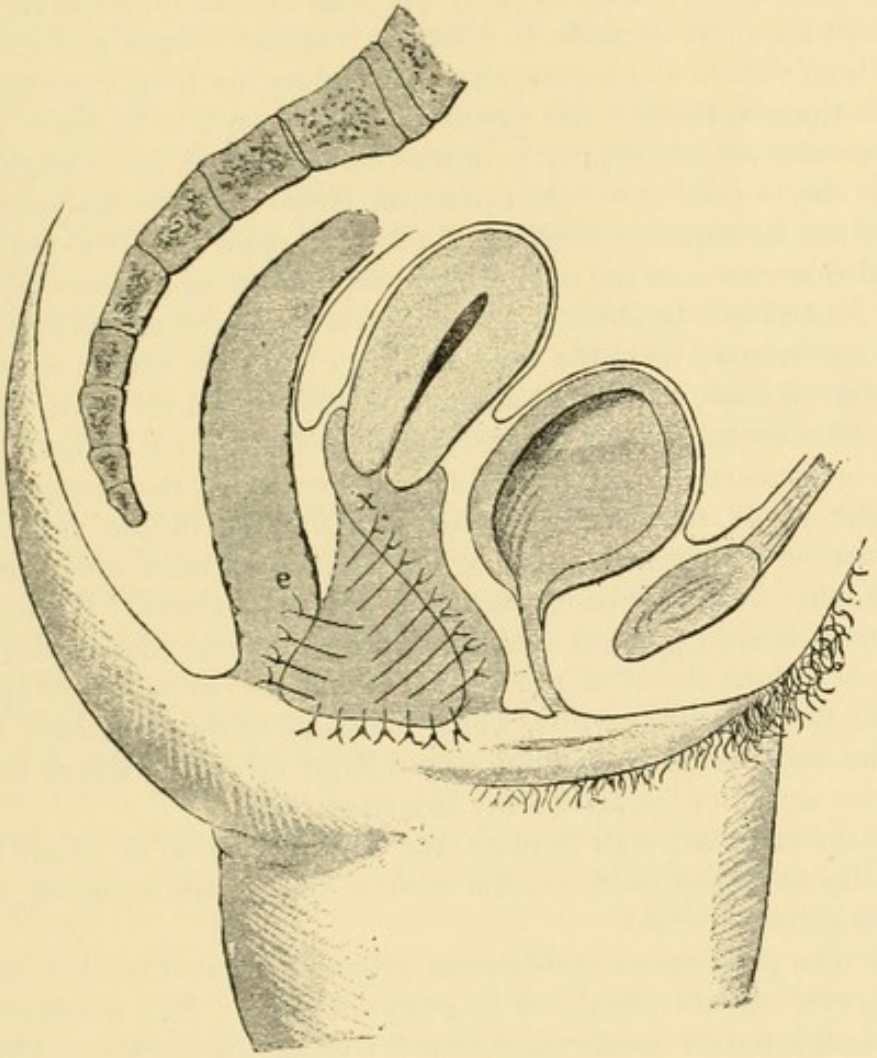


FIG. 534.—COMPLETE LACERATION OF THE PERINEUM; PERINEORRHAPHY. Simon-Hegar method; general disposition of the sutures.

1. All of the threads may be passed and then tied, as Hildebrandt is accustomed to do.

2. Or, as Hegar prefers, the first, which is situated most deeply, may be passed, drawn tight, and tied; then the second and so on, thus continuously equalizing the lips of the wound, and proportionately modifying the position of the sutures and correcting the shape of the denuded portion.

When the rectal and vaginal sutures are all in place and fastened, the perineal series is to be introduced (Fig. 534). Here the ordinary rules are followed. During the process of securing the sutures, the thighs of the

patient should be brought together to diminish the tension; it is advantageous to place the patient in the dorso-sacral position for this step of the operation.

The disposal of the deep and the superficial sutures varies. Dieffenbach employs deep sutures only on the perineum; Simon attaches great importance to sutures of both the vagina and the rectum. More recently Simon regards it as of great benefit to apply the deep sutures from the rectum, and those which are more superficial from the vagina. Hegar prefers deep sutures on both rectum and vagina, although he does not limit their application wholly to these surfaces; the capital point, he says, is to leave no space where the walls are not exactly in apposition and where fluids might collect.

When the laceration is very extensive, Hegar modifies his usual procedure. If the laceration reaches up the rectum more than four centimetres, the denuded surfaces on the recto-vaginal septum are so narrow that a single series of sutures will be sufficient, which embrace the whole thickness of the partition and are tied upon the vaginal surface; if two series be employed, they may not include a sufficient amount of tissue. On the other hand, with a single series we might fear that the apposition would not be quite regular; but this inconvenience may be avoided by alternating the deeper set which include the whole septum with others which take in the vagina alone. Lower down on the perineum, where the vivified surfaces are more extensive, a double suture may be employed, as described above. If the solution of continuity is very great, a terrace suture on several planes may be employed. A certain extent of the surface is denuded and a suture applied at this point; then another portion, which is treated in the same way; by operating thus, we avoid free bleeding, and a large extent of wound is not exposed to the action of the air for any length of time.

When the sutures are all in place, the little collection of blood between the flaps should be squeezed out, and rectum, vagina, and perineum well irrigated with antiseptic fluid.

Hegar then performs a subcutaneous or open section of the anal sphincter by making two lateral incisions in its posterior edge. This procedure sometimes gives rise to free hemorrhage, but it is easily controlled by ligature or forcipressure. According to Hegar, the section of the sphincter is an advantage, in that it permits the free issue of fæces and gas during the first few days, which if allowed to accumulate would distend the walls of the canal and thus interfere with proper union; it also prevents all dragging upon the rectal suture. Baker Brown also cut the sphincter, but his incision was made posteriorly toward the coccyx. Hegar has returned in recent years to the lateral liberating incisions of Dieffenbach, which he had formerly employed; these are incisions parallel to the line of union of the denuded flaps, extending to the cellulo-fatty subcutaneous tissue. But the tension is not very great when the operator has been careful not to make the denuded surface too large; and the presence of two open wounds so close to the line

of suture is not free from danger, for they may be means of entrance for infection.

Freund's Method.—Freund has insisted with much force upon the necessity of making the denudation in such a way that we reproduce the state in which the perineum is found immediately after the tear. If the flaps are made in the usual manner, the suture includes with great traction parts which normally are never in apposition. Freund, therefore, dissects out a surface whose form is wholly subordinated to that of the solution of continuity.

Hildebrandt's Method.—In this procedure the denuded area has the form of a trefoil, and the sutures are fastened on the cutaneous surface except for a small part of the wound. The vaginal sutures are first passed, then the rectal, then the deep sutures which are tied on the perineum; thus he avoids the production of a space between the rectal, vaginal, and perineal wall, which may serve for the accumulation of blood and the formation of abscess.

Heppner's Method of Suture.—Heppner has had the same object in view in proposing a suture of the shape of the figure "8," which is intended to assure at the same time complete apposition on both the vaginal and perineal surfaces.

Lauenstein's Method of Suture.—This procedure has for its object the prevention of infection of the sutures from the rectal and vaginal secretions. Lauenstein introduces the sutures about one-half centimetre from the borders of the wound and within the bleeding surface, making buried sutures of catgut at separate points, according to Werth's plan. When the rectal and vaginal mucous membranes are sufficiently coapted, he diminishes the depth of the wound posteriorly by a few more hidden sutures, and then completes the perineum with silver wire (Figs. 535 and 536).

Martin's Method of Suture.—Martin denudes the part in the same manner as Simon, but employs a method of suture which is very rapid and completely prevents the imperfect apposition for which Hildebrandt and Heppner have invented their ingenious but complicated procedures. He makes a continuous catgut suture, starting as for colporrhaphy at the superior angle of the wound, closing the rectum first by a few points which start from the intestinal mucous membrane, penetrate the bleeding surface, and come out again in the rectum. When the intestinal suture is complete up to the anus, with the same thread, but in a contrary direction, a first plane of suture is placed in the wound itself, going up to the superior angle in the vagina, from which the suture first started. If this one plane is sufficient, the lips of the vaginal wound are united, and then the perineum; but if the bleeding surface is of great extent, a second plane of suture is employed before uniting the edges (Fig. 537).

Le Fort's method resembles Demarquay's, from which it was derived, although with a number of ingenious modifications.

It is applicable to complete lacerations which involve the entire length

of the recto-vaginal septum. After separation of the sides of the vulva, an incision is made in the central intact portion of the septum at the point *C* (Fig. 538, 1), one centimetre in length, and including only the vaginal aspect

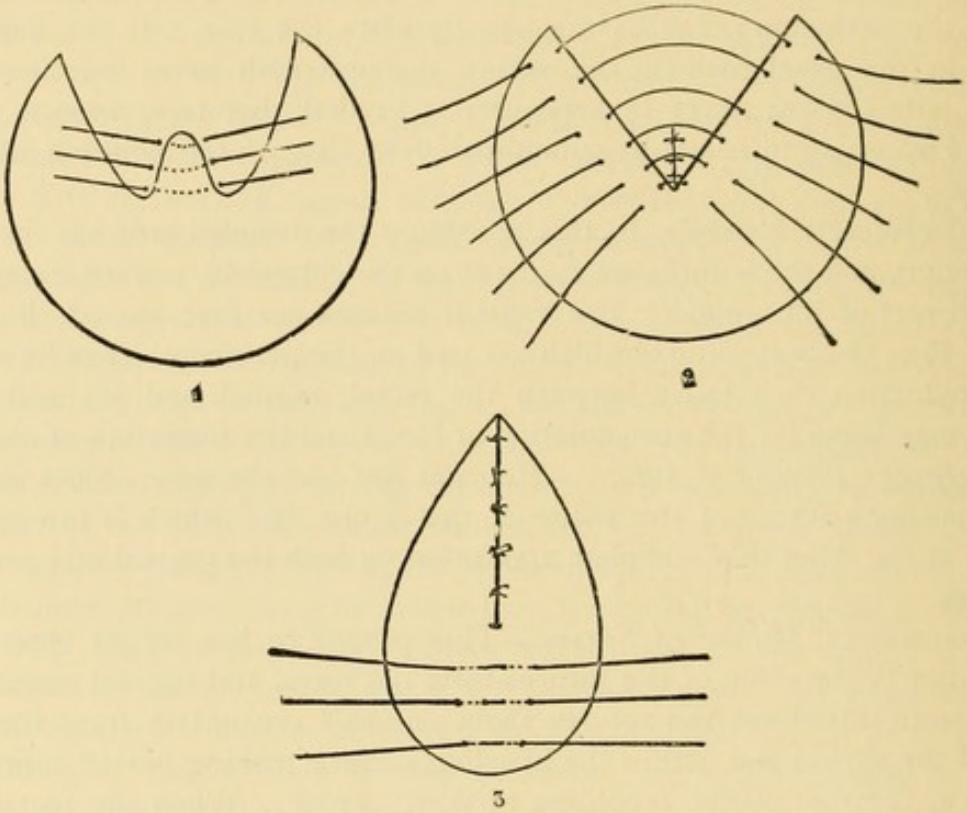


Fig. 535.—Incomplete Laceration of the Perineum; Lauenstein's Suture. 1, Suture of the anterior angle by the usual method; 2, submucous suture of the vaginal wall; 3, buried sutures in the depth of the wound

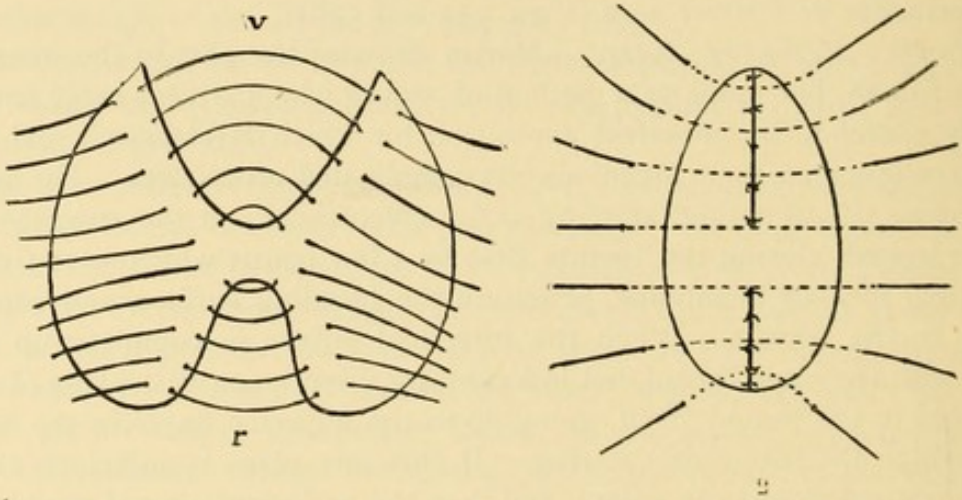


Fig. 536.—Incomplete Laceration of the Perineum; Lauenstein's Suture. 1, Introduction of the sutures which coapt the vaginal and rectal mucous membranes; 2, introduction of the perineal sutures after the vaginal and rectal have been fastened.

of the septum; then a slightly convex incision is made from *C*, following the lines *C*, *D*, *E*, and rising to the point *E*; from the same point *C* another incision *C G* is carried along the rectal portion of the remains of the septum,

but without involving the rectal mucous membrane, to the sides of the anus. These two incisions are separated by an acute angle; their extremities are united by a third curved incision *E I G*, which with them describes the triangle *H*, over which area the skin and cicatricial tissue are removed, so that there is a freshened triangle on each side. At this point of the operation the vaginal part of the septum is seized at the edge of the incision *C D E* with toothed forceps, and split as far as the dotted line *C E*, which liberates the vaginal layer *D*, destined to be united by its deep and bleeding surface to the similar layer from the other side. This union is made in three planes

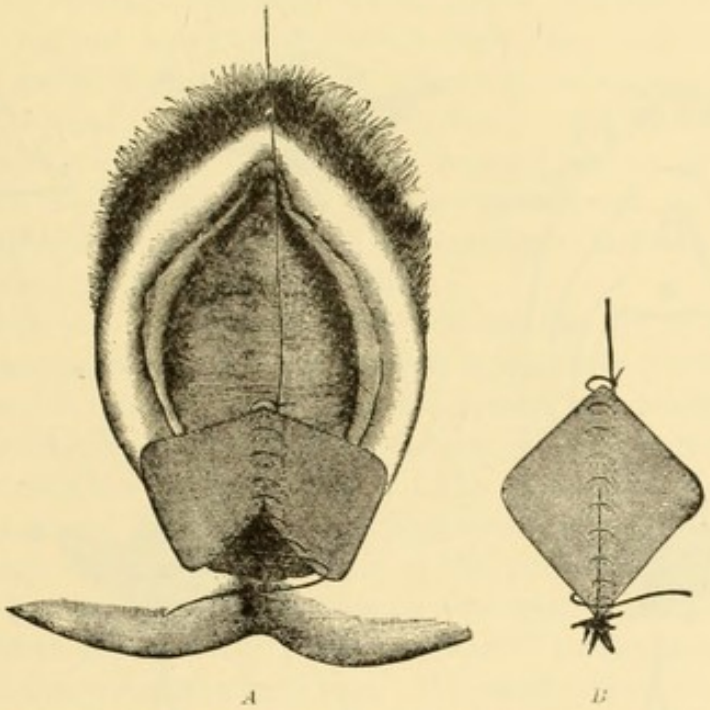


FIG. 537.—COMPLETE LACERATION OF THE PERINEUM; PERINEORRHAPHY. Martin's method. *a*, Deep plane of continuous suture; *b*, passage from the deep to the superficial.

as regards the septum: a rectal plane, formed by the suture of the two rectal edges; a vaginal plane, consisting of the two small flaps *D;* and a large intermediate plane formed by the junction of the two denuded triangles *H*.

To repair the rectal portion, a series of interrupted sutures is placed along the lines *C, G*, beginning at the flap *C;* the needle is introduced on the left border and passed from the rectum toward the vagina, then in the right flap (Fig. 538, 2) from the vagina toward the rectum. When the first suture has been drawn tight, a second is placed in the same manner, then a third and a fourth, until the anterior wall of the rectum is wholly reconstructed down to the anus, although the separation from the vagina is by a very thin partition. Next the intermediate portion of the septum is formed by adjusting the triangles *H;* the first thread is introduced outside of the line *C E* (Fig. 538, 3), at the point where the small triangle is inserted. The needle passes from above downward and from right to left in the thick-

ness of the tissues, turns at the median line, ascends at the same depth in the substance of the opposite side of the wound, to emerge at one-half centimetre from the line *C E;* three or four such threads are passed in the same manner through the part which is to be the deepest portion of the septum. During this entire step of the operation the finger is kept in the rectum to serve as a guide and prevent the sutures from entering the cavity of the rectum; the sutures are placed, but not tightened until those for the perineum and the sphincter are in position; these are three or four in number accord-

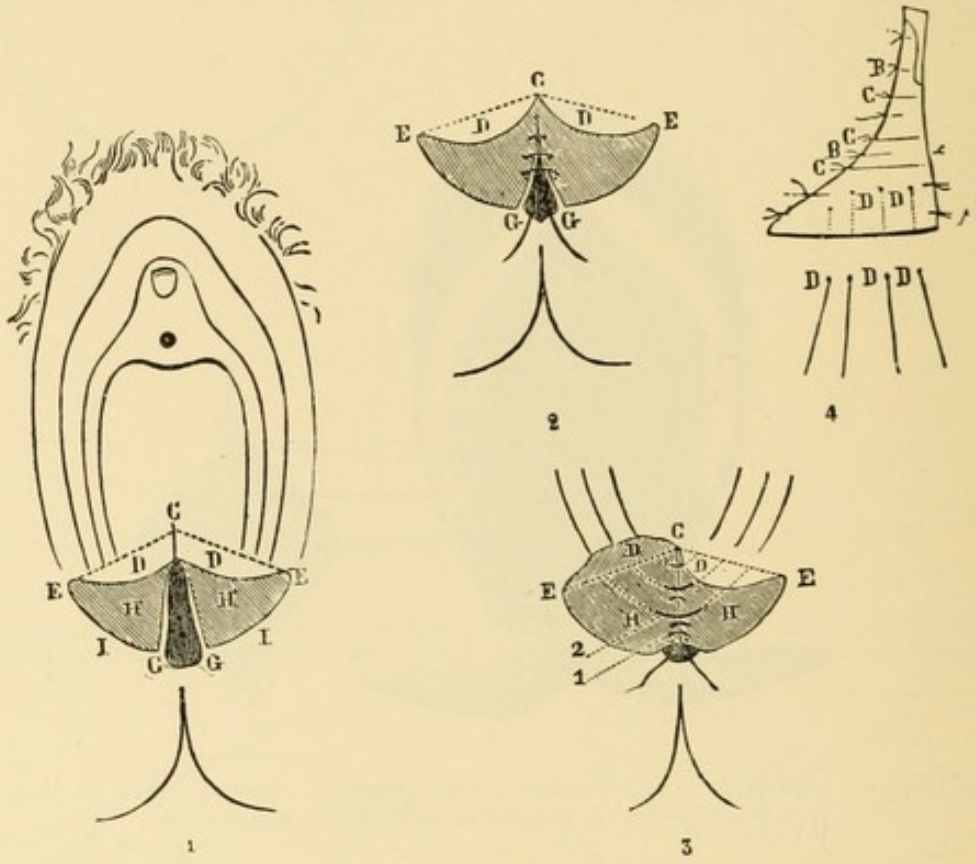


Fig. 538.—Complete Laceration of the Perineum. Le Fort's method. 1, Lines of incision; 2, repair of the rectal wall, line of the sutures; 3, repair of the vaginal septum; 4, vertical section showing the disposition of the sutures.

ing to the dimensions of the perineum. For the perineal series the needle enters at one and one-half centimetres from the perineal border of the denuded triangle *H* (Fig. 538, 3) penetrating to the depth of 1 cm.; the first suture being introduced near the point *E*, the second at *G*, and if necessary a third between the preceding. The ends of the three are united on either side by a quilled suture formed with a piece of rubber tube pierced with holes. The action of these sutures is exerted upon the deeper portions of the denuded surface and tends to bring the recto-vaginal septum toward the surface of the perineum. Before applying the rubbers and tying the sutures, the vaginal sutures are drawn tight, and in proportion as this is done a few superficial stitches are taken in the small vaginal flaps *D, D;* when the su-

tures are complete, Le Fort makes Dieffenbach's incisions if there is much tension.

Richet's Method.—This procedure is derived, like the preceding, from Demarquay's, but it presents many points which are original. It has been well described by Picqué, from whom I take my description.

In the first step a curved incision is made a little distance from the free border of the recto-vaginal defect, circumscribing it, and permitting the division of the vaginal wall from the rectal portion of the septum. This incision is prolonged upward on each side at the muco-cutaneous border as far as the cicatricial surface caused by the laceration extends, which is then denuded in the form of a butterfly. When the incision and the denudation have been performed, Richet splits the septum in such a way that the area of surface thus exposed increases in proportion to its vicinity to the perineum, but even at its broadest portion the denuded surface does not exceed 8 to 10 mm. In this condition when the two portions of the divided perineal body are finally united, the flaps of the horizontal laceration are pressed together and form a projecting median fold.

In the second step the borders of the vaginal flap are brought together by their bleeding surfaces and secured with a few sutures whose ends are laid over the mons veneris. The posterior sutures are placed first. The anterior sutures should not be completed before the perineum is united, except where the defect is of small extent. The apposition of the flaps by their bleeding surfaces produces a projecting median fold.

The third step includes the formation of the perineal body by the union of the lateral denuded surfaces by three or four quill sutures deeply placed to secure as perfect apposition as possible. Richet thinks that this method of suture makes the coaptation very sure. To avoid ulceration at the insertion of the sutures, he ties them over bits of rubber tube with compresses of carbolic or iodoform gauze beneath, which keep them from the skin, each suture being independent of the others. When the rectal and vaginal sutures are complete, he adds, if necessary, a few superficial stitches on the perineum. This method requires, therefore, two lines of sutures, perpendicular to each other; Richet employs no suture in the rectum.

Emmet's Method.—This method has been made known in France by Judes Hue's writings, who followed Gaillard Thomas in his description, and clearly brought out the original points of the method, by which he had obtained many successes. The exposition of the subject and the figure which he gave do not, however, seem to correspond exactly to the original operation of the author, especially as regards the anterior portion of the denudation and the suture. It is not absolutely necessary, as he repeatedly says, to have a long curved needle mounted on a handle. Emmet uses an ordinary needle, which he inserts in the upper part of the denuded area and reintroduces, after passing it a certain distance, through the same point from which it emerged. With these reservations, the following is borrowed from

Kirmisson, and the figures from an article by Hanks, a colleague of Emmet.

The patient is anæsthetized and placed in the lithotomy position, two assistants supporting the lower limbs on either side. The operator first carefully cleanses the anal, vaginal, and perineal regions with antiseptic fluid, and then proceeds with the denudation as in the other methods. On each side of the lacerated perineum a denuded triangle is formed whose base is the skin, from the anus to the lower caruncle, the apex being just above the upper limit of the rectal tear. These two triangles are united in the

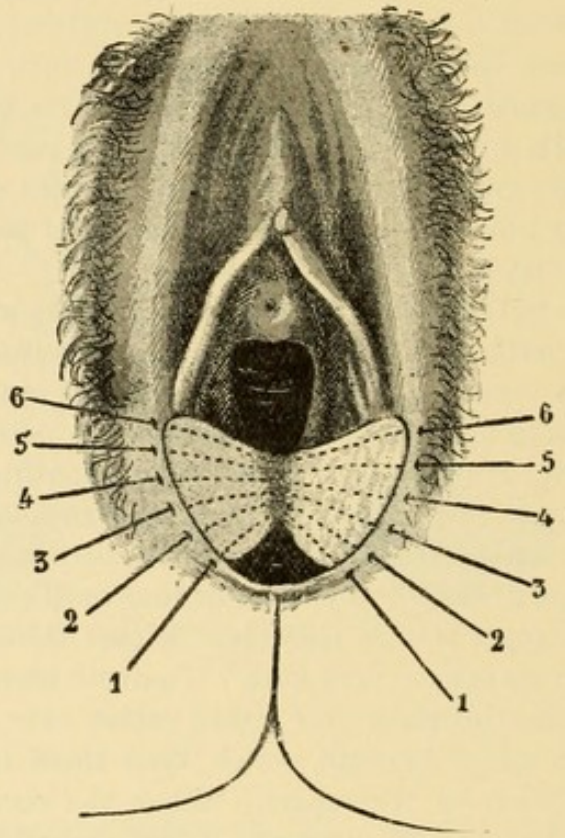


FIG. 539.—COMPLETE RUPTURE OF THE PERINEUM; PERINEORRHAPHY. Emmet's method; the freshened surface and the sutures in place (after Hanks).

median line above the tear in the septum for about three centimetres. The resulting figure has the form of a butterfly with extended wings, the central portion of the denuded area representing the body of the insect, and the lateral portions the wings (Fig. 539).

The limits of the vivified surface should first be traced with the bistoury to assure their symmetry, for it is necessary that they should correspond in every point. A very important precaution is to begin the dissection below at the median line, for otherwise one is incommoded by the blood flowing from the upper and lateral parts of the denudation. The finger of the assistant, in the rectum, stretches the septum and makes it project forward, rendering the vivification of the median part more easy; during the dissec-

tion on the lateral portions it is equally necessary to have the assistant draw the part under the knife tense by gentle traction outward. When the required surface has been prepared, the field of operation should be cleared of blood and all oozing stopped by the application of a cold antiseptic solution (weak boric or carbolic acid or bichloride). Then the suture is begun, which is the special point in Emmet's method. The sutures are placed with a needle mounted on a handle and strongly curved, or with a large Hagedorn needle, and medium-sized silver wire is used; they are passed from behind

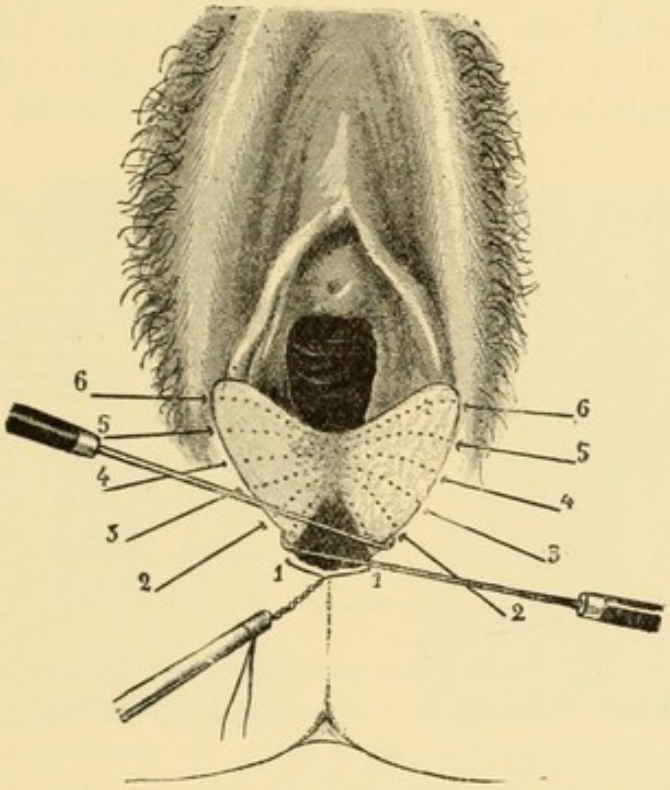


FIG. 540.—COMPLETE LACERATION OF THE PERINEUM; PERINEORRHAPHY. Emmet's method; tightening the posterior suture, which includes the sphincter (after Hanks).

forward. On the left side of the perineum the operator inserts the point of the needle held in the right hand, about one centimetre external and posterior to the posterior margin of the anus. It then traverses the lower part of the recto-vaginal septum, to emerge on the right side of the anus at a point exactly opposite its insertion. If the tissues are very thick, it is better to pass the needle in two motions, penetrating first to the septum, withdrawing it and reintroducing it so that it exactly reaches its point of exit. During the whole of this step the introduction of the finger into the rectum is absolutely indispensable; it stretches the septum, guides the needle, and prevents its issue in the cavity of the rectum. This manœuvre of passing the sutures demands great attention on the part of the operator, and should be performed with a certain gentleness, in order that the needle may not enter the rectum or lose itself in the tissues, and emerge at a point which is not symmetrical

with its insertion. Four or five sutures are placed in this manner. Introduced one centimetre from the line of denudation, they pass parallel across the septum at the distance of about one-half centimetre from each other, and appear on the opposite side of the perineum.

It is of great importance to pass the first suture in an exact manner, as it unites the severed ends of the sphincter and restores the anus as nearly as possible to its former condition. It should penetrate the bleeding surface very near its posterior border, and pass deeply in the angle of division of the septum, where it is to secure its supporting point. Generally five or six deep sutures are all that are necessary. If the region of the fourchette is not accurately adjusted, a superficial suture at this point will be necessary. The same is true if the skin flaps of the perineal incision are not brought

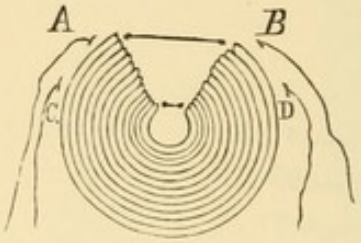


FIG. 541.—DIAGRAM OF THE SUTURE OF THE SPHINCTER BY EMMET'S METHOD.

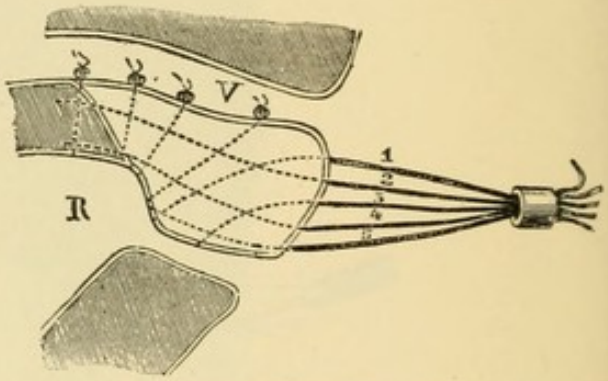


FIG. 542.—COMPLETE LACERATION OF THE PERINEUM AND THE RECTO-VAGINAL SEPTUM; PERINEORRHAPHY. Emmet's method. (Vertical section showing the plan of the sutures.)

into perfect apposition, when a few complementary sutures will be required superficially. The operation is terminated by a careful cleansing of the parts with an antiseptic solution, after which the dressing is applied.

As is evident from the preceding description Emmet's procedure for complete rupture is a method of a single series of sutures, except in unusual cases. Here there is no rectal suture and no vaginal; all the stitches are passed on a single plane, from the skin through the recto-vaginal septum or the vaginal wall, thus producing a great simplification of the operation. But that is not the principal object. What was proposed, according to Emmet and Thomas, was to pass the lower suture in such a way that the extremities of the retracted sphincter would be drawn forward and the muscular ring restored to its normal form and function. However that may be, the application of this posterior suture demands careful attention. When the operation has been finished, the surgeon should pass his finger into the rectum to assure himself that this suture has not contracted the calibre of the rectum, for in that case there would not be an easy exit for the gas and fæces.

A great advantage of this method is that, by closing the defect in the recto-vaginal wall by a constricting suture, the solution of continuity is obliterated as one shuts a purse by drawing its strings; and as the septum is

brought lower, the isolated suture of the vagina may be dispensed with. Thus is realized the exact occlusion of the vaginal wound and the protection of the line of union which Langenbeck endeavored to obtain by his autoplastic flap, and the absence of the rectal suture diminishes the risk of infection.

If a very high division of the septum renders its suture necessary, Emmet freshens only the vaginal surface of this laceration, and passes his sutures under the bleeding area in its whole extent, avoiding the intestinal canal, fastening them by leaden shot in the interior of the vagina (Fig. 542). But this suplementary operation is seldom necessary, and the type of the method remains that of the single perineal suture.

Lawson Tait's Method.—This procedure differs but little from that ap-

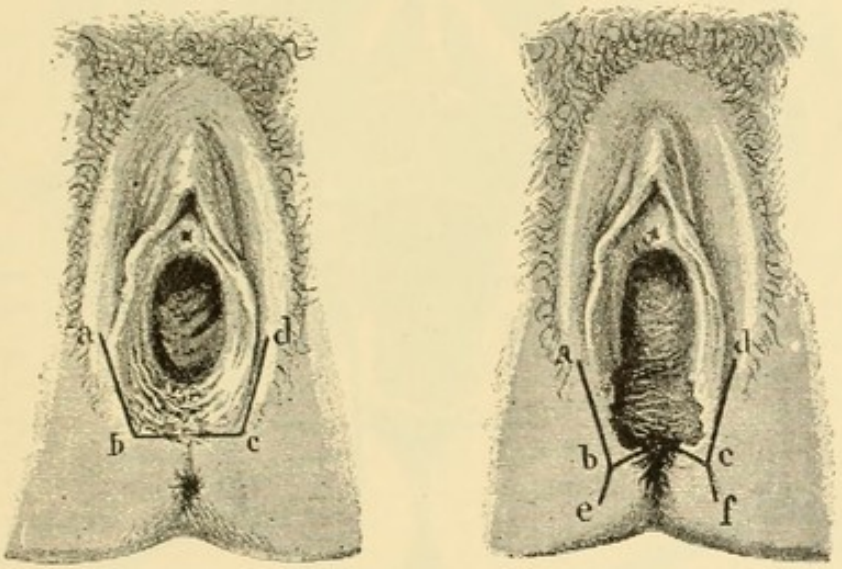


FIG. 543.—LACERATION OF THE PERINEUM; PERINEORRHAPHY. Lawson Tait's method. *a b c d*, Line of incision for incomplete laceration; *a b c d e f*, line of incision for complete laceration.

plied to partial lacerations. The surgeon begins by splitting the recto-vaginal septum and thus forming a rectal and a vaginal flap, the extent of this depending on the size of the laceration; according to Sänger, it is best made with the bistoury. Laterally this division of the septum is carried to the vertical lines which unite the labia minora, to the labia majora, which is sufficient in partial laceration; and to these lines a posterior incision may be added which with them produces a figure like the letter **H**, the transverse bar which joins the two sides being nearer to the lower part of the letter (Fig. 543). The division may be begun with the bistoury and completed with the scissors. Then the vaginal flap of the septum is carried upward and the rectal downward, so that the mucous surfaces may be carefully liberated by the scissors between the angles of the lines of section.

The two flaps, vaginal and rectal, when they are separated, form a quadrilateral, at the bottom of which is the intact portion of the septum (see Fig.

545); laterally they are attached to the soft parts by a thick margin, which must be divided, following the **H**-shaped cutaneous incision, to effect the denudation.

Great care should be employed in placing the first suture to see that it traverses the ends of the sphincter, whose situation may be recognized before the denudation by the small dimple on each side of the cicatrix. This suture is made by Tait and Mundé of silkworm gut, but by Sänger of silver, as in partial laceration. All the sutures appear on the perineum and none

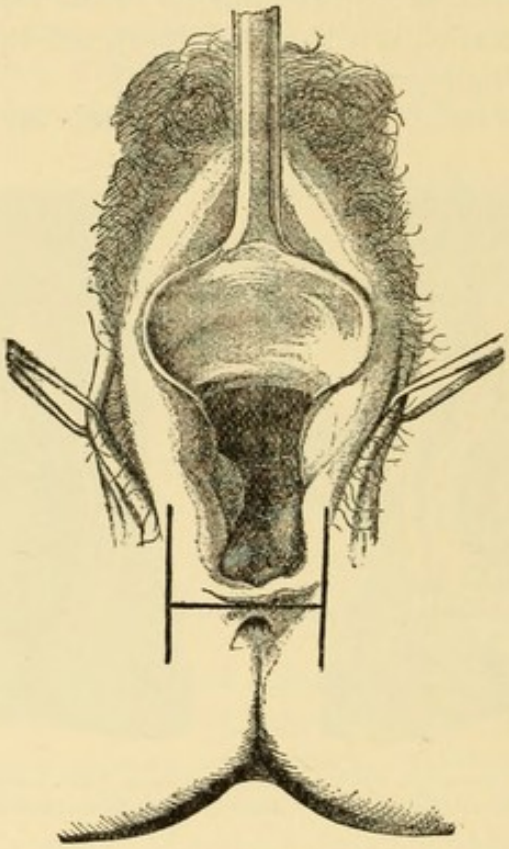


FIG. 544.—INCOMPLETE LACERATION OF THE PERINEUM. Lines of incision in modified Tait's operation (Pozzi).

are tied in the rectum. Tait does not include the skin in the deep series; Mundé advises to do so; Martin employs the continuous catgut suture on superposed planes.

Iodoform in powder is used for the dressing, and the sutures are removed on the seventh and fourteenth days.

Method of Lawson Tait, Modified (Pozzi).—I now use almost entirely, for lacerations of the perineum, whether complete or incomplete, Lawson Tait's method of flap-splitting with extensive modifications both in denudation and in suturing. For incomplete lacerations I make a **U**-shaped or an **H**-shaped incision, the lower parts of the vertical incisions in the latter case being very short, the transverse incision passes through the remains of the perineum, the vertical portions extend forward two or three centimetres from this, and, if the soft parts are very thick, are carried a short distance back-

ward, changing the U-shaped into the H-shaped incision (Fig. 544). Tension upon the skin by forceps applied on each side of the field of operation facilitates this incision. I use straight scissors, one of whose branches is pointed, or, better, scissors bent on the edge. I divide the recto-vaginal septum to a height of two or three centimetres, and on each side I dissect the posterior vaginal and the anterior rectal wall, so as to form a wound about the

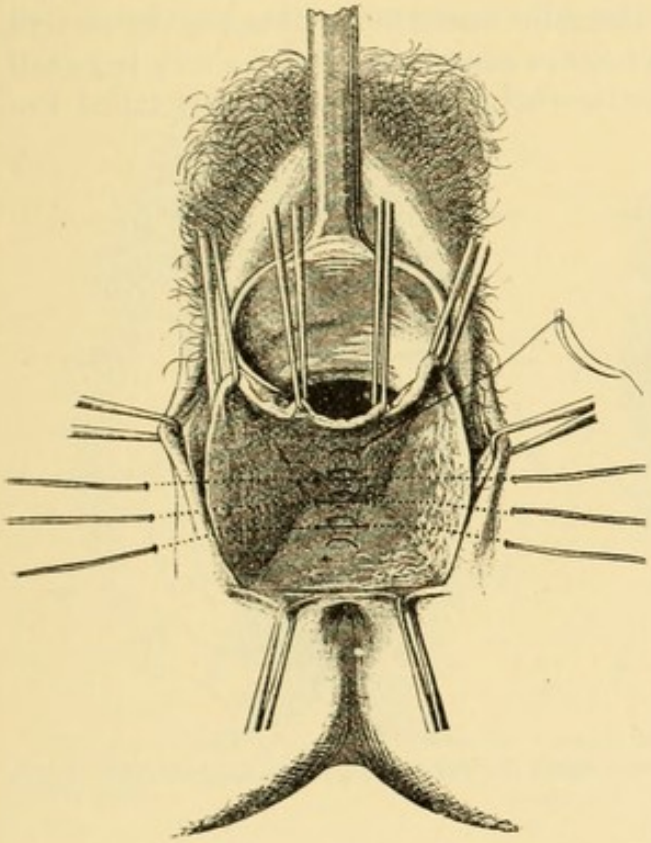


FIG. 545.—MODIFIED TAIT'S OPERATION (Pozzi). Flaps made and deep sutures in place. Buried sutures begun.

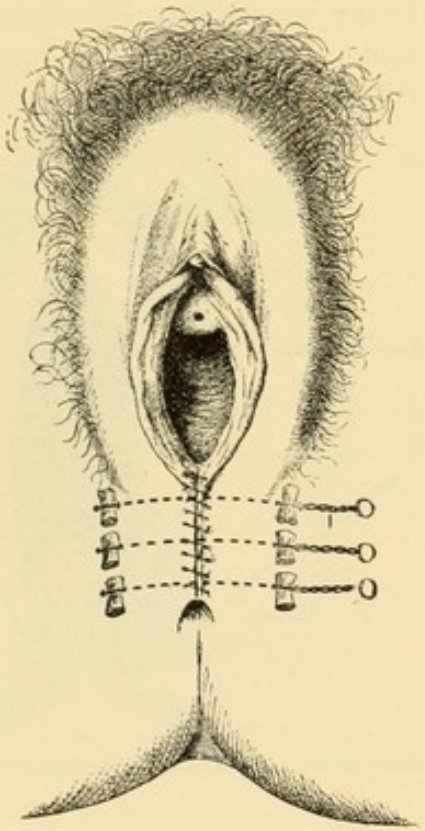


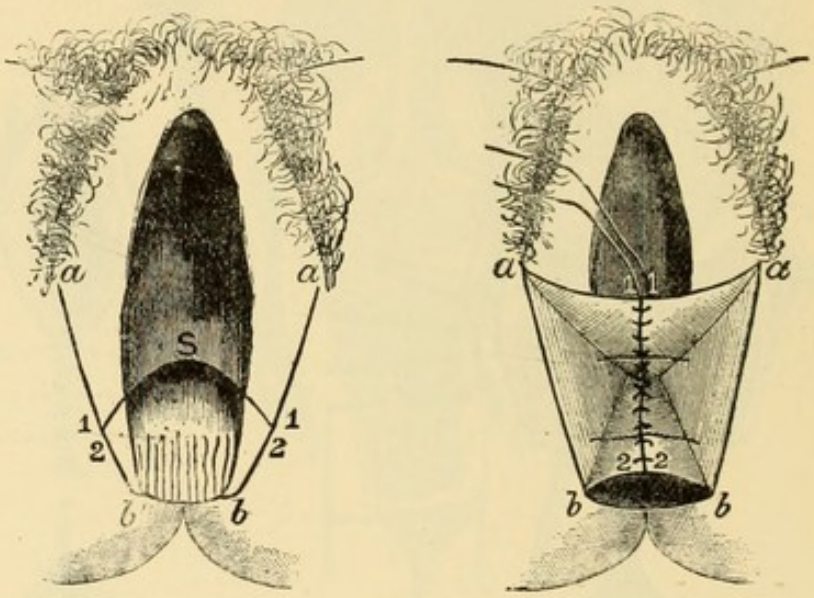
FIG. 546.—MODIFIED TAIT'S OPERATION (Pozzi). Sutures all tied. Dotted lines show the course of the deep silver sutures.

size of the palm of the hand. This often bleeds freely: the arteries are tied with catgut and the venous hemorrhage is checked with tampons, as the subsequent suture will arrest it.

During the whole dissection I am guided by the index finger inserted in the rectum. Without this it would be almost impossible to avoid injuring the intestine, which I liberate very high up if the laceration is complete, so as to be able to draw down the rectal tear so low that all its sutures may be external. By proceeding cautiously and following the anterior surface of the rectum, neither this nor the vagina should be opened. If such an accident should happen, the opening should be closed at once by a buried catgut suture passed according to Lauenstein's method.

This extensive splitting and extreme drawing down of the rectum is one of the points of modification of Lawson Tait's method, and the suture is

another. It is important that the coaptation should be very exact without dead spaces which might allow the accumulation of liquid and interfere with union. I secure this by combining a catgut suture in tiers with deep supporting sutures of silver wire, the latter being the first passed. A loop of silk is employed to draw three loops of silver wire entering and emerging one-half centimetre from the edges of the wound and passing beneath the entire raw surface. Their middle corresponds to the deepest part of the split in the recto-vagina septum, near the point where the rectum and vagina separate. Two or three of these sutures are passed with either a very large half-curved Hagedorn needle or a needle with a handle (erroneously called Em-



FIGS. 547 AND 548.—COMPLETE LACERATION OF THE PERINEUM; PERINEORRHAPHY. Simpson's method; vivification; sutures.

met's needle). The loop of each suture emerges on the right side, and the two free ends of each on the left (Fig. 545). Before tying these sutures the tier suture of catgut is inserted, beginning at the deepest part of the wound (Fig. 546), then the skin is closed by a running catgut suture or separate stitches of silkworm gut. A roll of iodoform gauze is then placed in the loop of each wire suture, and one between the face ends of each, and after exerting a certain amount of traction the sutures are twisted. I crush a piece of lead over the ends of the sutures in order to avoid sharp points (Fig. 546). Great care should be used in passing the deep silver sutures, which must traverse the entire raw area near its surface, without penetrating the vagina or rectum; they must not even enter the muscular coat of the intestine on account of the danger of producing ulceration, which would lead to infection of the whole wound. I employ a dressing of iodoform gauze and of equal parts of powdered iodoform and subnitrate of bismuth. The sutures are not removed until the eighth or tenth day, unless especially indicated.

Simpson's Method.—From the chronological standpoint this procedure should be described before the preceding, which it much anticipated; but as it is less important, I will treat it as an appendix. It resembles Tait's in the manner of denuding the tissues, but differs from it in the sutures; my description is taken from Hart and Barbour.

The first incision starts from the end of the recto-vaginal septum, enters both rectum and vagina, follows the internal face of the labium majus from within outward, and emerges at the point 1; another incision is made

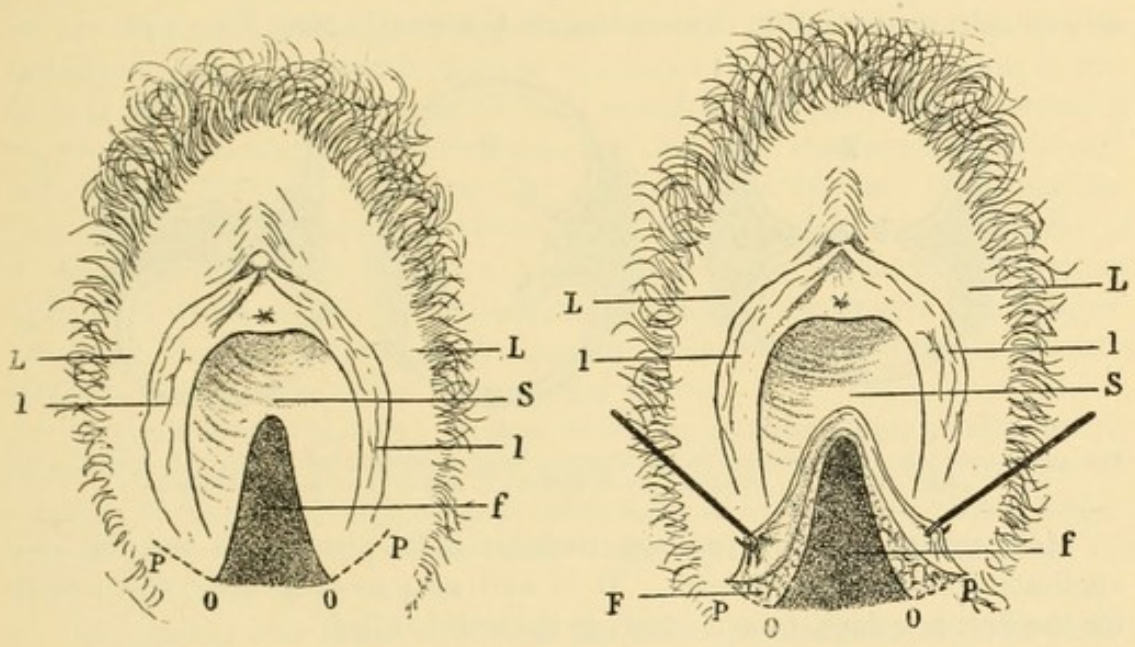


FIG. 549.—LACERATION OF THE RECTO-VAGINAL SEPTUM; METHOD OF SPLITTING (FRITSCH-WALZBERG). *S*, Recto-vaginal septum; *f*, laceration of the same; *L*, labium majus; *l*, labium minus; *P*, perineum; *F*, rectal portion of the septum.

from the point *a*, parallel to the orifice of the vulva, passing by the external extremity of the first incision and stopping at *b*, at the end of the sphincter. This is repeated on the other side. The two triangular flaps thus obtained are dissected (Fig. 548); the flap *aIS* is lifted forward on each side, so that the angles marked *I* in the first figure reunite with each other in the second. The vaginal flaps are sutured with silver or silk, taking care to tie them on the vaginal surface; the ends are left long, and hang out of the vagina. In the rectum it is better to employ catgut and cut the ends short. To close the bleeding cavity which results, two deep perineal sutures are passed, and tied over metal plates. A few superficial stitches complete the operation.

Fritsch's Method.—This procedure still more closely resembles Tait's, and like it is based on the principle of splitting the septum, instead of denuding the tissues, with the object of avoiding the formation of new cicatricial tissue. Fritsch detaches the rectum from the vagina in the partial lacerations, and adds to this a lateral incision for the sphincter when its ends are retracted; he unites these by a provisional stitch, which serves during

the operation to restore the shape of the orifice and permit the regular process of reunion. He then sutures the rectal mucous membrane with separate catgut points placed in the vagina and tied at the bottom of the wound. To avoid infection of the wound, according to Lauenstein's teaching, these sutures should not penetrate the rectum. The same sutures close the vagina without penetrating it. The perineum is then completed by a series of buried sutures on superposed planes, which Fritsch prefers to the continuous catgut suture in terraces.

If the laceration of the septum extend very far upward, it may be necessary to split it and suture it according to Walzberg's plan (Fig. 550).

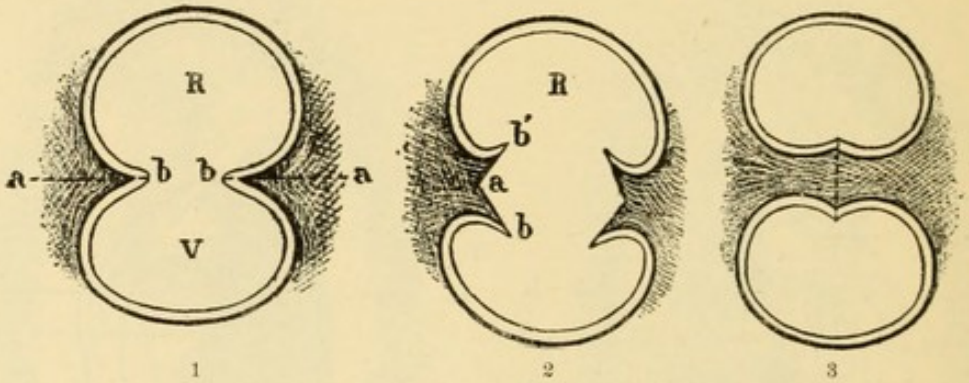


FIG. 550.—LACERATION OF THE RECTO-VAGINAL SEPTUM; METHOD OF SPLITTING (FRITSCH-WALZBERG). Diagram. *R*, Rectum; *V*, vagina; *a b b'*, incision; 1, incision; 2, division; 3, reunion.

After-treatment.—The dressing includes great cleanliness and the local application of iodoform powder. It is well also to catheterize the patient for the first few days, to avoid having the vulva soiled.

A very important question is whether the patient shall be kept constipated during the first few days. It is certain that the contact of fecal matters will infect the wound, especially if the sutures traverse the mucous membrane; but, on the other hand, the passage of hardened masses is apt to tear the uniting surfaces apart. Constipation not only presents a mechanical danger, but is also harmful by the trouble which it causes in the general condition of the patient, thus interfering with the process of repair. It is well, I think, to put the patient on a fluid diet for the first week, and to administer a gentle laxative at about the fifth day. When one or two stools have been produced, no attempt should be made to excite others, and if the simple laxative effect has been exceeded, give a little opium; four days afterward a new evacuation may be provoked. During the first few days the patient is apt to be tormented by intestinal gas; if that is the case, a soft rubber tube is carefully passed into the rectum several times a day to the depth of three to four inches.

The thighs should be placed close together and lightly tied, and the patient should not be allowed to assume the sitting posture before the third week. The greatest cleanliness must be maintained, the vulva and the perineum being washed after each act of micturition or defecation.

The temperature must also be carefully watched, fever announcing the infection of the wound or the formation of an abscess. This occurs when part of the wound surface has not been exactly coapted and there remains a dead space for the accumulation of blood or serum in the deeper portions of the perineum, which furnishes an excellent nidus for the development of bacteria introduced during an operation which was not sufficiently aseptic or along the sutures. The part then becomes tense, painful, and œdematous, and the sutures sink deeply into the swollen tissues. If not quickly relieved, the inflammation becomes more intense and causes the total disunion of the flaps; at times, by an opportune removal of one or two sutures, the inflammatory process may be limited to a small area and the disunion is only partial. If this occurs in the perineal aspect of the part, only a portion of the wound fails to unite by first intention; but if it involves the recto-vaginal septum, there is great danger of the formation of fistulæ. If the perforation is very small, it may be obliterated by the granulation with the aid of cauterization; but if it is more extensive, it persists, and necessitates a new operation, which should not be undertaken before a month after the perineorrhaphy. The pathognomonic symptom of this deep separation is incontinence of gas, complained of anew by the patient.

In general, the perineal sutures of silver, silkworm gut, or silk are removed on the tenth or twelfth day, when they begin to cut and irritate the tissues; if there is no sign of local inflammation, we may wait a little longer, especially when silver has been used. The vaginal sutures are removed the last; catgut may be left alone.

The patient may begin to walk at the end of two months, and the sexual relation be resumed at the end of six.

Prognosis and Results of Perineorrhaphy.—The operation is not really a grave one. There is no fear of great hemorrhage or of septicæmia; the cases of the latter complication are all, with rare exceptions, of very ancient date.

The results are also very much better since we ceased to fear suppuration. Before that, the absence of antiseptics and the multiplication of sutures in the rectum and the vagina made infection of the wound almost a certainty; and when the union was complete superficially, there was often a cavity left more deeply, with a resulting recto-vaginal fistula. This accident has seldom happened since the employment of antiseptics and since more care has been taken in the apposition of the deeper parts, and since the sutures in the great majority of cases have been passed through the perineum entirely (Emmet's and Tait's methods).

Moreover, the care taken in the union of the deep muscular planes and in the junction of the divided ends of the sphincter has improved the results obtained as regards the function of the intestine. It was not uncommon to see women whose perinea had the appearance of being perfectly restored, and yet who had no power of retaining the gaseous and liquid contents of the intestine.

Many cases prove that parturition may be accomplished without the production of any new rupture of the perineum, even when the operator has diminished the size of the vulva considerably; this latter is an operative fault, and should be guarded against.

Choice of Methods.—Each one of the procedures described has given good results, and they may therefore be said to be all good. But the preference should be given to the method which is most simple and rapid of execution. I have had very constantly good results from my modification of Lawson Tait's method, and use it now almost to the exclusion of all others. However, in cases of incomplete laceration without great relaxation, I recommend Hegar's procedure also, and in cases of relaxation without laceration Emmet's newer method. If the two lesions are combined, and especially if the laceration is complete, the flap-splitting method which I have described seems infinitely superior.

Usually, perineorrhaphy should be preceded by curetting the uterus and an operation on the cervix for the accompanying metritis.

CHAPTER XL.

INFLAMMATION, ŒDEMA, GANGRENE, ERYSIPELAS, ECZEMA, AND HERPES OF THE VULVA.

VULVITIS.—*Pathology.*—The vulva is formed of parts which are very distinct anatomically, comprising: Cutaneous folds, the labia majora; mucous folds, the labia minora and the hymen; and orifices of canals, the urinary meatus and the ducts of Bartholin's glands.

The inflammations which affect these various parts have very diverse characters, and the attempt has been made to indicate the chief differences by the use of the term sebaceous vulvitis for an inflammation which is localized in the integument, and mucous vulvitis where it is internal. But commonly all the parts found in this region are involved together by a diffuse inflammation. The sebaceous and sudoriparous glands in the skin are most frequently the starting-point for the inflammation of acne and furunculosis of the labia majora. On the other hand, the orifices of the excretory ducts of Bartholin, the mucous crypts which are found about the meatus and which Skene has described as glands, and the meatus itself are the principal foci for inflammation on the mucous surface. Inguinal adenitis is a frequent consequence of vulvitis of the cutaneous type. It is rarely seen unless in the puerperal state there has been suppuration of the labia majora in their loose cellular tissue; but it often attacks the vulvo-vaginal glands.

Symptoms.—A sharp local pain, which is increased by walking and the contact of the urine, is the first sign which the patient notices. A fairly abundant and at times fetid discharge bathes the region, irritates the internal surfaces of the thighs and, in children, the intergluteal fold. On the grayish floor of these erosions there may appear ganglionic engorgement which resembles syphilis. The mucous membrane of the labia minora and the fourchette is red and swollen; pus mingled with smegma accumulates between the labia; the latter become œdematous and present very small pustules at the bases of the hairs; the larger of these resemble furuncles, and circumscribed abscesses may result.

Huguier has described a cutaneous form of this affection under the name of vulvar folliculitis, which presents three periods—eruption, suppuration, and decline. The affection may terminate by induration, the small tumor which results resembling sebaceous acne; this is the acne varioliforme of Bazin and the vulvar exdermoptosis of Huguier. The small buttons thus formed are of the size of a hempseed, and although indurated have no inflammation about them; the skin between is completely healthy.

The intensity of the inflammation varies. When it is very acute it may cause fever, and there is then usually a complicating lymphadenitis of the inguinal region, with suppuration. Probably it is to this lymphangitis that suppuration of the labium majus, or phlegmonous vulvitis, has always been attributed; it is rarely observed. Inflammation of the meatus provokes dysuria. If the inflammation involves the glands of Bartholin, it is manifested by the tumor which forms, and the pus which may be expressed from its duct.

Diagnosis.—It is easy to recognize vulvitis, but the important point is to determine the complications of the urethra, the vulvo-vaginal glands, and the vagina.

The etiology is very obscure in certain cases. It must not be forgotten that, in lymphatic infants who are deprived of all hygienic care, a very intense vulvar catarrh may arise without any contagion, by simple decomposition of the smegma, and cause erosions and even ulceration. In a medico-legal examination, therefore, we should not too hastily assume either violation or contagion in the absence of other proof. Phlegmon of the labium majus may be distinguished from abscess of the vulvo-vaginal gland by the situation of the tumor and the fluctuation toward the external or cutaneous aspect of the part.

Etiology.—Of all the causes of vulvitis, the most frequent is certainly gonorrhœal contagion. This is the cause even in those cases in which we hesitate to make the assertion, as in the epidemics of vulvitis and vulvo-vaginitis which are observed where a number of children are herded together in boarding houses and hospitals. For the details I refer to the chapter on vaginitis. There is no doubt, on the other hand, that saprogenic microbes may develop independently of the gonococcus in children and poorly nourished women, and cause attacks of vulvitis which might be termed sordid. Small lymphatic children and obese women are particularly disposed to this form, especially in the poorer classes. With children the oxyuris may also share in the production of the affection.

In the case of vesico-vaginal fistula, the incessant contact of the urine irritates the vulva and the internal surface of the thighs, but this chronic irritation does not cause hypersecretion, and resembles more closely chronic erythema of the parts than vulvitis.

Treatment.—In the acute stage baths, abundant lotion with boric-acid solution or white wash (Goulard's lotion), extreme cleanliness, and repose are to be recommended. If there is a suspicion that the inflammation is gonorrhœal, painting with a weak solution of nitrate of silver may be employed (1 : 50); this lessens the pain and is an excellent antiseptic. Lotions and injections of bichloride are also employed (1 : 5,000). The vulva may be powdered with talc to which has been added one-tenth part of iodoform. If the orifice of the vulvo-vaginal gland is inflamed, it should be cauterized with a nitrate-of-silver pencil after enlargement with Weber's small knife

which is used for incision of the lachrymal ducts. If the crypts about the urethra seem to be the seat of the inflammation, they should be penetrated with a fine cautery point, or simple igni-puncture may be practised. Abscess and bubo should be at once opened.

ŒDEMA AND GANGRENE.—Localized œdema has been observed in the vulva during pregnancy, from the disturbance of the circulation in the lower pelvis and varix of the external pudic veins.

In the puerperal state, shortly after dellivery, if there is œdema of one side of the vulva alone, it is a sure sign of infection from a laceration in the vagina or an eschar or a phlegmon.

In general anasarca the labia majora, whose tissue is very lax and lamellated, may swell to an enormous size, rendering micturition or even the pas-

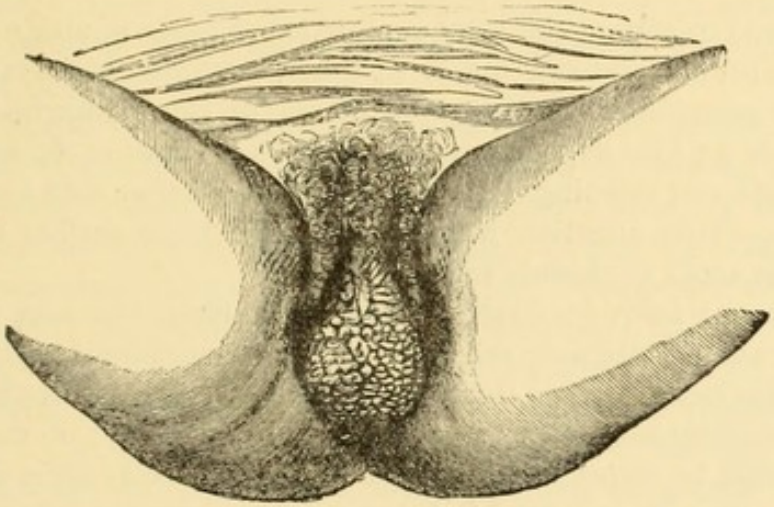


FIG. 551.—HARD HYPERTROPHIC ŒDEMA OF THE LEFT NYMPHA, FOLLOWING A SYPHILITIC LESION (MacClintock).

sage of a catheter difficult. Spontaneous fissures, or incisions made for the purpose, give issue to serous fluid, but are often the starting-points for erysipelas also.

In syphilitic affections of the vulva, especially in the case of infecting chancre, there is at times a hard œdema which attracts the attention of the patient more than the chancre, which is considered only an excoriation, of no importance. This œdema, which persists a long time after the ulcer has been cured, is often situated on the nymphæ, or the preputium clitoridis, which are transformed into sclerous hypertrophied tissue with the appearance of elephantiasis. In one such case I excised a tumor which had existed many months and had not been modified by the internal treatment. These are probably the cases which MacClintock describes as syphilitic hypertrophy of the vulva.

Gangrene of the vulva may be caused by traumatism during parturition, when to this local cause there is added the influence of a general infection as puerperal fever. Other forms of septicæmia may have the same result; typhoid, scarlatina, variola, etc.

Weak and scrofulous infants have gangrene of the vulva as they have noma of the mouth; this may also be epidemic and fatal.

The treatment consists in maintaining the vagina aseptic and keeping its walls separated to prevent the formation of adhesions.

Erysipelas.—Primary erysipelas of the vulva appears quite often in the new-born, just as it occurs also at the umbilicus; it is very serious and frequently ends in death.

In menstruating women there is often an attack of erysipelas which appears periodically at the time of the catamenia, and it has even been observed at the menstrual epoch in the absence of the flow, for which reason a supplementary character has been attributed to it. It is probable that the microbes persist in the part, but are latent until aroused each month by the catamenial molimen.

As regards treatment the local application of oxide of zinc in powder and bandaging with ethereal tincture of camphor, may give some relief. Hüter and Böckel recommend the injection of one or two syringefuls of carbolic solution (2 or 3 : 100) hypodermically about the edges of the inflamed area, repeated night and morning. Lücke prescribes friction with turpentine.

Eczema.—This affection may occur on the labia majora or the mons veneris as an acute or chronic inflammation.

In the acute form its onset is sudden, manifested by heat and followed by swelling and an intensely red color. Small transparent vesicles form, of the size of the head of a pin, scattered over the skin, but at times they are difficult to distinguish, as the scratching removes them; to discover them, the skin should be inspected by oblique light. There is often some disturbance of the stomach and catarrhal fever. The eruption is produced in the rheumatic especially in spring. At the end of about a fortnight the acute stage is over, and the patient passes to the chronic stage.

Chronic eczema most often appears as eczema rubrum. In the acute form it is chiefly the labia majora which are attacked, but from here the inflammation spreads to the thighs, the perineum, and the anus. The labia are swollen, the vulva is patulous, and, as it is bathed in pus, at the first sight it resembles gonorrhœal vulvitis. The heat and itching are intolerable; painful fissures are produced at the fourchette, anus, and genito-crural folds, and to the excoriation succeeds the formation of crusts.

According to Hebra, in the majority of these cases there are complicating menstrual troubles, and the same fact has been mentioned for herpes by Lagneau. The influence of diabetes mellitus has been suggested; that of the rheumatic diathesis is unquestionable.

The excoriations and fissures which follow chronic eczema must be distinguished from syphilitic lesions. Herpes differs in the disposition which presents toward the collection of large vesicles, and the derma is thicker in eczema. Simple pruritis vulvæ causes no eruption.

The treatment in the acute stage requires the application of poultices and

frequent laxatives; spices and pork should be forbidden. In the chronic form, bichloride lotions (1 : 1,000) are advantageous, and also inunctions with the following:

℞ Iodoformi,	1 gm.
Zinci oxidi,	2 "
Lanolini,	30 "

M. ft. ungt.

The general treatment of the arthritic or scrofulous diathesis, or of diabetes if it be present, should not be neglected.

Herpes.—This affection is characterized by the formation of small transparent vesicles of the size of a pin's head to that of a pea, and either very few in number or multiple, from which fact it is divided into discrete and confluent. A very rare form is solitary herpes, which appears as a single erosion of large extent at times, resulting from the excoriation of a single group of vesicles.

At first herpes always causes a sensation of heat and smarting.

It begins as an area of redness either diffuse or confined to one spot, which soon covers itself with agminated vesicles; many of these patches fuse and produce a large pemphigoid bulla. When the vesicle is fully formed, it remains as a red or pale vesication, looking as if covered with a false membrane; the edges of the ulcer are scalloped; the whole is covered with a crust under which cicatrization goes on after eight to fifteen days. When this falls, the skin is rosy and turgid and sometimes resembles a syphilitic papule. The inguinal ganglia are often engorged, but they seldom suppurate. They are also painful, which distinguishes them from the subacute adenitis of syphilis.

Gastric disturbances occur with fever in the confluent form of the affection. The eruption usually appears two days before the menses. With some women this is repeated every month, and it often occurs in pregnancy. The congestion of the genital organs is then evidently the predisposing cause.

Any irritation of the vulva may produce an accidental herpes; such as gonorrhœal and syphilitic infection and neglect of ordinary cleanliness; the affection may also be constitutional, according to classic language; that is, caused by some trifling local irritation in a herpetic individual.

Diagnosis.—Fournier warns against confounding solitary herpes with chancre, and the ulcerations which follow discrete and confluent herpes with mucous plaques. But the syphilitic chancre presents more of the character of an erosion than of an ulceration; its surface is smooth, varnished, and of a deep red color. Sometimes, however, its centre is slightly excavated; it is then called the ulcerative form. But in the erosive form the principal lesion seems to be constituted not so much by an actual loss of substance as by the formation of a small indurated plaque resembling parchment, which may be at once recognized by grasping it between the finger and the

thumb, at a certain distance from the lesion and parallel with its surface. The indolent engorgement of the ganglia, in the form of the Pleiades, is characteristic, and there is neither itching nor smarting with chancre. The evolution of the herpetic lesions in a typical manner every eight to fifteen days, and the coexistence of other characteristic symptoms, will also help to make the diagnosis evident; but in certain cases it may still be doubtful for a long time. Simple chancre may be confounded with confluent herpes. This affection is then always multiple, but the appearance of the syphilitic and the herpetic ulcers is not the same. The base of the sore is uneven, fissured, and of a greenish color; the edges are sharply punched, and the discharge is abundant and thick; bubo or suppurative adenitis is very frequent. Inoculation gives positive proof; but it is better not to employ this method of diagnosis, as it may give rise to accidents.

Syphilides of the vulva, which appear as papules, erosions, and ulcers, are generally disseminated, more abundant, and distributed over a larger surface than is the case in herpes. They should not be confounded: the erosive form alone presents no peculiar character and can be distinguished only by the other syphilitic symptoms; the ulcerative form presents ulcers with a circular outline, blended in places, coexisting with mucous patches in the mouth or about the anus and the spaces between the toes, with other lesions of syphilis; the papular form consists of a flattened plateau, of round or oval shape, coppery red in color, with a dry or ulcerated surface. It is evident how such a lesion differs from herpes; it is also seldom localized to the vulva, but is scattered over the whole integument.

Herpes of the vulva cannot be inoculated.

Treatment has for its object the calming of the pain by prolonged baths and by poultices; the ulcers are powdered with a mixture of equal parts of oxide of zinc, subnitrate of bismuth, and iodoform; they may also be touched with nitrate of silver solution (1 : 50). The predisposing diathesis should be treated at the same time, to avoid the return of the malady.

CHAPTER XLI.

LUPUS (ESTHIOMÈNE) OF THE VULVA.

Definition.—The name of esthiomène (ἐσθιειν, to devour) or lupus of the vulva has retained since the days of Huguier, who first described it, a purely clinical signification. It is applied to lesions of a variable nature which present the common characters of a tendency to hypertrophy and a slow ulceration which has a progressively destructive effect on the vulvar region. This affection has been justly compared to lupus of the face on account of its appearance and course. The demonstration of the tuberculous nature of lupus of the face has now been made, and it seems to have been demonstrated for esthiomène also.

Pathology.—As every ulceration whose borders had a tendency to hypertrophy has been called lupus, it is not astonishing that the most diverse histological changes have been encountered in this disease, comparable to elephantiasis, tubular epithelioma, the syphiloma of Wagner, or gummy tumors in different stages of nodulation, ulceration and sclerosis. Again, the only lesion found has been that of inflammation of the derma with an infiltration of embryonic cells into the connective tissue, especially about the vessels which were in a dilated condition.

In a case which I have examined the microscope revealed tuberculous nodules with giant cells (Figs. 553 and 555). Martin and Nicolle have found tubercular masses and have even been able to stain a few of Koch's bacilli in chronically œdematous tissue, forming nearly the whole of the neoplasm, in a case of the hypertrophic variety.

Symptoms.—There are two clinical types, according as the ulceration or the hypertrophy predominates.

1. *Ulcerative Form.*—Several varieties have been described. Erythematous lupus is a very superficial ulceration, like the same variety on the face, with a livid red color; tuberculous lupus is constituted by a number of hypertrophied papillæ scattered over the base of the ulceration; the latter has its borders bevelled, and is of a violet color. One of the most important characters is the tendency to heal on one side while the ulceration progresses on the other; thus the process of repair may build up a part several times, only to be broken down again. The ulceration is called serpiginous when it sends out prolongations toward the vestibule, and perforating when it produces deep excavations.

The discharge which comes from the ulcerations is not very abundant. Deep perforation and fistula of both rectum and bladder may be produced;

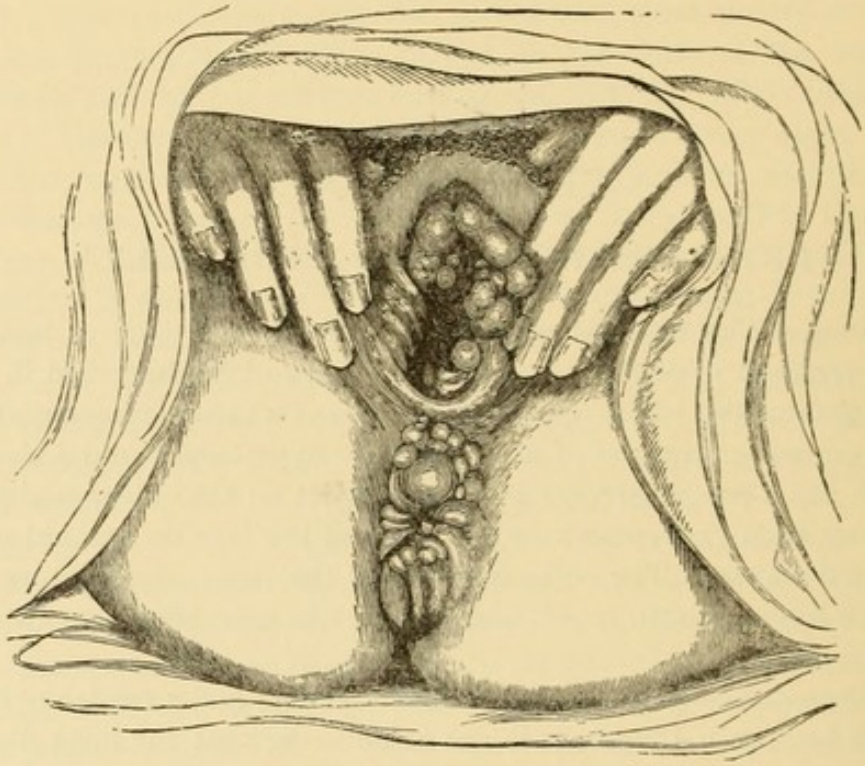


FIG. 552.—LUPUS OF THE VULVA (MACCLINTOCK).

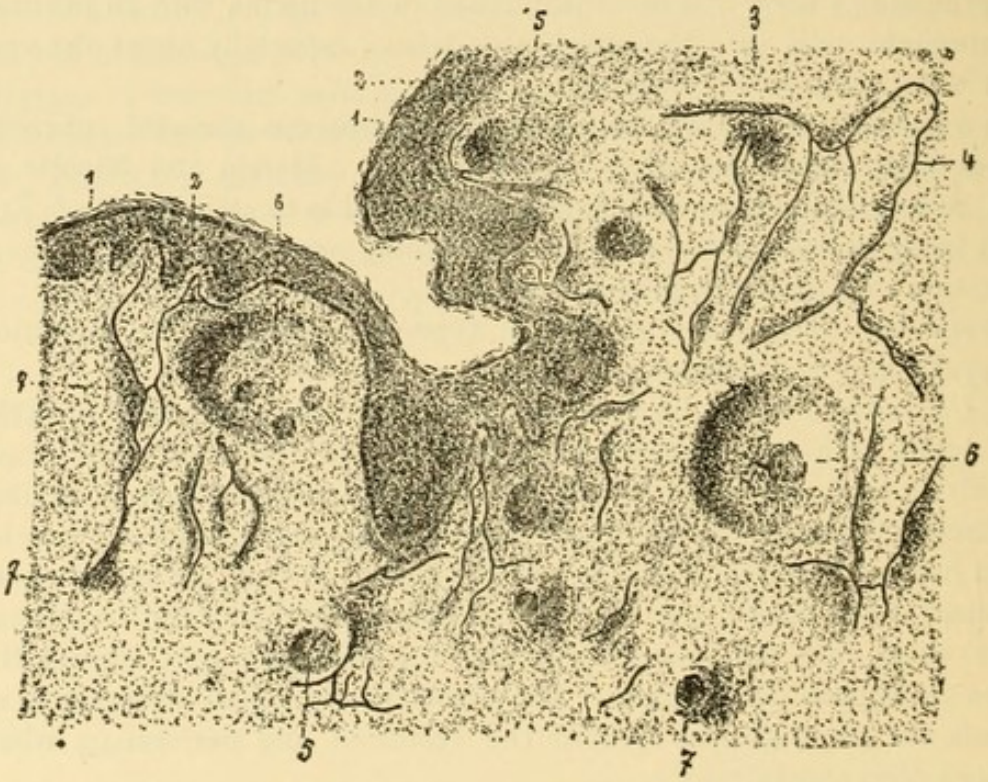


FIG. 553.—LUPUS OF THE VULVA. Section perpendicular to surface of tumor. 1, Corneous layer; 2, layer of Malpighi; 3, derma with many connective-tissue cells; 4, branching capillaries; 5, collection of inflammatory embryonal cells; 6, tubercular nodule with giant cell; 7, vessels surrounded by zone of inflammation.

and partial cicatrization of an ulcerated surface may cause retraction of the urinary meatus.

2. *Hypertrophic Form.*—The hypertrophy, which is never absent even in the preceding form, assumes here very great importance; the nymphæ and the prepuce of the clitoris may become of double or triple their normal size, seeming to be infiltrated with œdema which gives them a firm and elastic

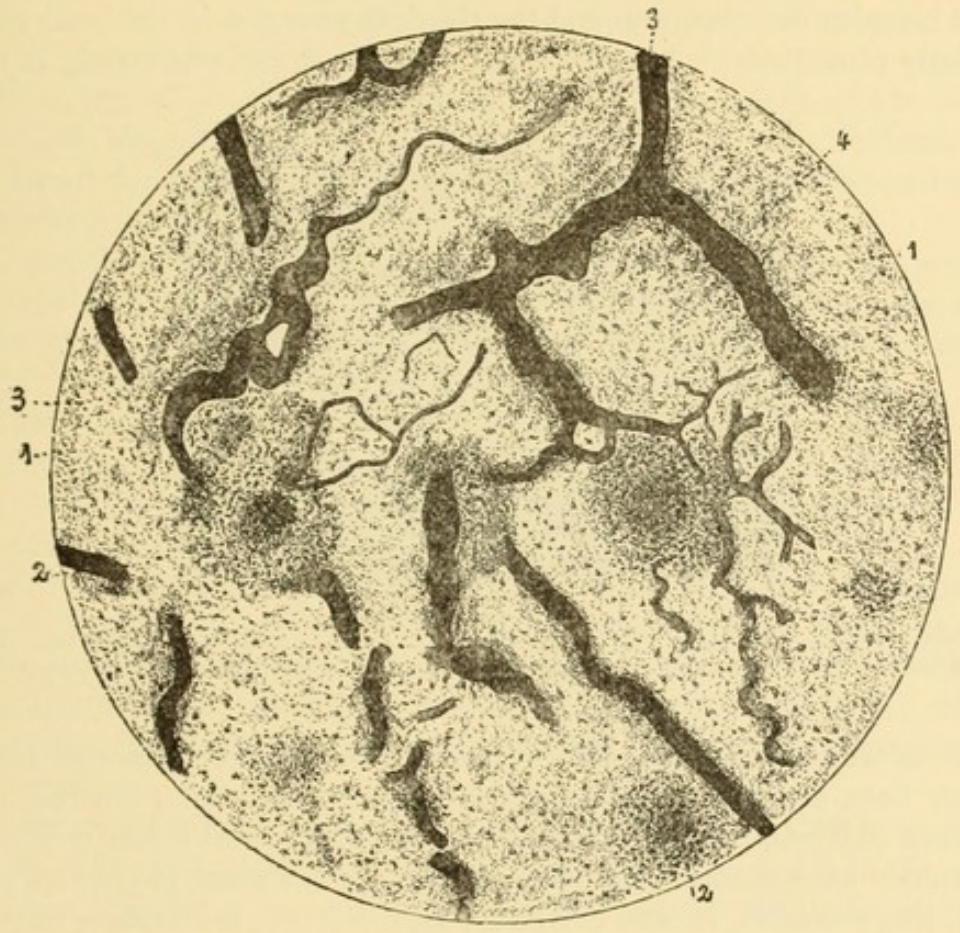


FIG. 554.—LUPUS OF THE VULVA. Varicose vessels. Photograph of injected specimen. 1, Fibrous stroma of derma infiltrated with numerous cells; 2, tubercular nodules; 3, varicose or enlarged vessels, ending at the periphery of tubercular areas; 4, accumulation of embryonal cells around vessels.

consistence; in many other points in the adjacent skin there are tubercles or hypertrophic nodules which may invade the whole surface of the perineum; the surface is polished and glossy, of a red or violet color. In certain cases the hypertrophy of the labium majus reaches such a development that it suggests the idea of elephantiasis. These indurated parts are seldom painful, except when they are inflamed, while urethral caruncles are ordinarily very sensitive.

These two forms are at times isolated, but usually they are found together.

Diagnosis.—The slow course of the affection, its accompanying hypertrophy, and the absence of any great engorgement of the ganglia serve to

distinguish it from phagedænic chancre, tertiary syphilis, and cancer. It can be confounded with elephantiasis only where there is no marked induration of the tissues or spontaneous ulceration.

Prognosis.—The disease is a grave one, although it has such a slow course that it may progress eight or ten years. Death may occur from extension to the rectum or from peritonitis.

Etiology.—Lupus of the vulva is a rare affection. It is most often observed between the twentieth and the thirtieth year and in the lower classes, especially prostitutes. A predisposing cause of great importance is tuber-

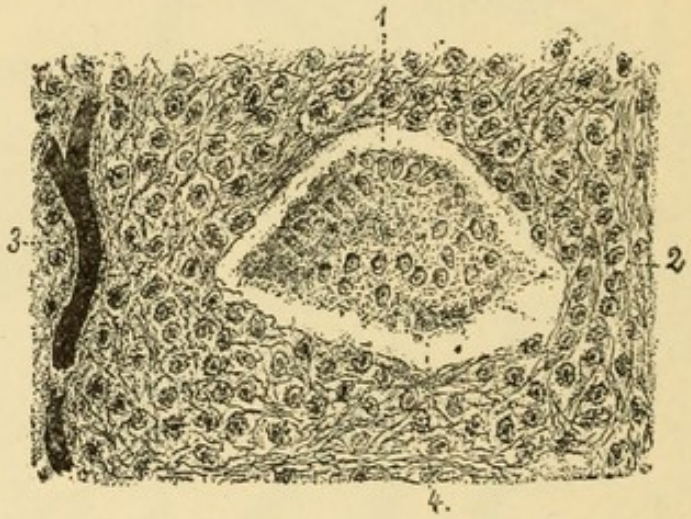


FIG. 555.—LUPUS OF THE VULVA. Tubercular nodule with giant cell. 1, Giant cell containing large numbers of nuclei; 2, loose connective tissue with many round cells; 3, large vessel; 4, space between giant cell and surrounding tissue.

culosis, of which it is often the cutaneous manifestation, although this has not yet been demonstrated anatomically. But it may be noted that two of Bernutz's patients, two of Fiquet's, and one of Le Fort's had very evident tuberculous antecedents. Whatever causes an abnormal physiological condition, like privation, excess, hereditary syphilis, etc., predisposes to lupus.

Treatment.—This consists essentially in cauterization of the ulcers and excision of the hypertrophic portions. The actual cautery is preferable to potential cauteries, such as nitric acid, caustic potash, and sulphuric acid. As to the scarification and scraping with the curette which have rendered such service in lupus of the face, they are of benefit here only in the erythematous form. Dressing with iodoform and application of tincture of iodine have also been successful.

CHAPTER XLII.

TUMORS OF THE VULVA.

Varicose Tumors.—During pregnancy it is not uncommon to see varices of the labium majus, which may reach a great size. Holden in one case found the labia majora of the size of the fœtal head; the patient died of phlebitis.

Usually such tumors produce only a feeling of discomfort and weight in waking. They are of a bluish color, which becomes violet on the mucous surface. When they rupture, under the effect of some effort, or from traumatism, or spontaneously, they cause serious or fatal hemorrhage.

The varicose region should be sustained and lightly compressed with a T-bandage. [The patient should also wear an abdominal corset to lift the uterus and lessen the pressure on the pelvic veins, and should dress loosely, and with no constriction about the waist.]

Hæmatoma or Thrombus.—The subcutaneous rupture of a varicose vein, often unrecognized before the accident, causes thrombus of the vulva. It occurs usually during labor, after violent manœuvres, exaggerated efforts, or the sudden issue of the head. In the non-pregnant condition it has been observed as the result of a blow or a fall, and its dimensions are then very much smaller.

Most commonly but one labium is distended with blood; it then presents a violet color, and may assume the proportions of the fœtal head. It is a grave complication of parturition; in one hundred and twenty cases collected by Girard there were twenty-four deaths.

The tumor thus formed may rupture and cause death, or suppurate and produce septicæmia. To avoid this complication the parts about the tumor should be incised, the cavity cleaned out, and, if necessary, a permanent forceps placed on the bleeding vessel, and the pouch stuffed with iodoform gauze. When, however, the tumor is very small, it may be trusted to nature to be absorbed, and all that is required is to keep the vagina aseptic.

Simple Vegetations.—This affection is also known under the name of papilloma or condyloma.

The tumor has the appearance of a cauliflower, at times very voluminous, formed by hypertrophy of the papillæ of the skin or vulvo-vaginal mucous membrane. As they are often isolated, they have received the name of "cock's combs"; when massed, they may be of the size of the fœtal head. Their color is either pale red or of a deep wine-tint; they are usually situ-

ated on the vulva, the perineum, or the margin of the anus, but may also occur in the vagina.

In the enormous mass which is formed by the junction of these vegetations we may distinguish groups of different orders separated by furrows more or less deep. They are accompanied by a sanious and fetid discharge, and the irritation of walking may inflame them and render them painful. The fissures which are produced at their base sometimes become the seat of hyperæsthesia.

These vegetations have for a long time been considered as a reliable index of venereal infection, either gonorrhœal or syphilitic. There is no

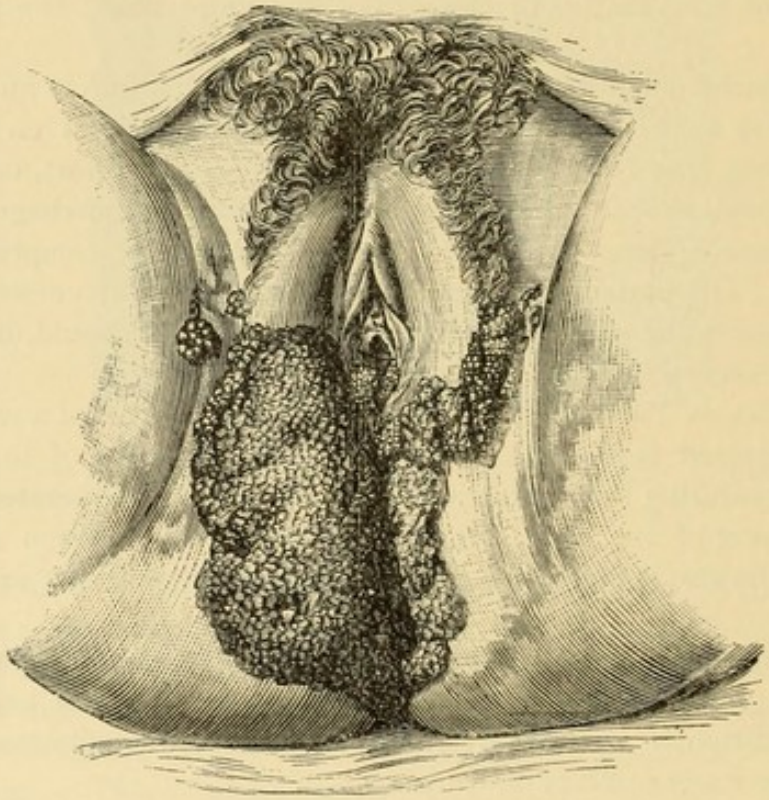


Fig. 556.—Simple Vegetations of the Vulva (Tarnier).

doubt that they are often caused by the irritation of a gonorrhœal discharge or the oozing of mucous patches of the vulva, especially in women who neglect the ordinary cleanliness of the parts. But the cock's-comb formation may also be observed in pregnant women attacked by simple leucorrhœa; they seem to be the result of sordid irritation of the papillæ rather than of the contamination of a virus.

Their transmission by contact has been demonstrated.

Treatment.—The best and most simple treatment is excision with the scissors, under continuous irrigation, followed by cauterization of their bases with the thermo-cautery, and a hem suture of the linear wound. This operation may be performed without pain by the use of cocaine, and may be

divided over several sessions if the tumor is of large size. There is no need of hesitation in operating during pregnancy, for the traumatism is unimportant, and it is very necessary that the genital canal should present no source of infection at the moment of parturition. Zweifel has described a case in his practice in which fatal suppuration in the pelvis took its origin from condylomata of the vulva, causing infection of a laceration of the vagina which had occurred during labor.

Elephantiasis Arabum (which must not be confounded with elephantiasis Græcorum) is caused by hyperplasia of the skin and subcutaneous cellular tissue. It is most common on the lower extremity (ninety-five per cent) and takes its name from the resulting resemblance to the foot of the elephant. It is also seen in men involving the penis and scrotum, and in women upon the labia and clitoris. It is a rare affection in our climate.

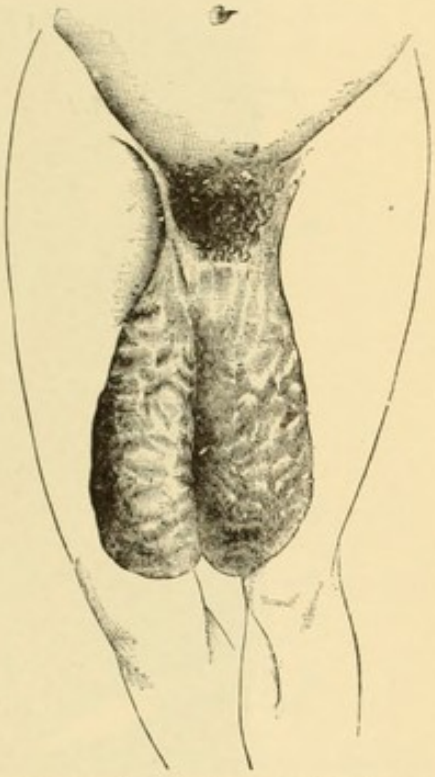


Fig. 557.—Elephantiasis of the Vulva.

Pathology.—The largely hypertrophied labia majora form voluminous masses which may exceed the dimensions of the adult head and the weight of 10 kgm. (4½ lb.). Their base is often broad, but at other times there is a pedicle and the tumor takes on the appearance which the older writers described as molluscum pendulosum—a clinical term which comprehends all forms of tumor of the integument, whether elephantiasis, lipoma, fibroma, or myxoma. Many of the cases published as elephantiasis with a normal skin seem to me explicable by this confusion.

According to Cornil and Ranvier, there are histologically three principal forms of elephantiasis of the vulva:

1. In the first the entire derma is hypertrophied and returns to the embryonic condition. In the midst of this transformed tissue there are vast dilatations of the lymph spaces, comparable to those which are found in lymphangioma.

2. In the second form, which often succeeds to repeated œdema, the engorgement of the tissue extends over a large area, there is a stagnation of the lymph in the capillaries, larger trunks, and lacunæ of the lymph system; and particularly in this variety the ganglia become the seat of fibrous alteration.

3. The third variety is chiefly remarkable for the enormous increase in the thickness of the derma. There is an abundant proliferation of all the elements of the derma, involving the connective tissue, the elastic fibres, and the smooth muscular cells, and, as in the other two forms, the lymph spaces

are notably dilated. The obliteration of the lymphatics by proliferation of the endothelium has also been described. Certain pathologists have considered that the stagnation of the lymph, and its great abundance, play an important part in the pathogeny of the affection, as if it caused hypertrophy of the elements which it bathed. However that may be, there is no doubt that, in whatever form we consider it, the constant and predominant lesion is a wide dilatation of the lymph-vessels.

Symptoms.—The principal symptom is the tumefaction, which may reach

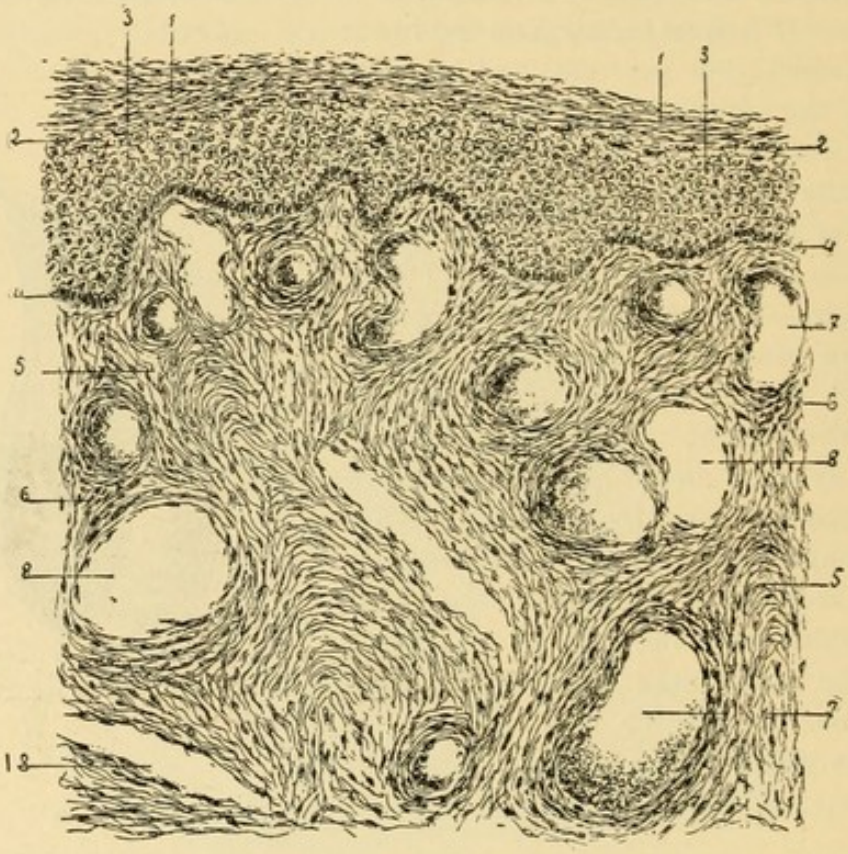


FIG. 558.—MOLLUSCUM OF THE VULVA. Section perpendicular to surface of tumor. 1, Thickened superficial corneous layer; 2, layer of flattened granular cells; 3, Malpighian layer; 4, deep pigmented layer; 5, connective tissue in wavy bundles; 6, centre of development of embryonal cells near vessels; 7, blood-vessels; 8, lymphatics.

such a degree that both walking and urination are interfered with. Ulceration may also be produced by friction, but the ulcers have a natural tendency to heal. The thickening of the tissues may invade the entire vulvar, perineal, and anal regions, and form enormous tumors, but usually without pain. Amenorrhœa is often observed.

The elephantiasis is called glabrous when the skin is smooth, verrucous when it is covered with warty projections, papillomatous when the papillæ are very much hypertrophied, hard when its consistence is firm, and soft when it yields to pressure, leaving an indentation as in œdema.

Diagnosis.—There are no great difficulties in determining the nature of the affection; the hypertrophic tumefaction of lupus always accompanies

ulceration, and is confined within very narrow limits. Papillary vegetations are situated on the skin, while the thickening of elephantiasis involves also the framework of the derma. Pedicled fibromata and myxomata, which are sometimes called elephantiasis by an abuse of language, are always isolated and circumscribed tumors, while elephantiasis is essentially diffuse.

Etiology.—This affection is very rare in our climate, but is common in

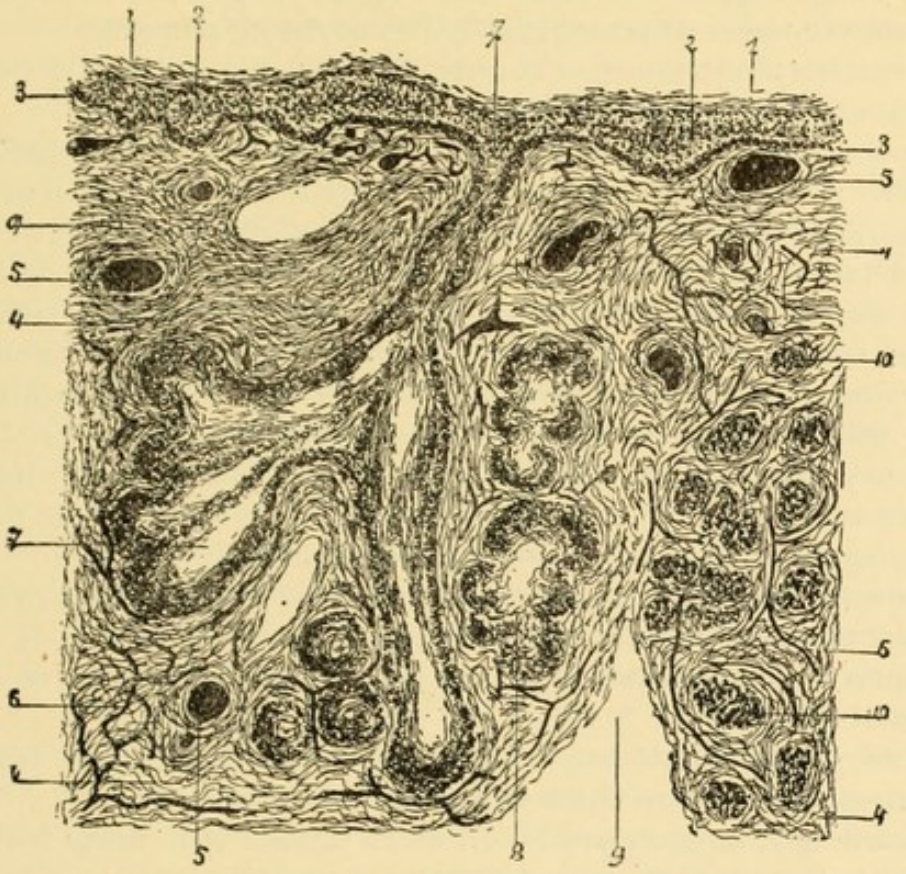


FIG. 559.—MOLLUSCUM OF THE VULVA. Section of pedicle. Injected specimen. 1, Superficial corneous layer; 2, layer of Malpighi; 3, deep layer of pigmented cylindrical cells; 4, dense fibrous tissue; 5, transverse section of large injected vessel; 6, branching capillaries; 7, sebaceous gland whose cavity is filled with desquamated epithelium; 8, isolated sebaceous lobules; 9, lymphatic; 10, transverse section of smooth muscular fibres.

the Antilles and particularly in Barbadoes. In these countries the period of onset is often marked by acute lymphangitis and intense fever. Traumatism has been observed in some cases.

Treatment.—The only rational treatment is ablation with the bistoury, which I prefer to either écraseur or thermo- or galvano-cautery. Care must be taken to have the wound unite by first intention, as suppuration would here be peculiarly dangerous, on account of the number of the lymphatics and their great dilatation.

FIBROMA.—*Fibromyoma—Myxoma.*—These tumors ordinarily occur in the labium majus, although they may be found in the nymphæ or the perineum. They are made up of fibrous tissue alone or in varying proportions with smooth muscular fibres or myxomatous tissue. They are at times of a

soft consistence, forming when they are large one of the varieties of molluscum pendulum, or what has recently been described as molluscum simplex.

These tumors are benign and of slow course; they may be enucleated or their pedicles may be cut, without danger of hemorrhage.

Lipoma.—Lipoma of the vulva arises in the fatty tissue of the mons veneris, and may reach such a development that it appears more like elephantiasis. Stiegele operated on one which weighed ten pounds; in one of Bruntzel's cases the tumor increased greatly in size during pregnancy.

On section of the tumor, it is seen to be made up of lobuli, traversed by strong bands of fibrous tissue. The tumor is easily extirpated.

Enchondroma.—Enchondroma of the vulvar region is a pathological curiosity. Cartilaginous tumors of the clitoris have been seen as large as the fist, furnished with a pedicle and presenting portions which were calcified. A case of pretended ossification of the clitoris reported by Beigel is of this class, and also the curious case of Bartholin, so often cited, of the Venetian courtesan who wounded her paramours with her ossified clitoris.

Neuroma.—I have found only two cases of this tumor in medical literature. One was a case of Simpson's, where there was a painful nodule near the urinary meatus; the other is reported by Kennedy, where there were tubercles which could be appreciated by touch, but could not be seen by a magnifying glass; this latter case is not indisputable.

Cysts of the Vulva.—I will describe the cysts of Bartholin's glands, which are the most frequent tumors of this class, in a later section.

Besides those of Bartholin's glands, cysts occur in other ways on different portions of the vulva.

A. *In the Labia Majora.*—Superficially, sebaceous cysts are found; Winckel operated on one which was of the size of an egg.

More deeply, serous cysts occur, which according to many authors are encysted hydrocele of the round ligament, and which Duplay declares to be almost always sacculated cysts developed in the sac of an old hernia. Blood cysts have also been observed in the greater labia, which by their position at the upper portion of the fold are very distinct from cysts of Bartholin's glands, of which I shall speak later. They are due, according to Koppe, to hæmatocele in the interior of the terminal portion of the round ligament. Weber has demonstrated that in the embryo this cord is hollow, and that the cavity may persist abnormally in later life. Other authors consider the cysts, like serous collections, as always originating in the sac of an old hernia (see chapter on Tumors of the Round Ligament). In this region also cysts have been observed whose origin is very obscure; in structure they resemble ovarian cysts, and the opinion has been advanced by Klob that they develop about the seat of a thrombus or else by dilatation of lymph-vessels. Lastly, there are many cases in which the cyst contains epidermic structures, hair, teeth, etc.—the so-called dermoid cyst.

B. *In the Vestibule.*—Between the meatus and the clitoris small cysts

have been seen of the volume of a bean, containing a yellow or greenish fluid, and invested with a layer of cylindrical epithelium; they probably come from the sebaceous glands.

C. *In the Urinary Meatus.*—Kocks has described a cul-de-sac which corresponds to the terminal vestige of Gärtner's duct; the small cysts which are encountered in this situation may be derived from this structure. On the other hand, Skene has found and described two glands between the mucous membrane and the muscular layer of the urethra whose excretory duct measures from 2 to 3 cm., and admits a No. 1 bougie and opens near the meatus; but whether a cyst may be formed in these glands is a question which needs further observation in order to decide it.

D. *In the hymen,* congenital cysts have been observed by Winckel which are of very small size and contain the products of disintegration of the pavement epithelial cells. Döderlein considers that they are due to the fusion of the two layers of the hymen, and has seen them in the process of formation, resembling a similar cystic development in the vagina.

Vascular Tumors of the Urinary Meatus.—As I have endeavored to demonstrate, the hymen is not an isolated structure, but only the greater portion of a hymeneal apparatus which comprises:

1. The masculine frænum vestibuli.
2. The ring inclosing the urinary meatus.
3. The hymen. If the meatus of a young girl is closely examined by drawing the hymen downward, the upward prolongation of this membrane is clearly seen to surround the external orifice of the urethra by a ring, which forms the superior portion of a figure of eight, of which the hymen forms the inferior and far larger part; this upper ring is surmounted by a thin vertical band, the masculine frænum, which starts from the meatus and loses itself in the upper third of the vestibule. This arrangement of the urethra in some women forms a decided projection, upon whose lower portion we may see a small tongue which lies detached within the urethra like a uvula. This appendage to the hymen is at times so distinct that it might be called a urethral hymen. Like the same structure in the vagina, it may be a continuous membrane, and cause imperforate urethra, or it may present an erectile structure which corresponds to its homology with the corpus spongiosum of the penis, of which the hymen represents the undeveloped matrix tissue, the fibro-elastic framework which has not become erectile. These considerations throw a certain light on the pathogeny of vascular tumors of the urethra and meatus.

Pathology.—First described by Morgagni and noted by Boyer and other authors, these tumors, which are for the most part pediculated and polypoid, have been for the first time made the subject of histological examination by G. Simon and Verneuil. The latter author has given them the name of papillary polyps and lays great stress upon their vascularity. To these tumors the term urethral hemorrhoids has been applied, and Wedl compares

the vessels of the pathological tissue to the vasa vorticosa of the choroid. According to Virchow, the difference between these tumors and ordinary telangiectasis consists in the fact that the vessels are not dilated nor are their walls thickened. Jondeau found, in two tumors of this class which he examined, connective tissue of the adult type mingled with elastic fibres, and between the trabeculæ were dilated vessels, which had preserved their normal walls, and which formed by their frequent union veritable lacunæ. A section following the axis of the tumor divided nearly all these vessels obliquely, and some of them longitudinally, which demonstrated their general direction parallel to the axis of the pedicle. More deeply there succeeded to the adult connective tissue an embryonic tissue characterized by fine connective bands and fibres; here also and up to the periphery of the tumor there were dilated vessels, though of less volume, and not provided with a distinct wall. All about the circumference of the tumor there were hypertrophied papillæ covered with pavement epithelium, and apparently secondary or accessory in their formation. In other words, the condition was that of an erectile tissue which in the male is normal, but of which the female is deprived; efforts of micturition had without doubt contributed to the development of the pedicle.

There are other cases in which the tumor is formed more by the prolapse of the mucous membrane than by a definite polyp. I do not think that this prolapse is essentially different from the mode of origin of polypi, for they always coincide with a marked increase in the vascularity of the part; it is more a question of degrees, but the general relaxation of the mucous membrane due to idiosyncrasy or constitutional weakness plays here an important part.

Etiology.—This affection is frequently met in little children; Larcher and Dollez have collected a number of such cases, and Benicke and Ruge have observed it in patients of the age of seven to eleven years. But it is toward the period of middle life that these lesions are most commonly seen, though they may also be encountered in the aged; one of Trélat's patients was seventy-five years old. All the causes of local irritation of the meatus, or of congestion of the pelvic organs, or of inflammation of the urinary passages in adults, and debility or cachexia in children favor the production of these lesions.

Symptoms.—To bring these tumors well into view, the nymphæ must be separated and pressure made on the urethra by a finger in the vagina so that the small tumor which is hidden within the urethra will spring forward out of the meatus. Their size is variable, being as small as a pin's head or as large as a nut. I have removed one from an old woman which had the appearance and volume of a raspberry. It is possible that the entire circumference of the meatus projects in a circular prolapse, like the condition of the rectal mucous membrane which is sometimes seen in hemorrhoids.

The most frequent seat of the tumor is in the lower portion of the meatus,

where is found the uvula which I have described as normal in some cases, and its insertion is apt to be broad; but it may be pedicled or constricted at the base. The color of these tumors is often violet or wine color, and pressure turns them pale and also diminishes their volume. The surface is smooth, easily torn, and bleeds with great freedom. General prolapse forms a cylindrical tumor, which occupies the normal place of the meatus and presents at its end an opening which is at times difficult to discover; it is seldom reducible. These tumors cause pain spontaneously and at the moment of urination or coitus, and they may be the origin of vaginismus; there are also occasionally crises of dysuria and retention by reflex action.

Diagnosis.—The painful nature of the complaint, in the absence of a local examination, would suggest either cystitis, vaginismus, or metritis. From the character of the tumor it is impossible to mistake it for epithelioma. Prolapse of the urethral membrane is not an essentially distinct lesion; it is the diffuse and less vascular form of the tumor whose circumscribed type is the polyp.

Treatment.—When the tumor is well pedicled, its base may be ligated with an elastic band, and its mortification thus produced. But the simplest and least painful treatment is excision, with cauterization, after applying cocaine. When the thermo-cautery is employed, there is no need of fearing hemorrhage, which may be annoying if a cutting instrument is used. The meatus will not be abnormally contracted if we do not cauterize the entire circumference of its orifice, which is unnecessary even when the prolapse of the membrane occupies the whole of the opening. The ablation of two segments and their cauterization is sufficient even in the latter case; hemorrhage is easily controlled by a catgut suture.

CANCER OF THE VULVA. *Pathology.*—Primitive cancer of the vulva is rare, especially as compared with the same affection of the uterus. In 7,479 women who suffered with cancer, Gurtl found 72 cases of cancer of the vulva, about 1 per cent; this proportion seems too large, for it is probable that many of these cancers were secondary. Wassermann has recently collected 24 cases of cancer of the urethra in women.

Cancer of the external genitals in the female presents many histological and anatomical forms. Histologically there may be epithelioma, either pavement or tubular, or sarcoma with its variety melano-sarcoma. Topographically there are two types, according as the neoplasm is developed in the clitoris or nymphæ, forming the variety known as cancer of the vestibule, or is situated about the urethra, infiltrating its tissues and giving rise to the peri-urethral variety.

Epithelioma presents no peculiar features histologically, and I refer to the chapter on Cancer of the Uterus for its description. It usually starts from the groove which separates the smaller from the greater labium; less often from the clitoris and meatus, under the form of nodules which are covered by thick layers of epithelium; these scales are of older date than

the cancer, and are the result of psoriasis of the part which has favored the development of the epithelioma. L. Mayer has reported several cases, and since then others have been observed. Later in the course of the disease the nodules ulcerate and invade the adjacent parts, but there is no tendency to involve the vagina except in the case of cancer starting at the urinary meatus, which may be propagated along this canal and so attack the anterior vaginal wall; the inguinal ganglia are rapidly engorged.

Sarcoma of the vulva may exist in the simple form, or as myxo-sarcoma, but it is more common to find it as melano-sarcoma. In a case reported by Taylor, the small fusiform cells were filled with a brownish pigment; in one of Terrillon's, the cells were round and pigmented, and both in the blood and in the urine there were dark granules to be discovered.

Etiology.—Cancer of the vulva is most frequent from forty to sixty years of age, but it has been observed much earlier. St. Germain operated on a patient at the age of five, and Arnott reports one of twenty; on the other hand, there are many cases known in the very old.

I have already mentioned the predisposing influence of psoriasis. Hutchinson asserts that the lesions of a former syphilis have a positive etiological value, but this does not appear probable.

Symptoms.—The cancerous nodules may pass unnoticed for a long time, the only symptom being pruritus vulvæ, wihch is very severe, in some cases presenting crises when it torments the patient, interspersed with periods of calm. When the tumor becomes excoriated, there is a discharge of serous or bloody fluid with a fetid odor. The neoplasm at first resembles a wart of the size of a nut and is hard, mammillated, sessile, or furnished with a small pedicle. When the nodules become multiplied and confluent, the whole region takes on a wooden consistence, as in the case of scirrhous cancer of the breast; the vaginal orifice is contracted, and in the peri-urethral form the meatus is partly obliterated. By vaginal touch, the urethra is felt as a hard cylinder. The ulceration has uneven borders covered with scales and crusts from the concretions of the discharge, and the adjacent skin is infiltrated and hard from œdema, presenting the appearance and consistence of orange peel; the pubic hair may fall out completely, and thus the vulva becomes entirely smooth. The secretion is serous or purulent; hemorrhage is rare. The ganglia of the groin rapidly swell and show all the signs of cancerous infection; from here the disease may become general, and death is hastened by some complication, as phlebitis or pleurisy. The vagina the rectum, and the bladder are finally involved, and the pain caused by inflammation of these parts is then very severe.

Course and Progress.—The latent period of simple pruritus may be quite long but as soon as the ulceration is established the various accidents succeed each other very rapidly; in melano-sarcoma the course is a little slower. In general, death occurs by the end of the second or third year. Cases in which the patient has lived from ten to twenty years are of doubtful diag-

nosis. Cornil has reported a case in which the tumor was a tubular epithelioma and a portion of it was eliminated, and the loss of tissue restored by a cicatrix.

Diagnosis.—Papillary vegetations of the vulva do not resemble cancer in the least, and in the case of polyp of the meatus the absence of ulceration would be a certain criterion.

Chancre occurs as a superficial ulceration or as an eroded and slightly projecting papule with very little discharge; and the early swelling of the ganglia in the characteristic form, together with other specific manifestations, will render the diagnosis clear.

Syphilitic papulo-erosions are multiple, flattened, and form a kind of rounded plateau looking like a small pastil placed upon the skin and varying in size from that of a pea to that of a franc piece; the surface is denuded, moist, and secreting like a blistered part; and under the influence of local and general treatment they disappear rapidly—a circumstance which may be used to distinguish them in doubtful cases.

When the papules are confluent, they may form plates of from 6 to 8 cm. in diameter, covering the whole vulvar region and encroaching upon the perineum. At first sight this lesion appears like that of total infiltration of the derma with cancerous process as in the so-called "cancer en curiasse," but attentive examination will quickly demonstrate the peculiar characters of the syphilitic papule. The enormous vegetations of hypertrophic papular syphilide (Fournier) have a malignant appearance only to the inexperienced.

Chancroid has an acute course without induration, is surrounded by healthy skin, and the ulceration is made up of many little sores in various degrees of development; for, according to the picturesque expression of Ricord, "the soft chancre lives with its family, surrounded by offspring."

Lupus presents the double characters of ulceration and hypertrophy, the latter often being the more prominent. This affection is also of an uncertain course with alternate destruction and repair, the edges of the ulceration being marked by cicatrices and bridles. Its contour, moreover, is sinuous: it is disposed on different levels with a tendency to invade the perineum and groin, and often at the bottom of the fissures a red, pink, or yellow base can be seen covered with cicatricial cuticle. Nothing like this is to be observed in cancer, whose course is continuous and destructive, and the ganglia, which are not involved in lupus, are here rapidly invaded.

Treatment.—Complete extirpation of the diseased part is the only means of arresting its course, and this ablation it has been advised to make with the thermo-cautery to avoid hemorrhage; but by proceeding rapidly with the bistoury and the scissors the loss of blood is very small, and we obtain a wound which will unite by first intention when sutured. In one case I thus procured primary union over a large surface after dissecting off a cancer which had destroyed the vestibule and the greater portion of the nymphæ. Especial care must be taken to restore the meatus by exact apposition of the

mucous membrane. Where the cancer is peri-urethral a sound introduced into the bladder will assist in the dissection, and it may be necessary to follow the neoplasm up to the neck of that organ. If the inguinal ganglia are involved, they should also be extirpated, but we are not able to postpone the recurrence of the disease for a very long time. Where ablation would expose too large a surface, we must have recourse to palliative measures. The symptoms which especially disturb the patient should be attacked, such as the ichorous discharge, the fetid odor, and the irritation of adjacent parts. Frequent application of antiseptic fluid should be made, and iodoform gauze packed into the ulcerations and frequently renewed. Borated vaselin should be applied to the groin and the inner surface of the thighs to prevent the erythema which is caused by the irritating leucorrhœa. In certain cases we may employ the method proposed by Kraske, who suggested covering the ulcerated surface with healthy skin, to render the course of the disease slower and the symptoms less painful. For this purpose the part to be treated should be first scraped carefully, and then the flaps of healthy skin swung over and applied to the denuded surface.

[TUMORS OF THE CLITORIS are extremely rare. They may be the result of simple hypertrophy, elephantiasis, or other benign growths, or of malignant degeneration. The study of their pathology and histology is very incomplete. In most of the cases noted the growth has followed syphilitic infection or eczematous or other chronic inflammatory conditions of the adjacent tissues. The tumors are often accompanied by warty excrescences and vegetations, are usually pedunculated, are accompanied by singularly insignificant symptoms, and, except where carcinomatous, seldom recur after removal by surgical measures. Peckham has observed a cyst of the clitoris containing about 60 gm. of a chocolate-colored liquid.]

CHAPTER XLIII.

INFLAMMATION AND CYSTS OF BARTHOLIN'S GLANDS.

Etiology and Pathogeny.—The glands of Bartholin, which Huguier proposed to call the vulvo-vaginal, have also been termed Duverney's or Cowper's glands, and the latter name has the advantage of suggesting their analogy with similar structures in the male. They are of the size of a bean and are situated deeply on the internal aspect of the labium majus, where they may be felt in a thin patient. The excretory duct is about 2 cm. in length and opens immediately in front of the hymen near the middle of the side of the vulva, and it admits the point of a Pravaz syringe.

The pathology of these glands may be almost said to have been created by Huguier. Since his time but little has been added to the descriptions which he gave, but we have learned that nearly all the lesions of the part, whether cysts or inflammation, are due to one great cause, namely, gonorrhœa. Breton was the first to demonstrate that this malady might remain for a long time dormant in the excretory duct of the gland after the vagina was free from it, and, starting from this point, renew its infection; Zeissl confirmed these statements. Suppuration of the duct is the rule in vaginitis, as is easily seen by pressing on the part after carefully cleaning it and thus obtaining a drop of pus from the opening of the gland, which is surrounded by a purple-red areola, which resembles a flea-bite and has been called the gonorrhœal macule by Sänger. To cure this inflammation, the duct should be opened with a Weber knife, such as is used in division of the lachrymal puncta, following it with the nitrate of silver crayon or a weak solution of chloride of zinc (1 : 50).

The intense infection which is propagated to the entire gland or some of its acini causes abscess; the obliteration or constriction of the duct produces cysts, among which are distinguished, arbitrarily and without anatomical proof, cyst of the duct, which is superficial, small, and transparent, and cysts of the gland. These expressions are no more justifiable than that of abscess of the duct applied to simple suppuration of the canal, which I have mentioned as the initial lesion in this group.

Cysts.—Symptoms.—The cyst may be single or multilocular; that is, formed at the expense of the whole gland or of one of its lobules, the rest being pushed aside. Its form is ovoid and its surface smooth; it is seldom transparent. Its contents are viscous, colorless or yellow, or at times mixed with blood and of a chocolate hue; in size it may vary from a nut to an egg. The tumor is usually unilateral, and on the left side elongated in the axis of

the greater lip, whose posterior portion it occupies nearer to the mucous than the cutaneous surface; on pressure it is elastic and compressible rather than fluctuating.

Cysts cause some discomfort in walking, but more in coitus, and they have a tendency to inflame and suppurate.

Since the time of Huguier all authors have distinguished two varieties —those of the duct and those of the gland proper. In the absence of any demonstrative dissection we ignore a distinction which refers to different parts of the gland in the production of the cyst, but clinically we know that there are two distinct types of the affection.

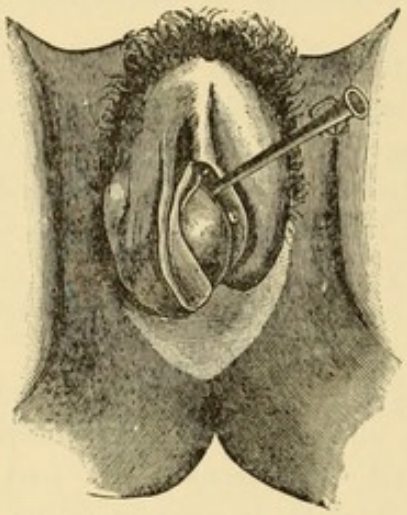


FIG. 560.—CYST OF BARTHOLIN'S GLAND. A sound has been passed into the urethra.

In the case of so-called cyst of the duct, which might better be termed the superficial variety, the tumor is generally very small, of the size of a nut, situated on the base of the labium minus, which it stretches out, making a projection in the vagina, and apparently placed directly under its mucous membrane, which glides freely over it; sometimes the tumor is transparent. The opening of the duct in certain cases remains pervious, and a small stylet may be introduced or pressure may force out a little viscous fluid; it seems then that the alteration in the consistence of the excretion plays here the double rôle of temporarily obstructing the duct, and also of contracting it and thus producing the cyst.

In the case of cyst of the gland itself, which I prefer to call deep cyst, the tumor is large and is situated behind the labium majus, between the entrance of the vagina and the ascending ramus of the ischium, elevating both labia. The duct is not permeable, and the fluid contained is often discolored by old extravasation. The case reported by Hoening, where the tumor reached into the pelvis, appears to me to belong to cysts of the vagina rather than to those of the labium majus; it was undoubtedly of Wolffian origin, and, being developed at the entrance of the vulva, it projected into the greater labium.

Diagnosis.—Reducible tumors should be first eliminated, and we should determine whether we have a solid or a fluid swelling to deal with. Fluctuation and transparence are not sufficient to indicate the nature of the affection certainly, as in case of similar collections in the scrotum. Transparence is usually absent in deep cysts of the labium majus, and fluctuation may also be lacking if the tumor is very tense; or the partial softening of a solid tumor, as, for instance, a fibroma, may simulate it. In doubtful cases, puncture with the aspirating needle will decide the question if we are un-

willing to wait till the moment of exploratory incision, which constitutes the first step of the extirpation in any case. After ascertaining that the tumor is liquid, we should then determine its exact situation. Hydrocele in the female, or cyst of the labium majus apart from the vulvo-vaginal gland, which has given rise to so much theoretic discussion, occupies the upper part of the labium; fluid collections, which may be either blood or serum, are reducible from the clinical standpoint to a few varieties, whose brief description will suffice to make clear the diagnosis (see the chapter on Tumors of the Round Ligament).

1. Small cysts of the size of an almond which enter and emerge from the more or less dilated inguinal canal, or even retire within the abdominal cavity under gentle pressure and come out as readily; sacculated cysts of old hernial sacs which have become obliterated and filled with fluid.

2. More voluminous cysts, not reducible, situated in the upper part of the labium majus, containing serum or a brownish fluid mixed with blood, which has given them the name of hæmatocele; at times furnished with a pedicle, which is continued into the inguinal canal. According to some authors, these are hydroceles of the canal of Nuck or cysts arising in the thickness of the round ligament, or sacculated cysts of old hernial sacs.

3. Occasionally a cyst may develop in front of a hernia which is retained by a truss, from the friction, but this clinical curiosity has nothing in common with the subject under discussion.

There remain the solid tumors, and among them the irreducible epiploceles, whose pasty consistence and lobulated form are easily recognized. The best sign is furnished by the presence of a pedicle, which may be felt by drawing down the tumor as much as possible, and palpating at the external ring. If there is no sign of a connection at this point between the tumor and the contents of the abdomen, the case is not one of hernia; and the diagnosis will be confirmed if the impulse of coughing can be felt at the ring but not in the tumor. As to reducible enterocele, it is very rare in this region, and its sonorous percussion note is characteristic. A difficulty in diagnosis may be caused by the presence of fluid in the sac; and when there are both a hernia and a tumor of the labium majus in the same case, the diagnosis beomes enormously complicated. Ovarian hernia into the labium majus has been seen, although it is usually arrested at the level of the ring; the gland preserves its usual form and sensibility, and pressure on the anterior face of the uterus causes a retraction of the tumor; but if there is a layer of fluid about an ovary which is atrophied and pressed against the wall of the sac, the case is very obscure.

Several cases of primary cancer of the glands of Bartholin have been observed, but they are very rare. Extension to adjoining parts will rapidly put one on the right path in regard to diagnosis.

Treatment.—If the contents of the sac are merely emptied, they reappear very quickly, and consequently the cyst cavity should be modified in some

way, for which purpose a number of methods have been proposed. The injection of from ten to twelve drops of chloride of zinc solution (1 : 10) with a Pravaz syringe, after aspiration of a quantity of the fluid equal to the amount injected, has been successful, but the inflammation thus produced may be so extreme as to cause suppuration. Free incision followed by tamponing with iodoform gauze until the cyst wall exfoliates is a very sure method, but also very long. Extirpation of the cyst with immediate suture of the wound is to be preferred. To facilitate the dissection, which is rendered very difficult as soon as the cyst is opened, I apply to the operation my procedure of injecting spermaceti. The cyst is first punctured with a trocar as in the case of hydrocele, washed with hot water, and the melted paraffin introduced at a low temperature. When the cavity is distended ice is applied, and at the end of a few minutes we obtain a mass which is very easily extirpated with the anæsthesia of the cold and cocaine if necessary.

Abscess.—Symptoms.—Suppuration of Bartholin's glands may supervene after inflammation of a cyst or originate *de novo*. The swelling and peripheral œdema are considerable and extend over the posterior portion of the vulva or even to the anus; the pain is acute, lancinating, and there is always a certain degree of fever and at times retention of urine. The fluctuation is apparent first on the inner surface of the labium majus, and the purulent matter is voided by one or many openings situated below the orifice of the duct. The pus is abundant and fetid as is usual in the neighborhood of the natural canals, and the presence of the gonococcus may often be determined. The fistulæ persist for a long time after the inflammation has disappeared, communicating with distinct foci which correspond to the different lobules of the gland. But more often the whole of the gland and the adjacent tissues are involved by the suppuration, and the many fistulæ which result open into a common cavity. Exceptionally they open on the perineum or into the rectum, giving rise to recto-vulvar fistulæ. If the integument has been destroyed, there is a vast ulcerating surface of the inner aspect of the labium.

To the acute form the chronic may succeed; it is clinically distinct from the other, and has been well described by Hamonic and Fauvel as an obstinate seat of gonorrhœa. Huguier has applied the term of purulent hypersecretion to this condition. There are no signs of inflammation, no tumor, but only a simple hypertrophic induration of the gland, whose duct gives vent on pressure to a milky or greenish pus, which also escapes spontaneously by the fistulous openings. It is the last refuge of the gonorrhœal inflammation, a frequent and unsuspected source of infection for the man, and capable of lighting up anew an ascending specific inflammation of the genital canal of the woman after labor or abortion.

Diagnosis.—A fecal abscess from the margin of the anus and extending to the posterior part of the labium majus may be distinguished by the greater disturbance on the part of the rectum and the wider diffusion of the inflam-

mation. Phlegmon of the labium majus, which is often of angioleucitic origin, is situated usually on the external and cutaneous surface of the part, while abscess of the vulvo-vaginal gland occupies the internal and mucous surface. Furuncles are found in the skin and present a special appearance and evolution. Ulceration of a part of the wall of a purulent focus must not be confounded with soft chancre; merely mentioning it is enough to prevent the error.

Treatment.—Free incision of the cyst should be practised as soon as the inflammation appears; the bistoury is plunged in at the junction of skin and mucous surfaces within the free edge of the labium majus; care should be taken, by making the opening large enough, that no cul-de-sac or pockets are left; drainage tubes are insufficient. It is good practice to extirpate the gland when the first incision is made, excising all the internal surface of the cavity with the curved scissors, washing the wound with strong carbolic solution, and tamponing with iodoform gauze. If there are old fistulæ from the spontaneous evacuation of the cyst, the gland should be extirpated in the same way, which is the only method of curing the interminable suppuration of these fistulæ, which close and open again continuously. The wound can be closed immediately with catgut sutures buried on superposed planes.

CHAPTER XLIV.

PRURITUS VULVÆ—COCCYGODYNIA.

Pruritus Vulvæ. *Definition.*—The sensations of itching and heat which accompany eruption of the vulva or the irritating leucorrhœa of vaginitis, metritis, and cancer, and also, especially in children, symptoms of oxyuris, constitute only a symptom and not a disease; the characteristic of idiopathic pruritus is the absence of every lesion which could explain the intolerable itching which drives these patients to scratch and excoriate themselves.

Etiology.—In the absence of all apparent causes, certain authors have supposed the existence of a central origin.

The arthritic diathesis, which G. de Mussey considered a cause and whose influence is incontestable, produces no alteration of the derma which can be determined clinically.

As there are many cases in which there is no lesion of any of the genital organs, so there are also many in which the uterus or the ovaries are involved, and seem to act by a sort of reflex on the vulva; it is thus that vesical calculus causes acute itching of the glans penis.

Diabetes is one of the most frequent causes of this affection, but it is difficult to decide whether it acts by the local irritation of the abnormal urine or by the central nervous system. Pregnancy also favors the appearance of pruritus, especially at the end and at the beginning of the period, when the congestion of the genital apparatus is most annoying.

Symptoms.—The itching sensation may be continuous or intermittent, returning at certain hours, especially during the night, when the heat of the bed aggravates it. Cases are also cited in which it appeared every two or three days. Many women suffer from it at the menstrual periods, others only when they are pregnant. The seat of the sensation is most often over a large surface comprising the clitoris, the mons veneris, and the labia majora, or the clitoris may alone be involved. The patient scratches, and the excoriations thus produced become the source of new itching. Finally, the friction of the parts leads to onanism (masturbation), and the profound excitement of the nervous system results in serious disturbance of the general health and the mental powers, leading to anæmia and lunacy.

Diagnosis.—Any local source of the irritation must be carefully sought, and the uterus and its adnexa examined with thoroughness, as well as the urinary system and the rectum, and the presence of diabetes should be determined.

The prognosis is variable according to the cause of the affection, the most rebellious cases being those in which the cause is most obscure.

Treatment.—In the first place the patient must be freed from every concomitant malady. The general nutrition should be modified by appropriate regimen when we have reason to think that she is arthritic or herpetic; causing her to abstain from alcoholic drinks, spices, fish, and crustacea, etc.; giving slightly alkaline beverages, frequent laxatives, prolonged baths, and arsenic internally. If there is diabetes, the proper treatment should be employed.

Locally, the eruption should be treated. Topical applications of various kinds have been recommended for idiopathic pruritus; the best for the pain and discomfort is cocaine solution (1 : 10). Light cauterization has also been advised with nitrate of silver or strong carbolic solution; chloroform water, white wash, Van Swieten's fluid, menthol, etc., have all been tried. Internally, the antispasmodics have been administered, but especially bromide of potassium and cannabis indica. Schröder and Löhlein have obtained success, the former in four cases, the latter in one case, by the excision of small portions of skin where the pruritus was localized; on histological examination Schröder was unable to find any change.

Coccygodynia.—*Definition.*—Under this name has been described an intense pain, situated at the coccyx, which appears only in women and is often related to disease of the genitals. It was first described by Nott as neuralgia of the coccyx; Simpson then published the first complete memoir on the point, and gave the affection its present name; Scanzoni also devoted some attention to the subject.

Etiology.—In the majority of the typical cases there is no appreciable lesion, and the disease seems to be simply a neuralgia. But in other cases there is some affection of the uterus, such as metritis, deviation, prolapse of the ovaries, etc., which does not explain the location or the intensity of the pain, but which seems to be bound up with it in some way. In a third class of cases there is some lesion of the coccyx itself or of its ligaments, which may be the cause of extreme pain occasionally. Of this kind are the cases in which there is abnormal mobility of the bone, due perhaps to torsion or luxation during parturition, with anchylosis, abnormal length, or osteitis of the part.

The influence of labor seems beyond doubt. Scanzoni in 34 cases of his own which he collected found no case in which the woman had not borne children; in 9 cases the pain appeared during the labor, and 5 were delivered with forceps; it is natural to suppose that the bone was luxated in these cases. It is interesting to notice that Hyrtl found 34 cases in which there was some vestige of luxation, and subsequent anchylosis in 180 pelves which he examined for the purpose; we must then admit that the lesion is both very frequent and not very painful. It evidently does not constitute the only explanation of pain, for cases of coccygodynia are

far more frequent than cases of luxation. Von Graefe observed 6 cases in women who had had unusually easy labors, and attributes no importance to luxation; in 2 of these cases the pain appeared at the end of pregnancy, and he thought that it was due to the pressure of the fœtal head upon the terminal portion of the sacral plexus, causing a neuritis.

Though the importance of coccygeal lesions may be slight, it must, however, be admitted. In a young girl observed by Zweifel the pain followed a fall which had probably fractured the bone; it disappeared at the end of a year. Scanzoni had two cases in which riding horseback was of some influence. Zweifel and Courty have observed the affection in virgins, and Beigel in children; these latter cases are altogether exceptional.

Symptoms.—The capital symptom is pain limited to the coccyx and the parts immediately adjacent. It is intense, is worse on pressure, on sitting, in coitus, defecation, and all other efforts. Everything which jolts the part increases the pain, which is at times so intense that Scanzoni compares it with dental neuralgia. To assure one's self of the anatomical condition of the coccyx, rectal touch may be practised, and the bone seized between the index and thumb after local anæsthesia with cocaine.

Treatment.—The cure of concomitant disease, especially of retroflexion, will often cure the pain also. To diminish the suffering, hypodermic injection of cocaine may be employed (1 cgm.). Morphine injections and belladonna suppositories are also of benefit.

When there is no lesion of the bone, Von Graefe recommends faradization, and has had good success with this means. He places one electrode on the coccyx and the other on the sacrum, and increases the strength of the current at each session, which vary in number from three to eight. The surgical treatment is the only one in many cases which promises any assistance. With the design of preventing movements of the bone, Simpson made a series of subcutaneous sections of the muscles and tendons which isolated the bone completely; but this treatment is often unsuccessful. The best plan is to have recourse to complete extirpation of the bone, first performed by Nott. Many cases have thus been successfully treated which had resisted all other therapeutic agents. It has yielded, in my hands, a complete and durable cure of a very rebellious case.

CHAPTER XLV.

WOUNDS OF THE VULVA AND VAGINA. ATRESIA AND STENOSIS. FOREIGN BODIES.

Wounds of the Vagina and Vulva.—*Etiology.*—Most frequently lacerations of the vulva and vagina result from coitus or parturition; they have also been observed after traumatism.

Coitus brutally performed at the first voluntary approach, or with violence, may lacerate the hymen, or even tear it off entirely; at other times the tear extends beyond the insertion of the membrane toward the nympha or vestibule; the vaginal wall is less often involved, but cases have been published in which the posterior wall of this canal was ruptured by violence. Sabin has reported a case in which the recto-vaginal septum was lacerated from the vulva to the cul-de-sac of Douglas; and Barnes mentions a specimen in the museum of St. George's Hospital in which the vaginal laceration penetrated the peritoneum; it had been produced by coitus with an aged woman whose vagina was probably the seat of atrophic contraction. Breisky cites a case, followed by cure, which may also be attributed to senile involution.

During parturition the hymen is often ruptured, for Budin observed it thirteen times in seventy-five primiparæ in whom it had been intact up to the end of pregnancy; and this rupture may extend to the perineum (see the chapter on Laceration of the Perineum). The vagina has been torn during labor by the forceps and the cephalotribe.

Surgical traumatism which may cause the rupture of the vagina may be: violent manœuvres to reduce an old inversion of the uterus, extraction of a large fibroma, etc. The most frequent accidents observed are injuries by the horns of animals, falls upon a pointed object, the rough introduction or the long sojourn of foreign bodies.

Symptoms.—The seat of the laceration varies with the cause which has produced it.

The hemorrhage, which is at times very serious in laceration of the hymen, may be attributed to the occasional presence of erectile tissue in the membrane, which Henle has described. The laceration may extend to the vestibule and the bleeding be so profuse as to threaten the life of the patient.

When Douglas' pouch has been opened, a loop of intestine may escape; if not reduced, it becomes strangulated and gangrenous and leaves an ileo-vaginal fistula when death is not the result of the accident.

If the rectum or the bladder be opened, there may be a persistent fecal or urinary fistula left.

The diagnosis raises important questions of a medico-legal bearing. There is a tendency to attribute all lacerations of the vulva in young girls to attempts at violent intercourse. Hofman and Maschka have shown that simple manipulations may have the same effect, and have therefore advised against a hasty decision, as there is frequently an attempt at blackmail connected with the charge of attempted rape.

Prognosis.—The hemorrhage is dangerous only when the woman is deprived of all assistance.

The inflammatory and septic complications which may follow the wound depend upon the care with which the injury is treated. It is worthy of note, and difficult of explanation, that lacerations which opened the peritoneum have been cured in the pre-antiseptic era, and also more recently in spite of the absence of all proper precaution against infection. On the contrary, an insignificant wound, like the bite of a leech, if neglected, may cause grave suppuration. Laceration of the vagina is especially serious during labor when there is any source of infection in the canal, such as vegetations, gonorrhœa, etc.

Treatment.—When the vulva and vagina are abnormally narrow, a prophylactic treatment should be begun during pregnancy. For the laceration itself, the general rules for all traumatic lesions should be followed: arrest of the bleeding by ligature, permanent forcipressure, or hæmostatic suture; closure of the wound after reduction of any viscera which have extruded by the solution of continuity; antisepsis of the region. Loose tamponing of the vagina with iodoform gauze should follow its suture, and gentle compression of the parts be maintained by a T-bandage.

Acquired Stenosis and Atresia.—*Etiology.*—In the great majority of cases the contraction (stenosis) and obliteration (atresia) of the vagina or vulva are the result of difficult labors. If the eschars produced involve the whole extent of the wall, they may leave fistulæ when they fall, either fecal or urinary; if only a portion of the thickness of the wall has been destroyed, the cicatrix which succeeds may undergo retraction, and often the parts in contact unite by immediate secondary union.

It is possible that the cicatrix may be due to injury by a foreign body which has violently penetrated the vagina and transfixed it, or by its long sojourn has caused ulceration, as in the case of forgotten pessaries. Cauterization for surgical purposes or to produce abortion, eschars due to gangrene in an infectious disease, lupus of the vulva and syphilitic ulceration, suppuration in the lower pelvis (phlegmonous dissecting peri-vaginitis) may all be the causes of contraction by cicatrices. Vaginitis alone, both in children and adults, may produce a fusion of the walls of the canal.

There is a rare cause which acts almost wholly on the upper portion of the vagina in the neighborhood of the cervix, namely, senile atrophy. The

canal contracts, becomes infundibuliform, and at the bottom of the cone thus formed the atrophied cervix may be perceived with difficulty. It is at times hard to distinguish these cases from those in which the contraction is the result of cicatrices or cancer. This contraction is seen only in women who have not been accustomed to coitus; I have seen one curious case.

Symptoms.—The cicatrices may occupy the entrance of the vagina when they are the result of traumatism, or of gangrene in young children, but the great majority of these adhesions and contractions are the effect of wounds received during parturition, and hence their situation is deeper, actually in the vagina. The disturbance which results is developed very slowly and at times for a long while retarded by the constant dilatation of coitus; a slight degree of permeability suffices for the escape of the menstrual fluid and the performance of coitus. It may thus happen that the patient has had a very pronounced lesion without having her attention attracted to it. If, however, the orifice is very narrow, there may be dysmenorrhæa of the variety which is termed obstructive.

If the obliteration is complete (atresia), the menstrual blood accumulates above the obstacle and distends the vagina in whole or in part, as well as the uterus and the tubes (hæmato-colpos, hæmatometra, hæmato-salpinx). (See Retention Accidents following Atresia of the Genital Passages.) On the contrary, accidental obstruction of the genital canal has occasionally produced amenorrhœa—a fortunate circumstance which prevents serious results.

The stenosis may present as an annular cicatrix forming a sort of diaphragm, whose projection acts as an obstacle to the escape of the uterine secretions which accumulate above it. The ring is often incomplete, in the form of a falciform band stretching across the external os, which it may altogether conceal, so that it is inaccessible to the touch except through the cicatricial membrane.

Certain deviations of the uterus seem to be due to this cause, as I have frequently observed. At the same time there is almost always metritis, produced no doubt by the presence of an obstacle to the ordinary drainage of the uterine cavity. The contraction may be so narrow that the orifice which gives passage to the menstrual flow is discovered only with difficulty.

The treatment of the acquired atresiæ resembles that of the congenital; an artificial vagina may have to be created either to permit coitus, or for the remedy of grave retention effects.

Cicatricial bridles which produce simple contractions or stenoses may require the interference of the surgeon in three different sets of circumstances; when the uterus is not gravid, during pregnancy, and at the moment of parturition.

1. *In the Non-gravid Condition.*—It is not only to destroy an obstacle to the performance of the conjugal relations that the affection requires treatment, for these bridles form the starting-point of abnormal reflexes, like foreign bodies, producing pain and metrorrhagia.

The simplest method of dividing them consists in removing them with the finger without the aid of the speculum, but depressing the cervix and adjacent parts if necessary with forceps; then they may be cut in successive strokes with the long scissors, taking great care not to wound the vaginal wall. This section may be accomplished in several sessions, each followed by dilatation; at first by tamponing with iodoform gauze, then with cylinders of rubber or Bozeman's dilators, which are used in the preliminary treatment of vesico-vaginal fistula. Later it is well to introduce a Dumont pallier or Hodge pessary to keep the vaginal walls separated. If the cicatrix is very thick and of great extent, it is better to excise it, and cover the loss of substance by a healthy flap of mucous membrane dissected from the immediate vicinity.

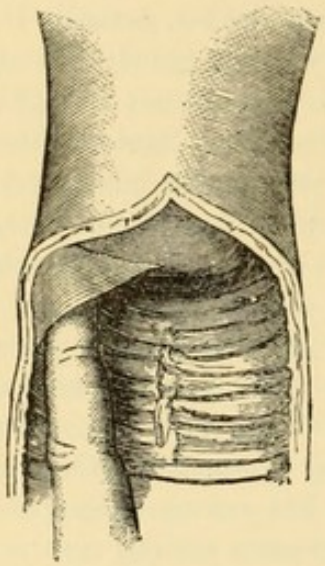


FIG. 561.—FALCIFORM CICATRICIAL BAND FROM THE VAGINAL WALL TO THE CERVIX (BARNES).

With vaginal cicatrices which contract the canal, there may also exist a rectal or vesical fistula; where this is the case, the destruction of the former may enlarge the fistula, and this fact may lead the surgeon to decide in favor of indirect treatment by obliterating the vagina by colpocleisis.

2. *During Pregnancy.*—Contractions and stenoses of the vagina in the gravid female raise serious questions as to operation—whether to provoke abortion or premature labor, or simply to destroy the obstacle, and allow the pregnancy to proceed. Oldham in a case of this sort caused premature labor and saved his patient; Doherty could not bring himself to adopt this plan, and his patient died. Churchill declares in favor of such interference with the object of preventing rupture of uterus and vagina, which is frequently the result of temporizing. But progressive section of the bridles may allow sufficient dilatation, and at the time of labor the parts are so much softened that a cicatrix is rendered very elastic, which before seemed inextensible.

3. *At the Time of Parturition.*—It may happen that the condition of the vagina has been ignored until the labor has begun, and we find ourselves in the presence of the obstacle. Where spontaneous dilatation is manifestly impossible, Churchill and Doherty recommend vaginal incisions, taking the risk of seeing them extend to become lacerations and cause fistulæ; after that, craniotomy must be employed. These measures of necessity in a very narrow and easily torn vagina are not free from danger, and I consider Porro's operation preferable, for it eliminates new risk to the woman and thus is better than the Cæsarean section. Porro's operation is absolutely indicated if the contraction is so complete that the escape of the lochia is impossible, and especially, as in a case of Levy's, if contraction over a large extent has occurred during pregnancy.

FOREIGN BODIES.—The list of foreign bodies introduced into the genital passages, and left there, includes pessaries, sponges, tampons, spools, pomade jars, boxes, bottles, pencils, hairpins, etc.; intestinal worms and insects have also been found there.

Etiology.—Children will at times pass various objects into the genital canal in play, but most often it is some instrument which serves for masturbation which escapes the fingers, and glides into the deeper parts of the canal; occasionally broken canulæ or fragments of glass specula may be left there by accident. Very rarely a foreign body in the rectum or bladder will ulcerate through into the vagina.

Symptoms and Course.—If the object is hard and not porous, it may be aseptic for a long time and so be tolerated, as is the case with pessaries of hard rubber or metal. But the steady pressure upon one point ends in ulceration of the tissues, and I have seen a case in which the pessary had been forgotten, had burrowed under the mucous membrane for a certain extent, and then the membrane had healed over it like a bridge, so that it was necessary to cut the loop thus formed in order to extract the instrument.

In other cases the foreign body becomes tolerable by a peculiar process which resembles that found in certain neoplasms, namely, by calcification; pointed objects, like pins, are thus prevented from wounding the parts. Getschel has observed one of these calculi which recalled those formed in the bladder in similar circumstances. Some of the cases, cited by the older authors, of vaginal stones may be only fibromata of the uterus which had become calcified, or vesical calculi which had ulcerated through the anterior vaginal wall.

If the object is porous, it may become infected and cause inflammation and progressive ulceration; thus, a hairpin has been extracted from the vagina, where it had been for sixteen years, and had produced a vesico-vaginal fistula, and a pomade jar which, after sixteen years had caused a recto-vaginal fistula. In 1887 I saw in Freund's service at Strasburg a woman who had suffered for ten years after the introduction of a hairpin into the uterus to provoke abortion; laparatomy was performed and pyo-salpinx discovered, and, stuck in the purulent pocket, the hairpin was found, rusty and eroded.

Pelvic suppuration has followed immediately or after the lapse of a certain time, with peritonitis.

The irritation produced about a foreign body of some size may cause a circular contraction of the vagina. Pearse, Kottmann, Carter, Breisky, Broer, and Winternitz have each seen almost complete obliteration of the canal below a spool which had become encysted in the superior portion of the vagina.

Usually the foreign body, even when tolerated, causes a profuse leucorrhœal discharge, which may become purulent, and be accompanied by hemorrhages. The bleeding comes not so much from the ulceration of the

vaginal wall as from the uterus, whose mucous membrane has been infected from the vagina.

The diagnosis may be very difficult when the foreign body is buried in the tissues and hidden by contraction; the assertions and memories of the patient are never trustworthy. Exploration with a sound, aided by vaginal touch and at times rectal palpation, will be found of great service.

The treatment consists first in removing the foreign body, and then in curing the lesions which it has caused.

Small free objects in the vaginal pouches, like insects, intestinal worms, etc., are extracted without difficulty by irrigation through a wide speculum which separates the walls freely. If there is a contraction of the vagina below a hard round body, it may be expelled by pressure through the rectum. It is usually advisable not to employ the speculum in extracting the object after its situation has been determined with the aid of this instrument, but sometimes a short blade is useful to depress the fourchette.

The forceps are passed along the finger, which is held close to the object to be removed, and, if there are bridles, they should be cut with the scissors, using the finger as a guide more than the sight. Hairpins are an important class by themselves, and are almost always found with their points directed forward, so that they must first be disengaged and then removed. If the foreign body is large and covered with asperities, no effort of extraction should be made unless the vaginal wall is protected with retractors, and the object has been seized with a lithotomy forceps. If the object is very large and hard, it may be extracted with Segond's instrument for polypi; if stony, it may be crushed with the instruments used for large vesical calculi.

The vagina should be carefully disinfected with antiseptic solutions, especially where the object was lodged, and the metritis which is almost always present treated by the curette.

CHAPTER XLVI.

MALFORMATIONS OF THE VULVA, AND HERMAPHRODISM.

The genital organs of the two sexes have the same origin, being developed from the Wolffian body, Müller's ducts, and the genital glands.

The organ of Wolff or of Oken, or the primordial kidney, is a temporary organ which is already well developed by the thirty-fifth day, but disappears at the end of the second month. It extends from the summit of the thorax to the pelvis on either side of the vertebral column. It consists first of two longitudinal ducts, and then there develop a series of straight tubes which afterward become flexuous, and empty into the two primitive conduits; these are situated in front of the glandular mass and outside of it, and seem to be the excretory ducts. They end posteriorly in the lower part of the genito-urinary sinus, a large depression which later becomes the vulva, the perineum, and the margin of the anus. On the inner portion of the Wolffian body, there appear in the fifth and sixth months the genital glands which develop into either ovaries or testicles; as they increase, the Wolffian body lessens, atrophies, and is finally shut off by a fold of peritoneum.

The permanent kidneys develop behind the Wolffian body, and remain independent of the rest of the genital apparatus; their excretory ducts, formed from a diverticulum of the Wolffian duct, open into the bladder, and this viscus, as also the urethra, is formed at the expense of the allantois, which is a process derived from the rectum in the fœtus. That portion of the allantois which extends from the upper part of the bladder to the umbilicus forms the urachus and becomes the superior ligament of the bladder. Two other ducts are formed parallel with those of the Wolffian body, situated above and external to them, which are called Müller's ducts; they fuse below and open into the inferior part of the allantois below the vesical dilatation at the place where the urethral canal is formed. The cavity where the Müllerian ducts empty communicates freely behind with the rectum, and this junction is termed the cloaca (see Fig. 564, 1 and 2).

Up to the third month the embryo has no sex, or rather has the elements of both sexes—its sex is indifferent and indeterminate; but at that time the internal organs begin to develop toward the masculine or the feminine type.

If the first shall be developed, the ducts of Müller disappear and leave only a vestige of their lower extremity, fused and opening into the uro-genital sinus, to become the prostato-membranous portion of the urethra; they open at this point by a common orifice, terminated by a cul-de-sac, the pro-

static utricle or uterus masculinus. At the same time the median portion of the Wolffian body forms the head of the epididymis and the tail of that organ, the vas deferens and ejaculatory ducts coming from the Wolffian ducts; the genital gland is transformed into the testicle (Fig. 562, 1 and 3).

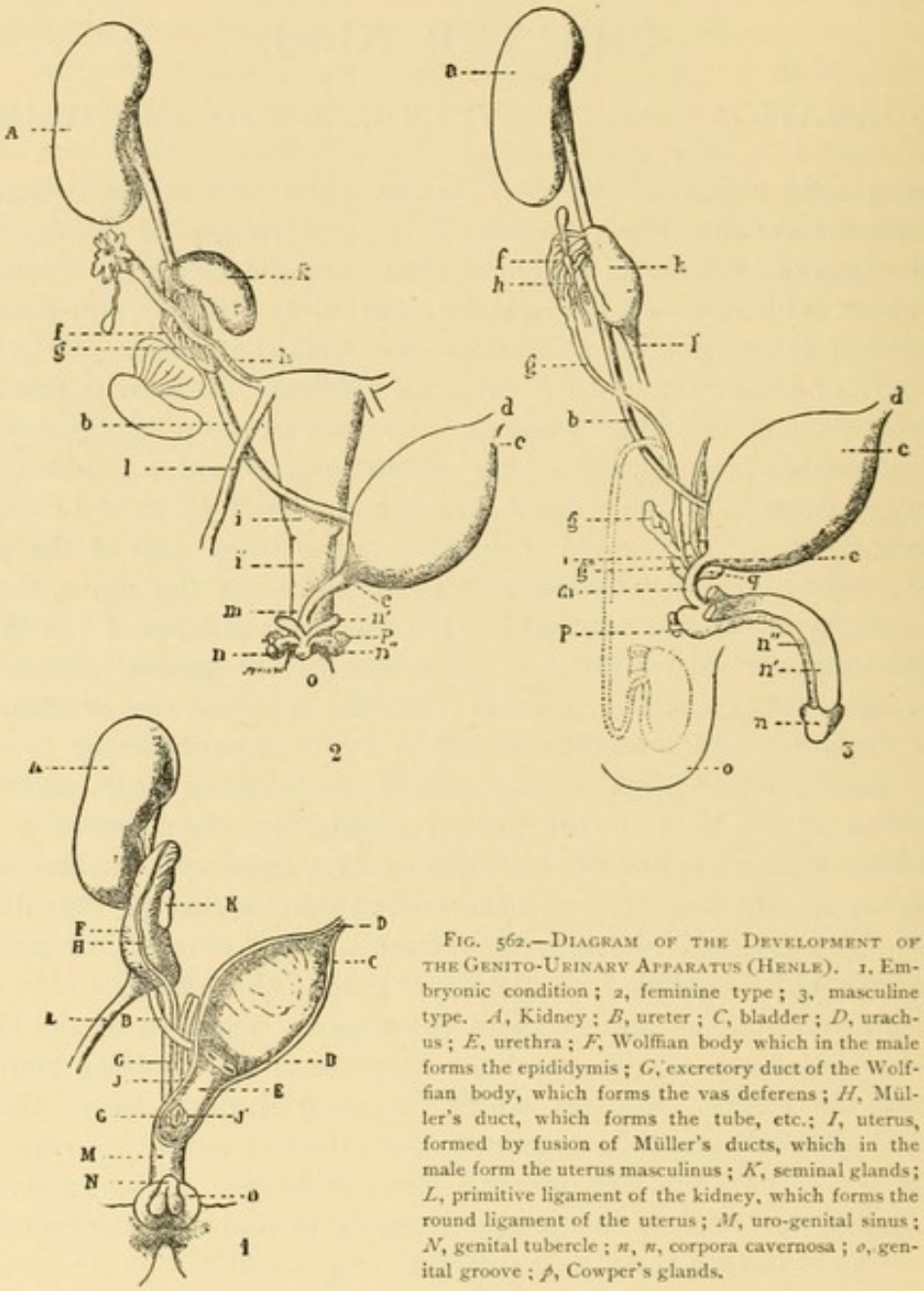


Fig. 562.—Diagram of the Development of the Genito-Urinary Apparatus (Henle). 1, Embryonic condition; 2, feminine type; 3, masculine type. *A*, Kidney; *B*, ureter; *C*, bladder; *D*, urachus; *E*, urethra; *F*, Wolffian body which in the male forms the epididymis; *G*, excretory duct of the Wolffian body, which forms the vas deferens; *H*, Müller's duct, which forms the tube, etc.; *I*, uterus, formed by fusion of Müller's ducts, which in the male form the uterus masculinus; *K*, seminal glands; *L*, primitive ligament of the kidney, which forms the round ligament of the uterus; *M*, uro-genital sinus; *N*, genital tubercle; *n*, *n*, corpora cavernosa; *o*, genital groove; *P*, Cowper's glands.

If the individual is to be of the feminine sex, the genital gland becomes the ovary, Müller's duct persists, the Wolffian body and canal atrophy and almost entirely disappear, leaving only the organ of Rosenmüller as their vestige in the broad ligament.

The upper portion of Müller's ducts forms the Fallopian tube, the middle and lower parts blend and constitute the vagina and uterus; this union

begins at the inferior portion, and the short conduit so formed communicates with the cloaca. At the end of the second month the two Müllerian canals are in apposition but still separated throughout their whole extent, except at the orifice, by a septum which results from their junction, and which persists at the upper part until the fourth month.

The round ligament is formed from the ligament of the Wolffian body, and is inserted at the junction of the superior with the middle third of Müller's duct; this point is important for the appreciation of arrested development (Fig. 562, 2).

The external organs are developed at the expense of the genital tubercle, which appears, according to Kölliker, at the sixth week of fœtal life, and is well developed at the end of the two following weeks. On each side two folds become prominent which are called the genital folds. At the end of

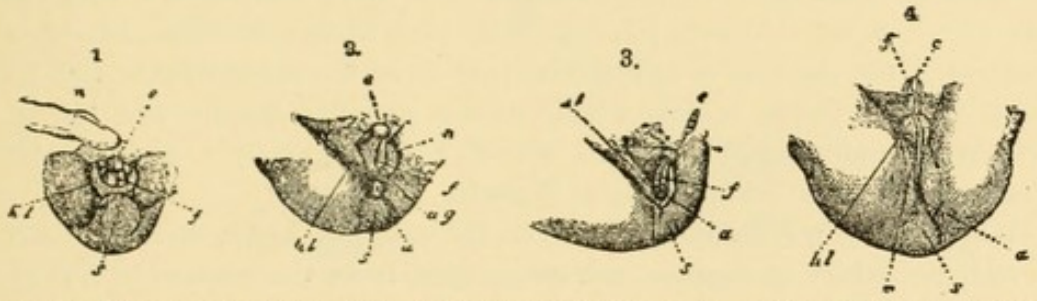


Fig. 563.—Development of the External Genital Organs (Ecker). 1. Lower portion of an embryo at the eighth week; hermaphrodite stage, enlarged two diameters. *c*, Glans at the summit of the genital tubercle; *f*, genital groove ending behind at the anus and thus forming part of the cloaca; *hl*, genital folds; *s*, extremity of the body of the embryo; *n*, umbilical cord. 2. Embryo at about the tenth week, female. *a*, Anus; *ug*, uro-genital sinus; *n*, edges of genital furrow or labia minora. 3. Embryo a little younger than the preceding, to show the stage which precedes the indication of the sex. 4. Male embryo at the end of the fourth month.

the second month the genital tubercle becomes prominent, and on its posterior aspect we can then recognize the presence of a furrow directed toward the orifice of the cloaca which gives it a bifid appearance, and is termed the genital groove. The perineum also advances under the form of a median projection and two lateral folds which meet in the middle line, forming the raphé, toward the point where the allantois empties into the rectum, transforming the recto-allantoid cloaca into two portions, the uro-genital sinus situated anteriorly, and the anus behind. The inferior segment of the allantois retracts to form the urethra, and the Müllerian ducts fuse to form the vagina (Fig. 564, 3, 4, 5).

This transformation of the cloaca is effected during the third month, and at the same time the difference in the sexes may be determined (Fig. 563); in the male embryo the genital tubercle becomes the penis and the genital furrow forms the penile portion of the urethra, while the genital folds, situated behind, blend to form the scrotum; in the female these folds become the labia majora, and the edges of the furrow are the labia minora, the genital tubercle appearing as the clitoris.

The genital groove does not close more in front than behind, and thus

the female lacks the clitoridian portion of the urethra; and this canal in the adult opens at a point homologous with that where it was found in the fœtus of eight weeks—a disposition which is found in the male when the proper development of the parts has been arrested (hypospadias). The corpus spongiosum of the urethra, the product of the erectilized borders of the genital furrow, is also completely developed in the male, and entirely surrounds the canal in the pendulous portion. But in the female it aborts in the intermediate or vestibular portion, and is reduced to its two extremities below, to the bulb of the vestibule, homologue of the bulb of the male urethra, but divided by the persistent genital opening; and above it forms the glands of the clitoris which covers the corpora cavernosa clitoridis, homologues of the similar structures in the male penis. At the internal part of the bulb of the vestibule there are vestiges of a membranous organ which reaches its full development in the male, namely, the bulb of the urethra; it is this which forms the hymen. Above, joining bulb and hymen to the clitoris, and representing the vertical or cylindrical portion of the masculine corpus spongiosum, there is in the female a band with a vascular bundle running in it, the frænum masculinum vestibuli, which I first described, and the intermediate plexus (pars intermedia) of Kobelt.

To appreciate the homology between the external organs of the two sexes, it is only necessary to suppose the penis split from the meatus to the bulb; the section of the urethra in the male just where it enters the bulb exactly represents the urinary meatus of the female surrounded by the bifurcation of the frænum masculinum, which is a vestige of the corpus spongiosum of the male. To complete the symmetry, the penis may be considered as elevated and applied to the pubic symphysis, placing the glans in the same subpubic situation that the glans clitoridis occupies. It is then easy to recognize the following homologies, which I have sought to establish since 1884:

Glans clitoridis.	Glans penis.
Prepuce of clitoris.	Upper part of prepuce.
Corpora cavernosa of clitoris.	Corpora cavernosa of penis.
Frænum masculinum and intermediate plexus of Kobelt.	Cylindrical portion of corpus spongiosum of urethra.
Hymen and bulb of vagina.	Veru montanum and bulb of urethra.
Frænum of clitoris.	Frænum of penis.
Labia minora.	Deeper layer of scrotum.
Labia majora.	Superficial layer of scrotum and sheath of penis.
Vestibule and small portion of vagina behind hymen (1 to 2 mm.).	Membranous and prostatic portions of urethra to prostatic utricle, which is analogous to the Müllerian vagina.
Bartholin's glands.	Cowper's glands.

The uro-genital sinus is at first relatively long, and is directly continuous with the allantois, that is, with the urethral canal. Later in the course of the development there remains only a vestige of it as a very short canal, which might be called the vulvar canal, which prolongs the vestibule immediately behind the hymen (Fig. 564, 4 and 5). This space, which almost

wholly disappears in the adult female, is still very noticeable in the young girl, and to that fact is due the deeper situation of the hymen in children, as described by Budin. The unequal development of these various parts completely hides their primitive relations after birth; it is thus that the vulvar or vestibular canal, the last vestige of the anterior portion of the uro-genital sinus, seems directly continuous with the Müllerian vagina, while in the embryo it exists as an independent structure and forms the lower portion of the prolongation of the allantois or the urethral canal (Fig. 564, 4). In other words, it is primitively the Müllerian vagina which seems to empty at the entrance of the urethra at the vestibular expansion, while later it is the ure-

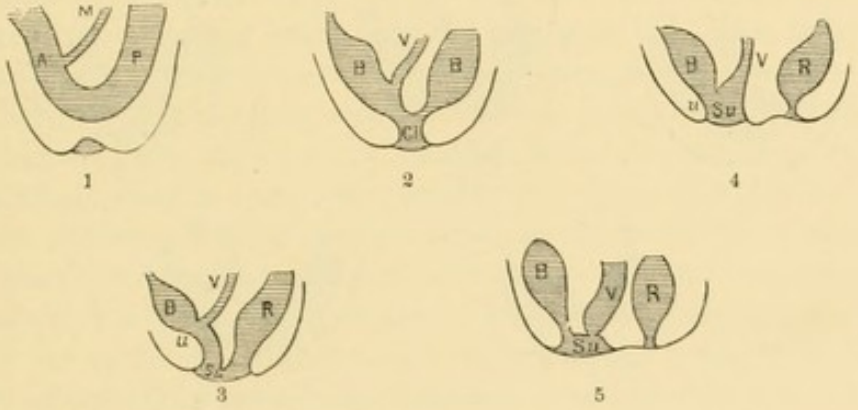


FIG. 564.—DEVELOPMENT OF THE EXTERNAL GENITAL ORGANS. Diagrammatic. (Schröder.) 1. *R*, Rectum, continuous with *All*, allantois (bladder), and *M*, Müller's canal (vagina); *x*, depression of the integument below the median tubercle, which by its progress inward forms the vulva. 2. The depression has extended inward to become continuous with the rectum and the allantois to form the cloaca *Cl*. 3. The cloaca has split into the uro-genital sinus, *Su*, and the anus, *u*, by the downgrowth of the perineal septum. The Müllerian canals are fused to form the vagina *V*, behind the bladder *B* and the orifice of the urethra *u*. 4. The perineum completely formed. 5. The upper portion of the uro-genital sinus contracts to form the urethra, the lower portion persists and forms the vestibule *u*, into which both urethra and vagina empty.

thra which appears to open in the vaginal orifice which has become blended with the vestibule (Fig. 564, 5). This distinction which I have drawn between the Müllerian vagina and its vestibular antechamber is of the greatest importance in considering malformations of the parts.

If the development of the parts be arrested at this time, the following forms may be produced:

1. Complete atresia of the urethra and vagina, resulting from absence of the division of the genital tubercle and of the genital furrow which prolongs the opening of the uro-genital sinus forward; in this case there is no vulvar opening. According as the cloacal septum has been perfect or incomplete, the rectum, the bladder, and the genital canal are separated or in communication (Fig. 565, 1, 2). Infants with this malformation are seldom viable. The urethra being absent or imperforate, the bladder and the genital canal are enormously distended with urine.

The absence of the cloacal septum is at times observed alone, the uro-genital sinus being open and communicating freely with the rectum, which does not reach the anus but appears to end in the vagina; this form is called

ano-vulvar, vestibular, and ano-vaginal atresia (atresia ani vestibularis, seu ani vaginalis, Fig. 564, 3). In reality it is not into the vagina that the rectum opens, but into the uro-genital sinus, which receives also the vagina, at times imperfectly separated from the rectum by a septum, and the urethra. This renders the homology difficult to establish, and the relations of the parts have been subordinated to their dimensions, which are altogether accessory. The malformation may be simply a congenital ano-vaginal fistula.

Hypospadias in the female corresponds to an analogous arrest, though not so pronounced. The perineum has developed normally, but the uro-genital sinus has preserved its embryonic condition. In certain cases of the

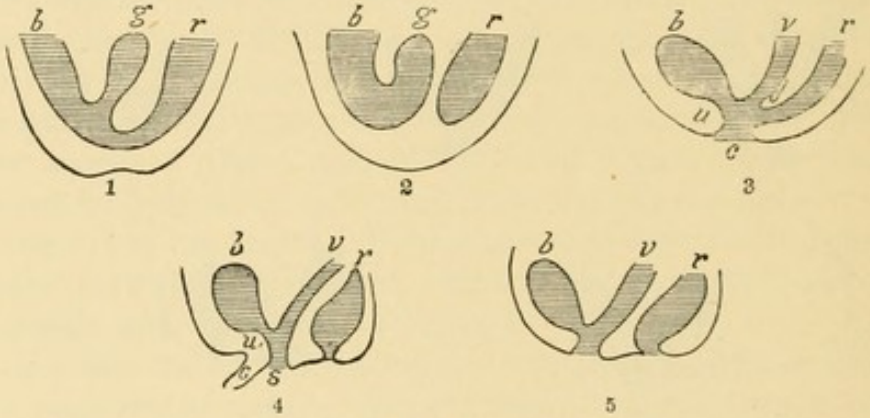


FIG. 565.—MALFORMATIONS OF THE EXTERNAL GENITAL ORGANS. Diagrammatic. (Schröder.) 1. Complete atresia of the vulva. *r*, Rectum; *g*, genital canal; *b*, bladder, communicating with both. 2. Complete atresia of the vulva; *r*, rectum separated from the allantois; *b*, bladder, and *g*, genital canal, distended with urine. 3. Atresia of vagina and anus. *d*, Perineum, incomplete; *b*, bladder; *v*, vagina, and *r*, rectum, open by a common cloaca. 4. Hypospadias in the female. First degree coincident with hypertrophy of the clitoris. *s*, Persistent uro-genital sinus, to which succeeds the long vestibular canal; *u*, urethra, and *v*, vagina, opening into the vestibular canal; *c*, hypertrophied clitoris. 5. Hypospadias in the female, properly so called; the allantois wholly transformed into a bladder which opens directly, without the intermediate urethra, into the uro-genital sinus; that is, into the vestibule.

first degree of this malformation, the vulvar or vestibular canal is long and narrow, like the urethra, and receives high up the urethra and vagina. This condition has wrongly been considered only a simple opening, at a high level, of the urethral canal into the vagina, retracted below; hypertrophy usually involves the clitoris in this malformation (Fig. 565, 4).

Hypospadias proper occurs when the uro-genital sinus has regularly disappeared, but the lower portion of the allantois which should form the urethra has been taken to form the inferior part of the bladder. The urethra is lacking altogether, and bladder and vagina open into the vestibular canal, which gives the clinical appearance of the vesical orifice being in the vagina.

Epispadias.—This is a rare condition in the female, and its mode of origin is still a matter of doubt; it may coincide with ectropion of the bladder and defect in the pubic symphysis, as well as with atresia of the anus. It is certainly related to defective disposition of the allantois which forms an obstacle to the development of the urethra and the occlusion of the anterior portion of the vulva; the clitoris is occasionally bifid.

I will not speak of ectropion of the bladder, which does not belong to my

subject, but only of those cases in which the lesion is confined to the urethral canal, which is one of the external genital organs in the female. Instead of the vestibule and meatus, we find at times a wide furrow, opening above, or a horseshoe orifice with its convexity applied to the symphysis; the vesical mucous membrane may project like a collar from this opening, and the clitoris may be absent, as in a case of Nunez, or bifid. The labia majora diverge above, and the nymphæ are attached to the fissured clitoris; often the symphysis presents a separation. The incontinence of urine is never complete, and the patients may have the power of retaining it for a long time; but the least effort causes it to issue, and it must be passed as soon as the necessity is manifest.

The ureter very rarely opens into the vagina or the vulva, but it is of interest on account of the congenital incontinence of urine which it causes. Independently of the cases in which the two ureters emptied into the vagina in the absence of the neck of the bladder and of the urethra, one of these canals has been seen to open near the meatus. This anomaly has been explained as follows: The ureter is formed by the budding of the Wolffian canal in the form of a tube toward its cloacal portion; at a certain level this tube receives lateral buds which are to form the urinary canaliculi, which terminate its superior extremity, and its lower end is partly of the cloacal extremity of the Wolffian body and presents thus a portion which is common with that canal, of very short extent and temporary duration. The duct of Müller, which descends along the canal of Wolff, empties into the cloaca near the canal of which it remains the neighbor but inferior to the ureter. The anomaly arises when the ureter is tardy in its development if the original bud on the Wolffian canal appears not near its lower end, but high up in the uro-genital sinus, and thus the ureter loses its normal relations; it does not empty high enough but follows the course of the Wolffian duct, which descends to the vestibule, and confounds its origin with the vestiges of that embryonic organ.

Total absence of the vulva is characterized by the simple opening of the uro-genital sinus at the vulvar region, although none of the parts constituting that region have been formed. This malformation may coincide with the normal development of the other genital organs according to many cases cited by the older authors, but the fact is not beyond question. Foville reports one case which seems to be explicable by the fusion of the labia majora rather than by their non-development. There is generally an absence of all projection of the vulvar region in those infants, usually still-born, which present total atresia of the vulva and urethra, but the first part of this malformation is wholly accessory.

Absence of the greater labia is the rule in cases of ectropion of the bladder, and it may also be observed independently of all other anomalies, as I have myself seen. The nymphæ may also be absent, and this condition is often related to incomplete development of the clitoris. It is more frequent

to see them hypertrophied. At times they form two or more juxtaposed leaflets, or they may exceed the labia majora in size, and project beyond them. This condition, which is common in certain tribes, has been termed the "Hottentot apron." Absence of the clitoris coincides at times with epispadias.

The infantile condition of the vulva is observed in certain weak patients, and also in imperfect development of the uterus and tubes. According to Freund, this state of the tubes predisposes to inflammation. The indications furnished by examination of the vulva have then a certain clinical value.

Hypertrophy of the clitoris is unusual in our climate, but quite frequent in the tropics. It may render the sex uncertain when it coexists with apparent occlusion of the external genitals. Hypertrophy of the clitoris has also been observed as an accessory malformation in certain cases of hypospadias and division of the genital canal (Fig. 570). Union of the nymphæ appears to be always a congenital anomaly, but it may result from a process like that which joins prepuce and glans in phimosis in little boys; thus in very young girls the nymphæ may be found united up to the urethra in such a way as to impede micturition. These adhesions may be easily separated by simple traction. The labia majora may also be united over a certain extent anterior to the fourchette.

Development and Malformation of the Hymen.—The hymen develops slowly in the female embryo; it is only at the nineteenth week that we notice a fold about the vulvar opening at the anterior extremity of the vaginal canal, which is formed above by the fusion of the Müllerian ducts and below by the remains of the vestibular canal of the uro-genital sinus. At first there are two linear projections which advance to the median line, where they meet; the hymen is at this time a double fold, and the band which forms each side of the opening extends from meatus to the base of the clitoris. When the vulvar orifice and the hymen are formed, this band surrounds both openings, forming at the first the collar of the hymen, and at the second a ring, which is very plain in children, continuous with the hymen below, and above with the median projection analogous to the frænum in masculine hypospadias. The hymeneal apparatus thus comprises the hymen, the ring about the meatus, which is sufficiently marked to merit the name of urethral hymen, and the frænum masculinum of the vestibule. Anomalies of development may involve all three of these divisions; and their intimate connection, until now unrecognized, permits us to explain all the difficulties which occur.

This theory of the origin of the hymen is contrary to that which is generally accepted. Since the teachings of Blandin in France and of Henle of Germany it has been supposed that the hymen was only a projection from the vagina.

Infantile Hymen.—In the infant at birth the entire hymeneal apparatus

is well developed and its three portions are very distinct. The hymen presents a considerable size, so that it may be mistaken by the inexperienced for the nymphæ, and the erroneous conclusion may be drawn that the hymen is absent or destroyed; this error might be of importance in medico-legal inquiries.

The usual form of the hymen is the labiated (Brouardel), although it may be found as a projecting collar, more prominent at its lower part, or like a purse folded in the form of a tobacco pouch. In the labiate form an antero-posterior opening separates the two valves which go from the bulb of the vagina to the posterior part; in the new-born a bougie of 9 mm. may be

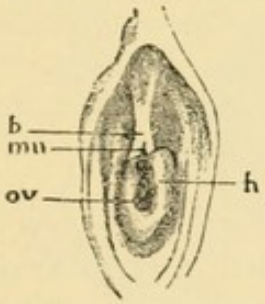


FIG. 566.—INFUNDIBULIFORM HYMEN AND FRÆNUM MASCULINUM IN THE NEW-BORN. *h*, Hymen; *ov*, vulvar orifice; *b*, frænum; *mu*, meatus.

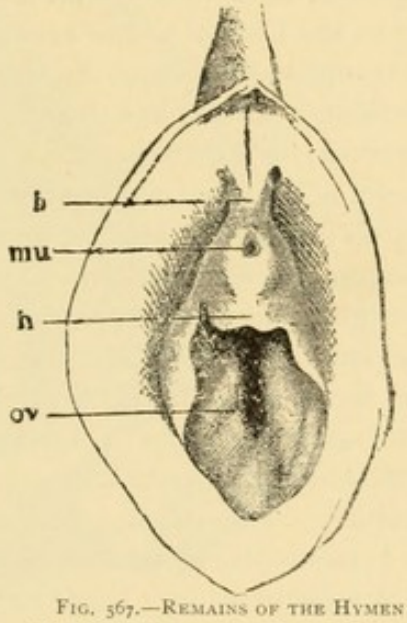


FIG. 567.—REMAINS OF THE HYMEN AND FRÆNUM IN A WOMAN WHO HAD BORNE CHILDREN. *b*, Frænum; *mu*, meatus; *h*, hymen; *ov*, vulvar orifice.

passed in; this form persists throughout life. In the infant of seven years a bougie of 10 mm. may be passed, and in the marriageable woman the end of the finger may be introduced with little effort.

The left lip of the hymen may project posteriorly, and the other anteriorly; there is then an intercrossing like the crura of the diaphragm, and this disposition on different planes forms an orifice which enters the vagina obliquely from right to left.

Brouardel's remarks on the medico-legal importance of the hymen in little children are very weighty. If the thighs are widely separated, the hymen is stretched, and will not permit the passage of the finger; but if the limbs are brought together, it folds in a gusset and its posterior valve is depressed, leaving a large orifice which permits a great deal of stretching. Penetration of this opening offers no difficulty, and it is well to note that there was no more obstacle to the penis of the accused person than to the finger of the expert.

It often happens that the crescentic portion of the membrane which is

inserted near the anterior column of the vagina suffers an arrest of development, and the free border then present notches; two of these are fairly constant, being situated nearly symmetrically at the junction of the superior with the middle third of the structure, and 2 or 3 mm. in extent. In certain cases there is but a single notch, and the other branch is intact. More rarely there are four of these impressions, two situated behind at the junction of the inferior third with the upper two-thirds, and the others as above anteriorly; so that the membrane of the hymen is formed by two projections posteriorly, two more on the sides, and two smaller ones anteriorly. The seat of these notches and the integrity of their free borders when unfolded permit us to distinguish an arrest of development from lacerations.

Injury to the hymen as the result of coitus is not constant. Penetration may be accomplished without laceration of the membrane, especially if the woman consents. Budin has seen the hymen in its normal condition thirteen times in seventy-five primiparæ.

Brouardel and Laugier have shown that laceration of the hymen may heal completely in a few days after it has been torn by intercourse, but attentive examination will suffice to discover the white fibrous cicatrices.

On the other hand, the normal furrows of the part are often mistaken by the inexperienced for old lacerations; this error may be avoided by introducing the finger and tracing the cicatrix.

In little girls there are other morphological peculiarities of congenital origin, with which the physician should be familiar in order to prevent serious mistakes. The small white points which resemble grains of hemp, caused by hypertrophy of the sebaceous glands, are not, as has been asserted, the proof of masturbation. Dolbeau has described a special deformity of the vulva which depends on attempts at coitus with too narrow genital passages. He applies the term vulvar canal to the infundibulum or false passage, made by the penis above the fourchette; a very similar vestibular canal is found in the abnormally developed fœtus, and at times is a family characteristic. Brouardel reports a case in which he had found a vulvar canal in a little girl into which he could pass the thumb. The mother accused the father of attempting intercourse with his daughter while she was absent with another child. Brouardel examined both children and found the same condition, which was evidently a family peculiarity.

Anomalies of Situation.—In the child at birth the hymen is placed far more deeply than in later years, the vestibule being sunken, and this condition is very pronounced in the negro race. In the adult the hymen may be placed very high, Kirmer having found it in one case, where the woman was twenty years old, at a depth of 2 cm., the vulvar orifice seeming on first sight to lack the membrane altogether.

Anomalies in Number.—Cases are reported in the literature of the subject of double hymen. Some of these are due to occlusion of the vagina, by membranes, especially in the new-born, following adhesions between the

walls of the canal, with a collection of mucus above; other cases in the adult are probably only an analogous lesion which has persisted from fœtal life or from infancy. The reversal to the condition which is normal in some animals may perhaps be found, as I will describe farther on; thus, Frisco, of Metz, found five membranes in a pregnant woman who had had the hymen divided at puberty for the retention of menstrual fluid.

Anomalies of Form.—If the theory which I have formulated be accepted, we shall not be surprised at the great variety in the form of the hymen

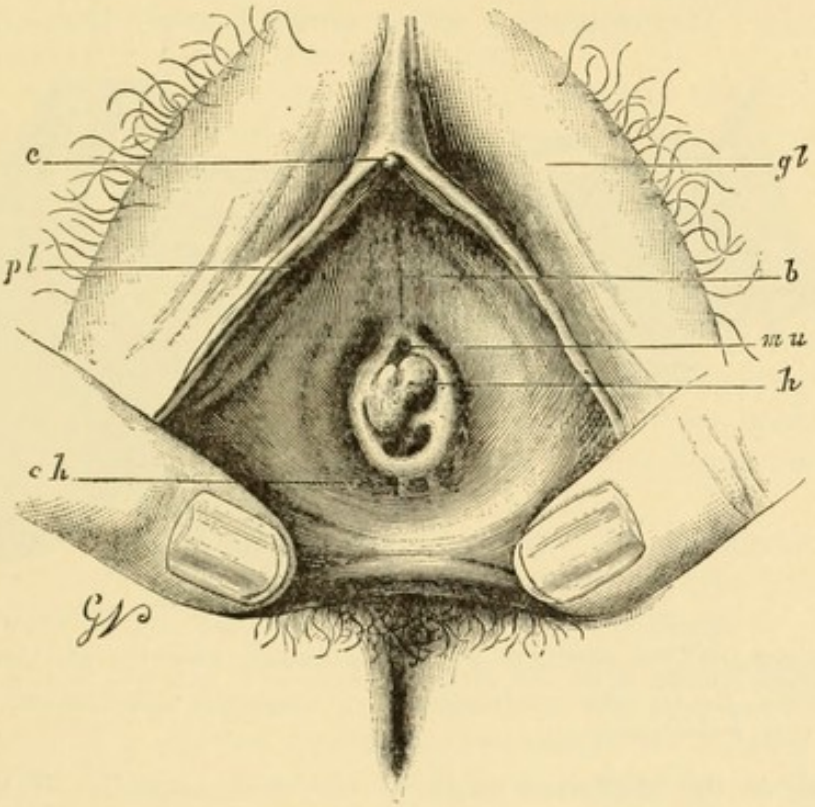


Fig. 568.—Fleshy Sculptured Hymen in a Young Virgin.

which we encounter. We have not to do with a fixed organ, but with the vestige or embryonic residuum of the corpus spongiosum, which is completely developed in the male but aborted in the female, in whom it persists as a membrane except at the most external portion, which becomes erectile to form the bulb of the vestibule. This extreme variability is as easily explained as that of the organ of Rosenmüller in the female or the organ of Giraldes in the male.

However that may be, there is one form which is very common in the adult, namely, the annular; the hymen is termed circular when it has an exactly central orifice; semilunar when it is chiefly attached at the superior border, which gives it the shape of a crescent; falciform when the opening is very large, and leaves only a small fold at the bottom.

These varieties have been described under many names; the denticulate

hymen (Fig. 568) is usually thick and fleshy, and is a persistence of the infantile type; in a medico-legal examination it must be unfolded to determine whether it has been lacerated, as the irregular folds would lead one to think.

The linguliform hymen is a variety of the preceding.

The fringed variety is very rare. The infundibuliform hymen, turned forward like the calyx of a flower, is a reproduction of the infantile type; if very pronounced, it is termed hypertrophic, and is often associated with very grave malformation of the genital organs. The hymen septus or biseptus presents two openings separated by a band, which is usually enlarged at its posterior part. This disposition, which is not common, is considered a de-

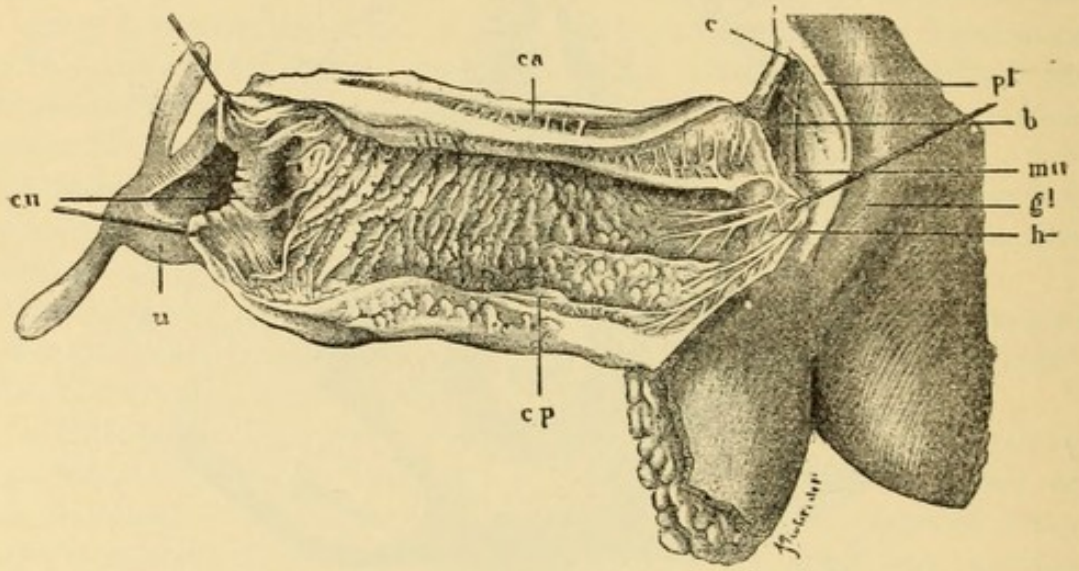


Fig. 569.—Vulva and Vagina Opened on the Side in a Fœtus of Eight Months. The vaginal folds are seen to be continuous with those on the cervix and the posterior surface of the hymen. *ca*, Anterior column of the vagina; *cp*, posterior column; *c*, clitoris; *b*, frænum vestibuli; *pl*, nymphæ; *gl*, labia majora; *mu*, urinary meatus; *h*, hymen; *u*, uterus; *cu*, cervix uteri.

cisive proof of the Müllerian origin of the membrane, but it has no real value, as is evident from the occasional completely imperforate condition.

The two openings are often not at all regular, but form two unequal fenestræ (hymen bifenestratus); or the membrane may be pierced with holes, forming the cribriform hymen.

The columnar hymen is formed by a thick pillar on its posterior face, which is often a vestige of one of the columns of the vagina, especially the posterior; in the fœtus they are prolonged upon the hymen as are also the rugæ of the vagina (Fig. 569). The hymen is formed by two lamellæ which are always distinct at the fifth month. The external is derived from the vulva and is the fundamental structure of the hymen; the other is an investment from the vagina; these two lamellæ fuse later on, and the posterior face becomes smooth by the effacement of the vaginal folds, while the epithelium of the anterior surface comes from the vestibule.

Atresia of the Hymen.—Whenever the vagina is found occluded by a thin membrane, it is usually supposed that this represents the hymen; it is

most often, however, a terminal imperforation of the vagina or an adhesion between its walls, and the hymen, distended by the accumulation of fluid behind it, is simply applied to the membrane, and may be separated from it after evacuation of the hæmatocolpos. Duncan has often found a circular hymen in such cases in which atresia was claimed, and has described an excellent example. Schröder expressly mentions this error, and has discovered at the lower portion of the obturating membrane the opening of the hymen for which it was mistaken. There are cases, however, in which the hymen forms a complete septum, as in one reported by Godefroy, where the mucus which accumulated behind it in the vagina of an infant of two months had produced compression of both rectum and urethra.

Cases of the greatest interest have been published which show very clearly the close relation between the different parts of the hymen and the ring which surrounds the meatus. In the normal condition there is often a prolongation in the form of a valve or uvula which covers the meatus in part, and cases have been observed in which there was a very distinct hymen provided with fringes covering the meatus; and at times the hymen has entirely covered this orifice, causing a retention of the urine in the new-born. This is a superficial atresia which might be called imperforate urethral hymen. It should not be confounded with aplasia of all or a part of the urethra which may exist by itself, or with persistence of the urachus which permits the evacuation of the urine.

Anomalies of Structure.—The hymen is usually thin and membraniform, apparently formed by the simple apposition of the two lamellæ covered with pavement epithelium, at times fused, at times perfectly distinct. The variations in structure which it presents are: (1) Increase in thickness, which renders it fleshy without augmenting its tenacity; and (2) a peculiar rigidity, which gives it a sclerous consistence and renders its division with the knife imperative, intercourse in the natural manner being impossible. According to Budin, this rigidity may be the principal factor in laceration of the perineum posteriorly and an obstacle to the progressive dilatation of the vulva; and, on the other hand, the hymen may be so elastic that no laceration can be discovered in it after labor; it has been found intact after abortion at the sixth month; (3) excessive vascularity of the membrane has caused grave and even fatal hemorrhage at the time of the first coitus. Such cases, difficult of comprehension if we suppose that the hymen is only a fold of the vaginal membrane, become easily understood when we consider it as the organ of the corpus spongiosum (urethro-penile mucous membrane of the male), which has persisted in the embryonic state, and may by anomaly present in the female an erectile tissue like its homologue in the male. Henle has removed all doubt from the latter case, for he found exceptionally an erectile tissue in the hymen.

Congenital Absence.—The older observations of the entire absence of the hymen should be received with doubt; they are all probably erroneous from

causes which I have mentioned. Devilliers, Tardieu, and Brouardel have never seen such a case among the large number of infants which they have examined for medico-legal purposes.

Hermaphrodism.—True hermaphrodism would be constituted by the presence in one person of the organs of both sexes in a condition of perfect function; I will discuss the pretended cases of this kind further on, and demonstrate their folly. But the appearance of a double sex may arise from malformation of the genitals or their arrest in the embryonic phase in the male, or their excessive development in the female. The individuals of the first category are far more numerous than those of the second, and the great majority of the pseudo-hermaphrodites which have been described have been males with hypospadias. The criterion of the sex in a doubtful case is the presence of the testicles or ovaries, and the great difficulty in determining the sex on the living person is the impossibility of deciding what is the nature of the genital gland placed in the inguinal canal or hidden within the abdomen.

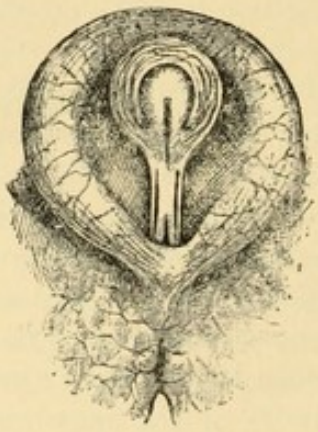


Fig. 570.—Pseudo-Hermaphrodism in a Female by Hypertrophy of the Clitoris (Gynandry). The external genitals of a child of three weeks, natural size; specimen deposited in the Museum of Legal Medicine at Vienna, by Hofmann. The integuments show the effects of long action of alcohol. The projecting labia majora surround the clitoris and conceal the vulvar opening. The frænum vestibuli is very large.

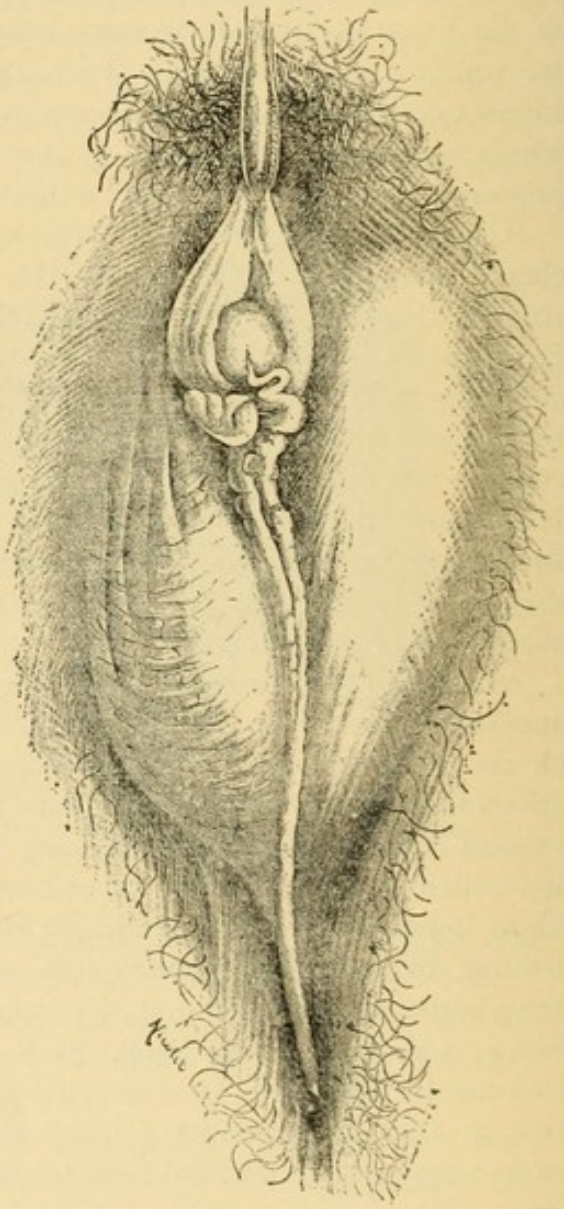


Fig. 571.—Partial Pseudo-Hermaphrodism in the Male (Androgyny). Hypertrophy of the frænum and prolongation along the raphe, with bifid projection simulating the nymphæ. This young subject, named Jan ——, presented also hypertrophy of the breasts; the left testicle was atrophied and retained in the ring.

To present the complete classification of hermaphrodism, it seems useful to establish the following divisions on a practical basis rather than on a theoretical:

1. Pseudo-hermaphrodism: certain parts of the sexual organs of both sexes with evident predominance of one. This comprises two varieties, gynandry and androgyny, according as the individual is really male or female.

2. True hermaphrodism.

Pseudo-hermaphrodism.—A. *Gynandry.*—In this class there might be distinguished one variety in which the principal reason for doubt as to the

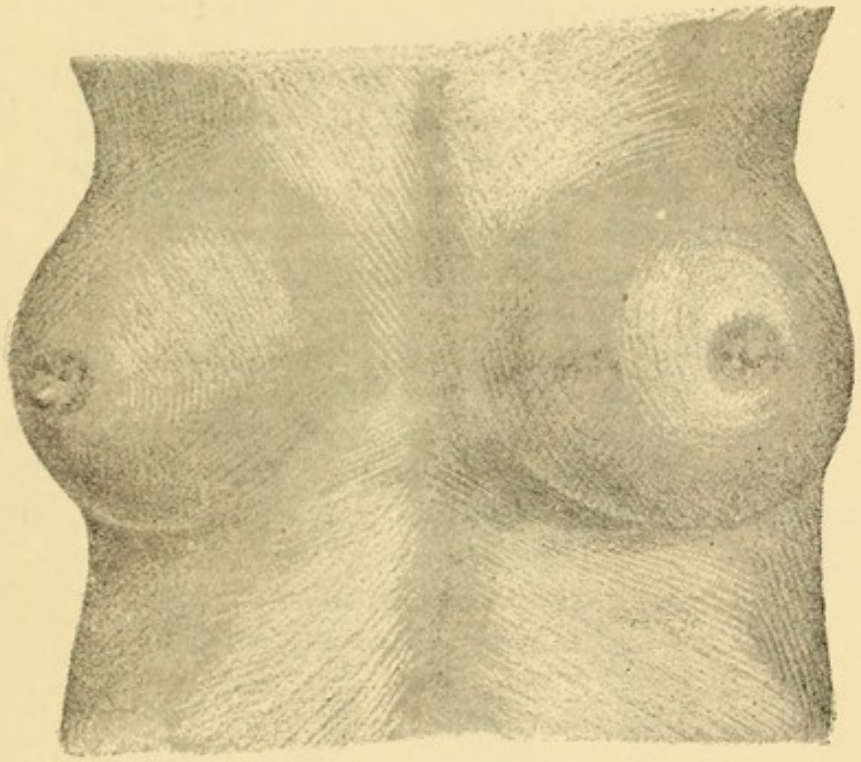


FIG. 572.—ANDROGYNY. Breasts of Jan ——.

actual sex is the absence of the breasts, or rather the presence of breasts of the masculine type, and which I propose to call andromasty. This anomaly is usually accompanied by a masculine appearance, the development of hair upon the face, and a deep voice. Usually there are malformations of the external genitals, sometimes even complete occlusion of the vulva and absence of the vagina, but there are present a uterus, more or less rudimentary, and ovaries.

A second variety of gynandry is constituted by hypertrophy of the clitoris which resembles a penis. The masculine appearance is often increased by fusion of the labia majora, and perhaps also of the nymphæ, simulating the scrotum and concealing the vulvar opening (Fig. 570). The resemblance is still more striking when there is an ovarian hernia at the anus or into the labium majus.

The hypertrophy of the clitoris does not change its form, but only its dimensions and those of its prepuce. It may reach a length of 4 or 5 cm. (Huguier). The internal organs of the female are at times irregularly developed.

B. *Androgyny.*—Several clinical divisions may be made in this class. One contains those individuals in whom the marked feature is the feminine development of the breast, gynecomastia. They are usually monorchid or cryptorchid males, presenting an incomplete development of the penis and testicles, and degenerate physiologically and psychologically.

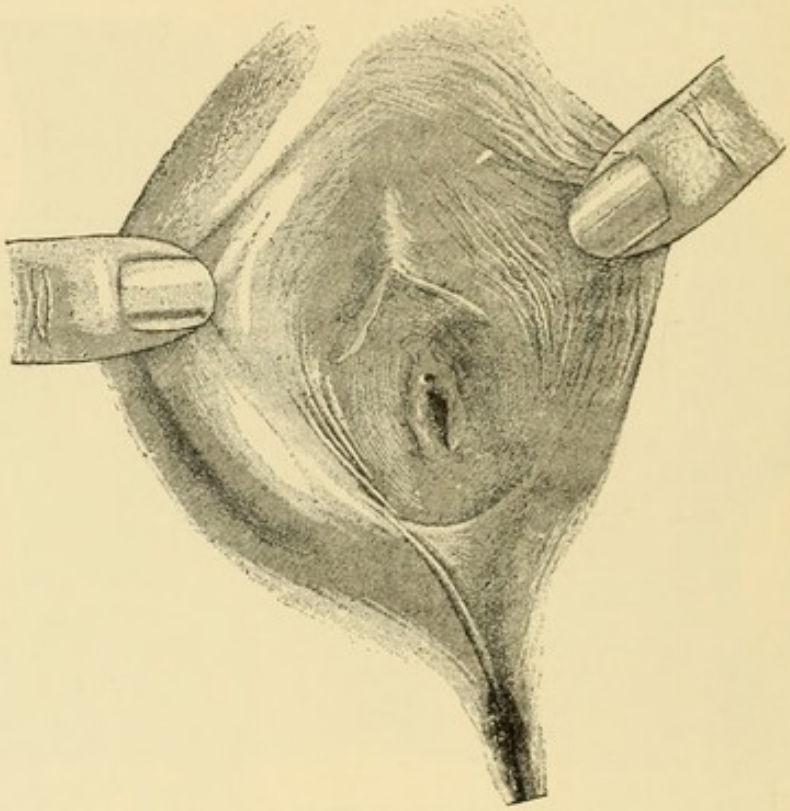


FIG. 573.—PSEUDO-HERMAPHRODITISM (ANDROGENY). External genital organs of Marie C——.

Here the type is masculine, the scrotum is fused and surmounted by a perforate penis; but the absence of testicles in the scrotum and the median depression which seems like the space between the labia majora, the large breasts which may be developed as in the female, and lastly, as in a case which I have seen (Fig. 578) the presence of two smaller labia, formed by a crease in the scrotal arch, give the individual a very feminine aspect. The development of the breasts, a frequent corollary in the male of arrested development of the genital organs, is a fact of organic sympathy which is inexplicable, but it is of great interest in connection with the facts of the physiological relations of these organs (Fig. 572).

A second division includes individuals of that variety of pseudo-hermaphroditism which I have proposed to call regular androgeny. These

persons possess external genital organs of the normal feminine type and proportionate size, including the clitoris, labia majora, nymphæ, and even the vagina (Fig 573). The dominating feature of hermaphroditism in these

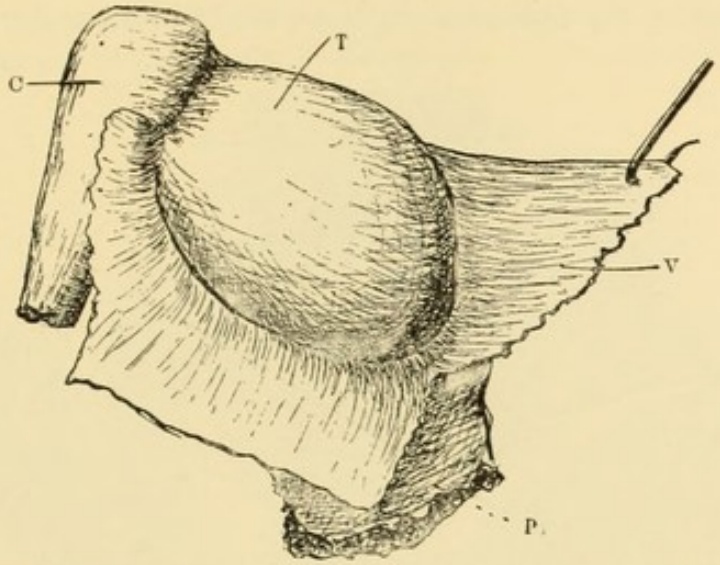


Fig. 574.—Testicle and Uterus of Marie C——. Anterior view. *C*, Left horn of a rudimentary unicorn uterus; *T*, testicle; *V*, tunica vaginalis; *P*, pedicle.

cases is the presence of testicles instead of ovaries, either in the abdomen or in inguinal herniæ. The uterus and tubes are always incompletely developed and the vagina is often so also. In view of the general appearance, these

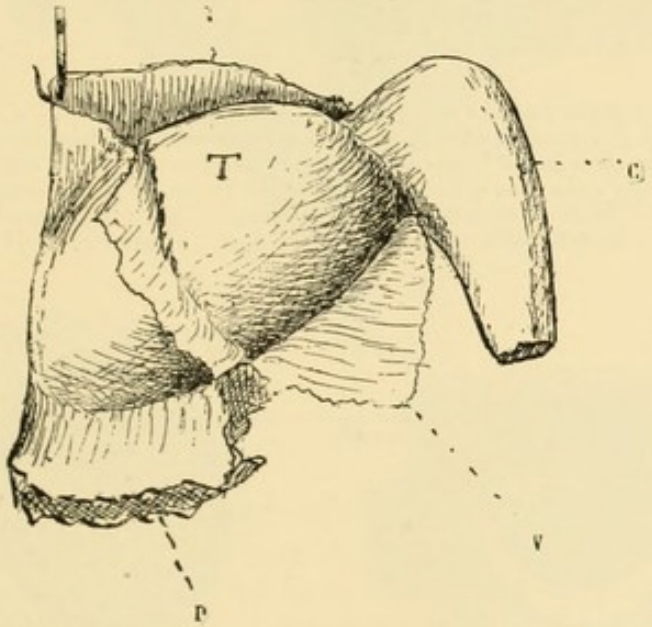


Fig. 575.—Posterior View of Organs Shown in Fig. 574.

peculiarities pass unobserved, and the individuals are declared to be women at the time of their birth, and remain so throughout life in name and appearance. In such a case I have examined the testicles and rudimentary uterus.

An arrested development of their finer structure was observed, recalling the fœtal condition and characterized by the abundance of the interstitial cells of Hofmeister (Figs. 576 and 577).

A third class is that of irregular androgeny or hypospadias. The external genitals are of the feminine type, but disproportionately developed, an

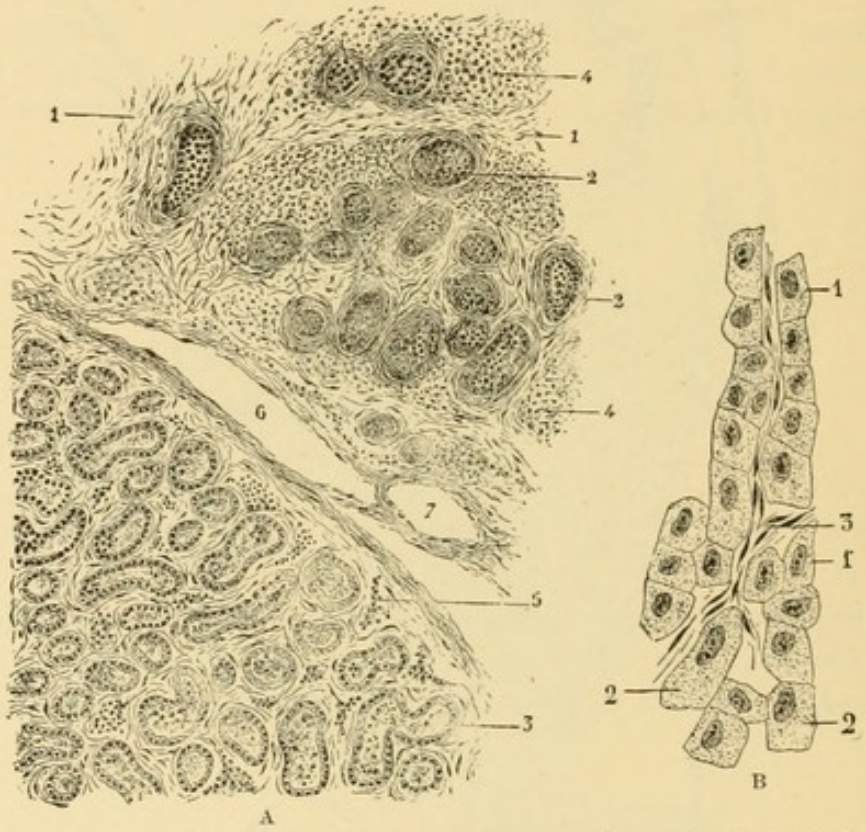


FIG. 576.—STRUCTURE OF THE TESTICLE OF A PSEUDO-HERMAPHRODITE (MARIE C——). *A*, Section perpendicular to the surface (× 150 diam.). 1, Connective tissue; 2, section of large seminiferous tubes forming the peripheral portion of the organ; 3, section of much smaller tubes forming a well-defined central mass; 4, masses of *special interstitial cells* surrounding the tubes; 5, the same cell masses about the small tubes; 6, large lymphatic space separating the two areas; 7, blood-vessel. *B*, Small seminiferous tube from the central zone; 1, Elongated cells about the spaces occupied by the tubes; 2, Epithelial cells with large granular nuclei; 3, spaces produced by the retraction of the epithelial layer.

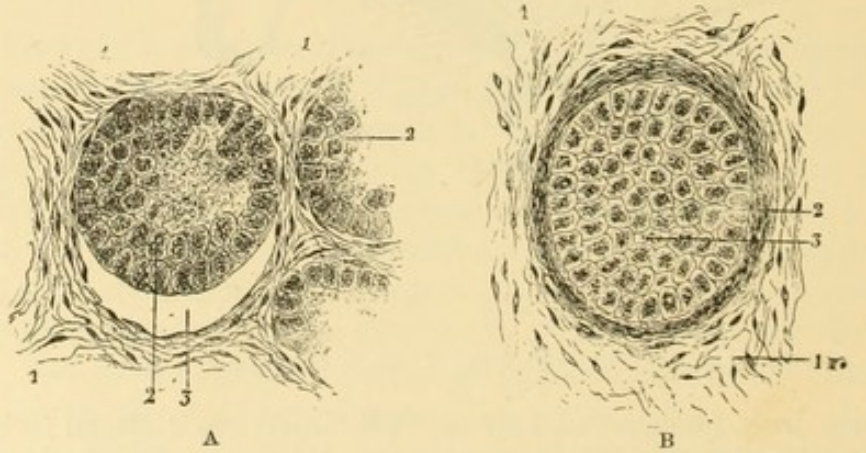


FIG. 577.—STRUCTURE OF THE TESTICLE OF A PSEUDO-HERMAPHRODITE (MARIE C——.) *A*, Large seminiferous tube from the peripheral zone (× 500 diam.). *B*, The large interstitial cells (× 1,000 diam.).

enormous clitoris accompanying a rudimentary vulva. These cases comprise the great majority of those reported. They are usually men with hypospadias in whom there is a perineo-scrotal fissure, and numerous autopsies have determined their exact signification. I have described three cases from the living individual, and all three were built upon exactly the same plan, in accord with cases described by my predecessors. These persons are generally

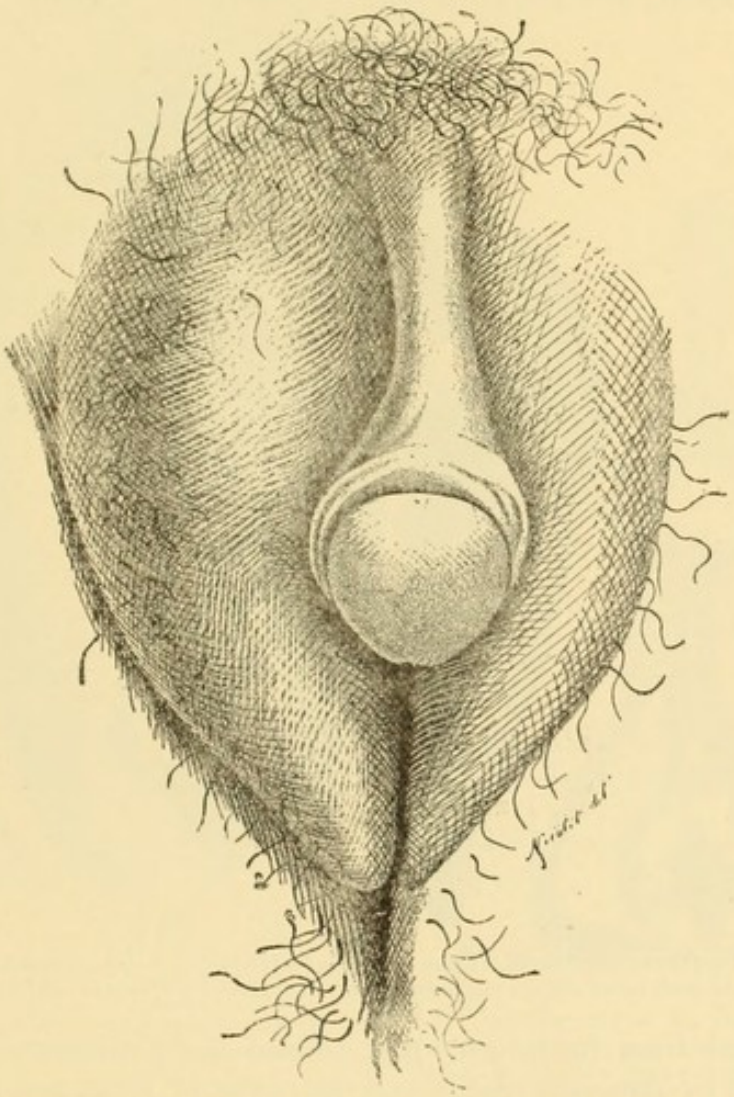


FIG. 578.—PSEUDO-HERMAPHRODISM PROPER, BY HYPOSPADIAS. External genital organs of Julie D—— (man). Masculine appearance of the parts with the penis depressed and the thighs together.

regarded as of the feminine sex at their birth, are registered as girls, and are dressed and educated as of the female sex. Many of them have been married, and nearly all were able to have intercourse with their husbands by the urethral orifice, which was transformed into an infundibulum, rather than by the depression which existed below; but, at the same time, many of them have had a taste for women and performed a more or less complete coitus. In some of these cases there was the appearance of irregular menses from hemorrhages of the dilated and irritated urethra; but there are other cases

in which there was undeniable evidence of menstruation, although feeble and intermittent, and the anatomical condition of the parts was fully explanatory of the fact.

The external conformation resembles that of an embryo seen through a magnifying glass; the penis projects or is fastened to the pubes and maintained below by a frænum; the glans is as large as in the child or youth, and is imperforate, but its extremity is marked by a groove with a fleshy

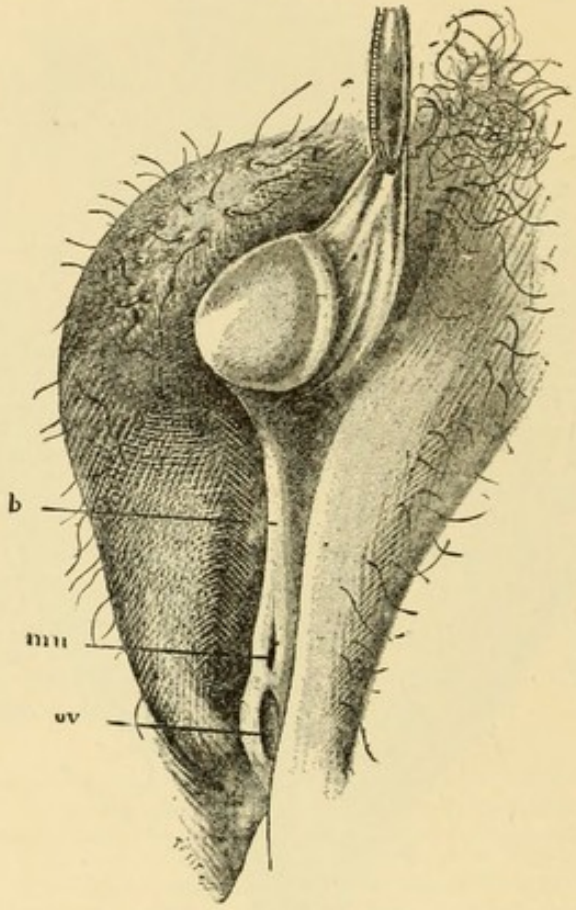


FIG. 579.—PSEUDO-HERMAPHRODISM PROPER. External genitals of Julie D—— (man). Feminine appearance of the parts with the penis raised and the thighs separated. *b*, Frænum; *mu*, meatus; *ov*, vulvar orifice.

band prolonged from its inferior part toward the perineum. This bridle, well described by Bouisson from a surgical point of view, and which I have shown to be homologous with the frænum vestibuli, extends from the glans to the urinary meatus, situated 1 or 2 cm. below the root of the penis. The vulvar orifice is found below this, of varying size, but usually so narrow that the finger is introduced only with difficulty.

A perfectly formed hymen may exist at the vaginal opening, as I have seen in two cases. It is maintained intact owing to the hyperæsthesia which is often found in the parts. The vagina varies in extent up to 10 cm. The Müllerian canals may reach the same complete development in the male in cases of even slight malformation of the external genitals. This is known as uterus masculinus.

In the pathological museum at Würzburg there is a specimen described by Franque where there are the external organs of the male, and above them a vagina opening into the prostatic portion of the urethra, as well as a uterus and oviducts, both well developed. Zweifel cites a case in which at the

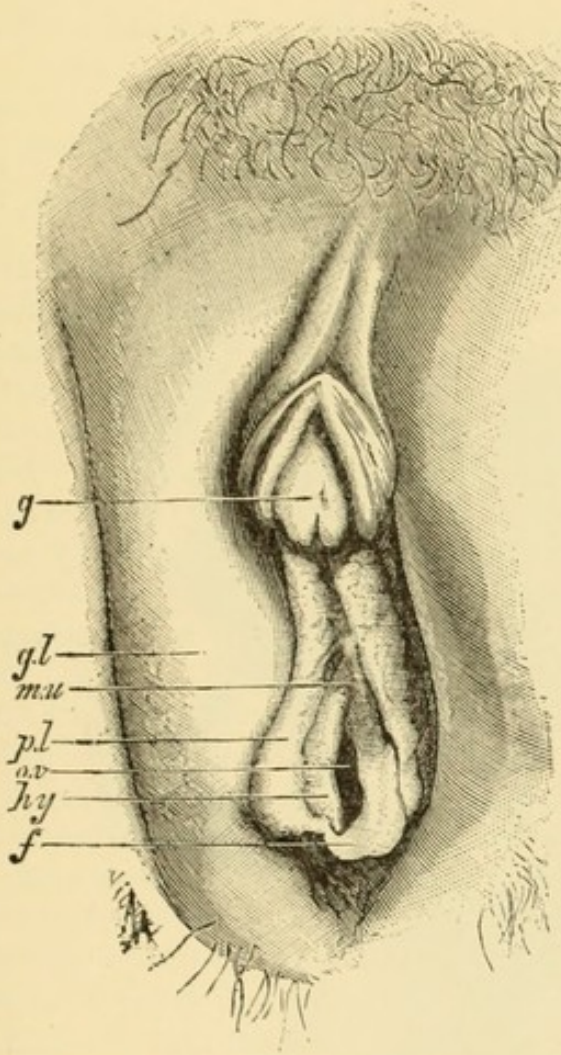


FIG. 580.—PSEUDO-HERMAPHRODISM PROPER, BY PERINEO-SCROTAL HYPOSPADIAS. External organs of Julie D—— (man).

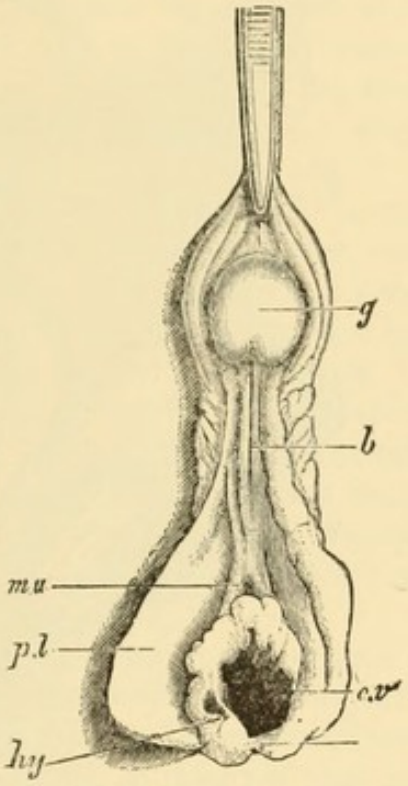


FIG. 581.—DETAILS OF THE HYMEN AND FRÆNUM VESTIBULI IN THE SAME SUBJECT. *g*, Glans; *gl*, labia majora; *pl*, nymphæ; *mu*, meatus; *ov*, vulvar orifice; *hy*, hymen; *f*, fourchette.

autopsy of a child of six months there was found a hypospadias with testicles, but also Müllerian canals completely developed into vagina, uterus, and tubes.

Ahlfeld has collected several similar cases. It is in the interior of this canal that ejaculation occurs at the moment of orgasm. During erection the penis is held in a curved position by the bridle.

The prepuce is open below and is disposed as in the case of the clitoris; there are rudimentary labia minora and well-marked labia majora. The testicles are always rudimentary and secrete a semen which is sterile like that

of cryptorchids; at times they descend, at other times they remain at the ring or within the abdomen.

The development of the breasts is often feminine, as also the appearance of the buttocks and thighs, where the panniculus adiposus is usually very

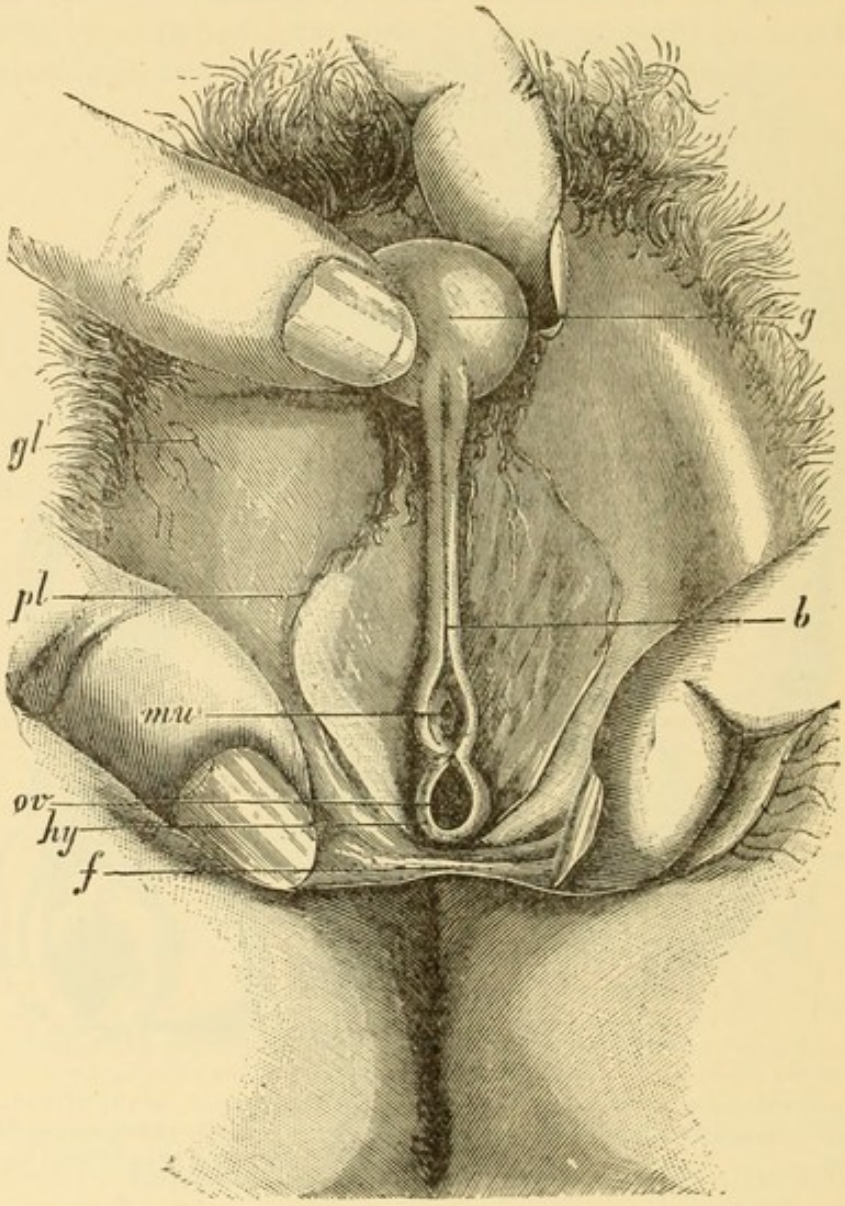


FIG. 582.—PSEUDO-HERMAPHRODISM PROPER. External organs of Louise B—— (man). *g*, Glans; *b*, frænum; *mu*, meatus; *ov*, vulvar orifice; *hy*, hymen; *f*, fourchette; *pl*, nymphæ; *gl*, labia majora.

thick. The larynx does not project and the voice is womanish; the pelvis is masculine and the beard is either very scanty or well grown; and when the latter character accompanies well-developed breasts, the case is particularly striking. Ordinarily, rectal touch and the use of the catheter fail to discover any trace of a uterus, or generally of a prostate, and bimanual palpation does not reveal the presence of ovaries.

These individuals are of feeble spirit, or, if intelligent, are not well bal-

anced; their antecedents are often marked by nervous phenomena; and the coincidence of similar deformities in the same family has been observed.

True Hermaphrodism.—Although admitted without hesitation by the older writers, who have instanced a number of examples, the existence of true hermaphrodism is to-day strongly contested.

Klebs offers the following theoretic classification of true hermaphrodites:

1. Bilateral, where there is a testicle and an ovary on each side; also termed vertical hermaphrodism.

2. Unilateral, where there is a testicle and an ovary on but one side.

3. Lateral, where on one side there is a testicle and on the other an ovary.

The first two varieties may be quickly dismissed; no case of unilateral hermaphrodism has ever been seen, only two cases of the bilateral have been observed, and these are more than doubtful; the third variety has received the credence of late writers, it seems to me unnecessarily, and therefore shall be considered at length.

A real importance can be accorded to a case only when it has been controlled by autopsy; the case of Katharina Hohmann, so often cited, was not thus controlled, as has been wrongly asserted. It is easily seen by the details of the case that it was one of pseudo-hermaphrodism by perineo-scrotal hypospadias. The right testicle alone had descended into the labium. The subject claimed to have a regular menstrual discharge, but it was discovered too late that the pretended menses were the result of a trick. Rokitansky, thus deceived, concluded that menstruation was real, and imagined the presence of ovaries and Graafian follicles—in other words, supposed that he had found a case of true hermaphrodism. The breasts in this case were developed like a woman's.

The well-known subject of Heppner's, of St. Petersburg, has been cited as conclusive proof of the existence of true hermaphrodism by the partisans of this idea, and at first sight it seemed incontestable, but on close examination the doubt was removed. The case was one of an infant of two months with the external organs of the female or of perineo-scrotal hypospadias. The uterus, tubes, and ovaries were well developed on each side, and there was an additional gland which resembled a testicle. Between the fundus and the ovary there was a parovarium or the shrivelled Wolffian body attached to the supposed testicle. Under the microscope this indeterminate body showed a number of tubes directed toward a hilum, with hyaline walls, which gave no striæ or nodules with acetic acid; there was no vas deferens. Upon these elements Heppner based his opinion that it was a testicle. Slavjansky declared that he was not convinced that it was not an ovary. Beigel has quite frequently found supernumerary ovaries. As regards this question, it is well to remember that the primitive condition of the ovary so closely resembles that of the testicle that it is a matter of the greatest delicacy to decide between them.

The autopsy of the pretended hermaphrodite (lateralis vera) of Meyer is open to the same objections. The small body which resembled an ovary, and was found on the left side, was probably an atrophied testicle; the large cells discovered in it were without doubt male ova; it was impossible to find any Graafian follicles.

I will not stop to discuss others, which are too old to have any value from a histological standpoint, or too incomplete to be believed.

A recent work upon this subject, by G. F. Blacker and Lawrence, proves that of the twenty-eight reputed cases of true hermaphroditism only three

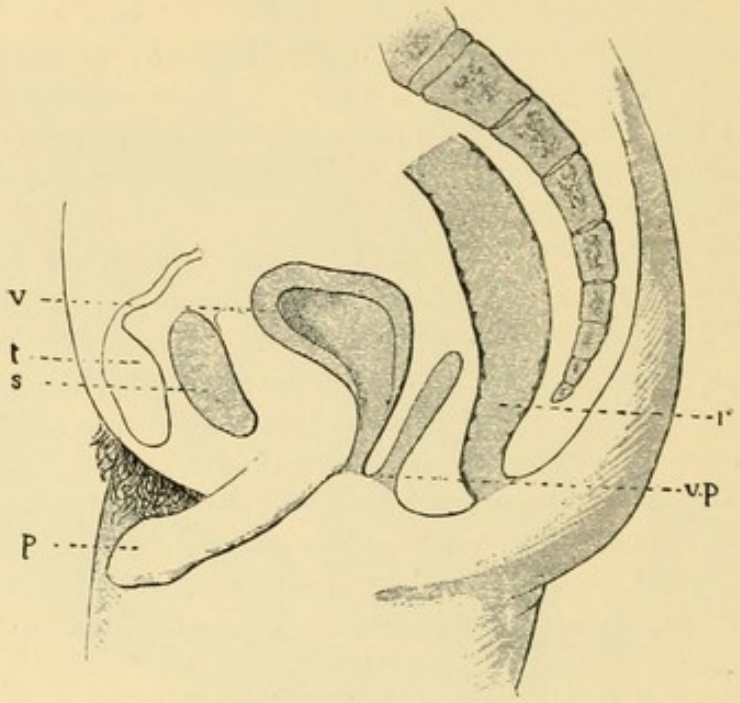


FIG. 583.—PSEUDO-HERMAPHRODISM PROPER, BY PERINEO-SCROTAL HYPOSPADIAS (ZWEIFEL). Diagrammatic figure of the deep connections. *v*, Bladder; *vp*, prostatic vesicle (pseudo-vagina); *r*, rectum; *p*, penis; *s*, symphysis; *t*, testicle.

are worthy of recognition: that of Heppner, which seems to us so improbable, they believe to be probably an example of bilateral hermaphroditism; the cases of Obolonsky and of Schmorl they hold to be examples of lateral hermaphroditism. Finally they claim to have observed a fœtus of eight and a half months with an ovo-testis of one side (unilateral hermaphroditism).

As a matter of fact, then, there is actually one single case of true hermaphrodism, in which testicles and ovaries coexist. This anomaly does not seem improbable *a priori;* it is frequent in the batrachia, and almost the rule in the toad; but it is rare in the higher vertebratæ. True hermaphrodism has, however, been found in the goat and the pig; hypospadias with pseudo-hermaphrodism has been observed more frequently, and I have seen an excellent example in the dog.

Treatment.—These various malformations which I have mentioned are

of more interest for the anatomist than for the surgeon, and interference is seldom opportune.

The fusion of the labia may be remedied by traction or the knife.

Hypertrophy of the labia and clitoris may require amputation of the excess of tissue, especially if the friction of the clothing is painful. The operation may be performed under cocaine with the knife, and the hemorrhage controlled with the hæmostatic suture or forcipressure or the thermo-cautery applied to the corpus cavernosum of the clitoris.

In epispadias, the parts may be sutured after freshening their edges according to the shape of the orifice, as Roser, Schröder, Richelot, and Dohrn have done. In one case Testelin occluded the canal which existed above the urethra by means of caustic potash, but it is not advisable to adopt this method.

Malformations of the hymen may require incision or partial excision.

Pseudo-hermaphrodism may perhaps give rise to surgical indications. In one case which I saw, the erection of the penis was much interfered with by the frænum, and the patient requested me to destroy it. A simple section seemed insufficient, and I decided upon excision of the bridle and autoplastic repair; but when I proposed to perform the operation the patient refused to allow it.

CHAPTER XLVII.

MALFORMATIONS OF THE VAGINA AND THE UTERUS.

MÜLLER'S ducts form the entire genital canal, vagina, uterus, and tubes; the vagina and the uterus develop from the inferior segments of these ducts enclosed between the uro-genital sinus and the insertion of Hunter's ligament in the Wolffian body. These inferior segments fuse in the median line to form a single canal, called the genital canal or the utero-vaginal; their upper portions, diverging between the ends of the genital cord and the round ligaments, become the uterine cornua. Normally, these horns are little developed in the human species, being absorbed into the fundus of the organ as part of its further development. But if the space included between the insertion of the round ligaments and the end of the genital canal is obliterated, as is the rule in certain animals and the abnormal exception in the human female, the uterine fundus is diminished or suppressed; the organ then develops singly at the expense of the cornua, which become very prominent and open into the vagina by distinct orifices; this is the case in the rabbit, the squirrel, and the hare. If the limit between the vagina and the uterus is increased from the insertion of the round ligaments a little below the summit of the genital canal, the uterine body remains very small, as is the case in the rat and the guinea-pig. Finally, the body of the uterus may be produced beyond the summit of the genital canal, as in carnivora, pachyderms, ruminants, solipeds, etc. In the cheiropters the uterine cornua are much prolonged, and in the monkeys they disappear. In the human type this simple disposition of the uterus reaches its highest degree in the normal condition, but an entire series of malformations may be derived from embryonic arrangements which reproduce the types which I have indicated in the animal scale by reversive anomaly.

Such cases should be referred to their proper place by the aid of comparative anatomy. In most of the marsupials the ducts of Müller do not fuse, but evolve separately, and produce two uteri and two vaginæ opening by two distinct orifices into the vestibule. At other times the two vaginæ, though separate by their median portions and distinctly two canals, fuse at their upper parts, and receive the two uteri and also at the lower end, which opens into the vestibule (halmaturus). Traces of the internal division of the genital canal into two exist more or less clearly in all animals with the exception of man and monkeys. In many rodents, the hares, for example, there is thus a double uterus and a double vagina; in others, like the mice, the septum is found only at the superior part of the uterine canal.

The preceding considerations are of the greatest interest in appreciating the malformations of the vagina and the uterus, for they complete and explain the facts of human embryology. It is not only in comparative anatomy that phylogeny and ontogeny should be associated, but also in teratology; and thus we are able to account for the arrest of development which the parts may undergo, by understanding the various stages of their growth.

The Müllerian ducts are disposed side by side in the genital cord and fuse except at their lower extremity at the end of the third month. At this time the genital canal shows no trace of a division into its uterine and vaginal portions, and it is lined by the primitive epithelium of the Müllerian ducts. The whole lower portion of the genital canal is still imperforate, and the walls of the future vagina are fastened together, as are also the glans and prepuce and the eyelids and eyeballs at the same period.

At the end of the third month the lumen of the duct at the vestibule begins to enlarge and increase steadily as it advances from that point; the two Wolffian canals burrow under the utero-vaginal conduit, and open into the vestibule behind the urethra. This canal, which is separated by a septum into two halves up to the vestibule, becomes single by the disappearance of the partition, which progresses from below upward and is complete about the fifth month. The differentiation of the canal into vagina and uterus begins at the end of the third month by the appearance of the cervix, which is completed one month later.

The internal surface of the uterus remains uneven and folded during the entire fœtal period; the furrows of the arbor vitæ apparently reaching to the fundus because the fundus is not yet developed, but is formed later by the thickening of that portion of the organ which is situated between the insertion of the tubes; these latter structures are at first provided with a simple opening, but soon acquire a fringed pavilion.

The development of the lower portion of the vagina is not clearly understood. Hofmann supposes that the Wolffian canals take part in this formation, and Tourneux and Legay have lately maintained a similar theory, which seems very contestable. But with the facts of teratology, there appears to me to be no doubt that the region which we may term, with Legay, the vestibular canal and which is usually confounded with the vagina, is independent from an embryogenic point of view; for we often see that a very short vestibular canal may coexist with complete absence of the Müllerian vagina. This region, which is almost wholly effaced in the adult by the deformation and depression caused by coitus and parturition, is very clearly defined in young girls, and extends from the border of the labia majora to about 1 mm. below the hymen. I am inclined to think that it is a vestige of the urogenital sinus. However that may be, from the standpoint of comparative anatomy, this short region is wholly distinct from the vagina, and should be considered as a dilated portion of the urethra which receives the Müllerian vagina. It is this vestibular canal which forms by its great elongation the

major portion of the vagina in the pseudo-hermaphrodite (hypospadias in the male). It is evident then that it may be provided with a hymen which is ectodermic, I think, and not derived from the Müllerian ducts.

The hymen, which, according to the partisans of the commonly received theory, comes wholly from the ducts of Müller, is formed by an invagination of these canals in the uro-genital sinus. Dohrn places its appearance at the beginning of the nineteenth week. According to Legay and Tourneux, this membrane results from the transformation of the primitive projection from the posterior wall of the uro-genital sinus, which crosses the canal of Müller to end in the sinus, or rather to apply the epithelium of these canals to the part which it is to cover. I have already briefly stated that the membrane does not form an isolated diaphragm (page 874), but belongs to an entire hymeneal apparatus which is homologous with the urethral mucous membrane which forms the corpus spongiosum of the male urethra. However that may be, the hymen takes its characteristic form and becomes prominent in the vestibular canal only after the vagina has been dilated by the accumulation of pavement epithelial cells which begin to distend it as with a caseous mass toward the end of the fifth month. At this time the vaginal rugæ and columns are prolonged upon the posterior surface of the hymen, which seems to confirm the opinion that these two membranes are absolutely one. This continuity of the investment of parts which have a different origin is not unusual in embryology and is a secondary fact of development. The constitution of the hymen is essentially different from that of the vagina—for instance, in the absence of smooth muscular fibres in it. O. Schaeffer has shown the primitive form of the two independent lamellæ which unite only after the fifth month. Only the superior layer is a prolongation from the vagina; and certain teratological facts tend to prove that the portion of the canal situated immediately above the hymen, which it covers and binds to the vagina, is really of ectodermic origin and formed the upper portion of the vestibule.

At birth the uterus still preserves an appearance which is very different from its adult form. The cervix constitutes its major part, and the fundus seems to be wholly secondary; the length of the cervix is double that of the body, and its walls are much thicker. The external os is large, the anterior lip exceeding the posterior; and this disposition, like the muzzle of the tapir, is often found in the adult as a vestige of the embryonic condition. If the two walls are separated, there is found on each a ridge directed longitudinally which serves as the axis of the oblique folds which run from above down and out; these ridges, which begin near the vaginal orifice of the cervical canal, reaching to within a half-centimetre of the fundus of the uterus, fit into a furrow on the opposite side formed by the transverse folds of the arbor vitæ; the anterior axis is to the right, the posterior to the left. I insist on this disposition, as it has been employed in the decision of the variety of malformations and arrests of development when there is no real

advantage in separating them; the uterus is called fœtal where the arbor vitæ has the aspect which I have described, and infantile when it ceases at a great distance from the fundus or where there is a clear demarcation between the cavity of the cervix and that of the body. These distinctions are interesting from a purely theoretic point of view, but of no practical importance.

During the first years of life the uterus does not appear to participate in the growth of the body; its life remains latent until the moment of puberty. Then, however, the change is rapid in both form and volume. It is the fundus especially which undergoes this increase, and the result is that it becomes far more prominent than the cervix, which becomes only an appendage of half the size and less than half the thickness; at the same time the folds in the uterine cavity disappear, and the internal os becomes more pronounced. It is of interest to notice that this complete development may not be reached at puberty, but that pregnancy may produce it.

With the object of classifying malformations of these parts L. Fürst has established five divisions in the embryonic period:

First Period—From Fecundation to the Fifth Week.—This is the indifferent period where there is no marked tendency toward either sex; the ducts of Müller and the Wolffian body are not yet atrophied; the ducts of Müller are separated by a septum; there is a cloaca into which empty both intestine and urachus; the genital tubercle and fissure do not show any sexual indications.

Second Period—From the Eighth to the Twelfth Week.—At the end of this time, the septum in the genital canal has wholly disappeared; the fusion of the Müllerian canals is prolonged far upward; the insertion of the round ligament is clearly separated from what will be the tube above and what will be the uterine cornu below; and at the end of the period the cloaca has divided into anal and uro-genital portions.

Third Period—From the Twelfth to the Twentieth Week.—The uterine horns are fused, the arbor is distinct in the cavity of the organ, while the vagina is still smooth; the cervix is formed; the perineum is enlarged; the vagina is developing, and the uro-genital sinus, which has been stationary, seems now to open into the genital canal, and after this time forms the vestibule of the vagina, where the hymen appears; the genital tubercle is reduced to the proportions of the clitoris, and the edges of the genital fissure form the nymphæ.

Fourth Period—From the Twentieth Week to the End of Fœtal Life.—During this time, the folds in the vaginal mucous membrane are formed, as well as in the cervical canal, and the fundus of the uterus develops more appreciably.

Fifth Period—From Birth to Puberty.—The uterus increases in thickness a little; at the sixth year the uterine mucous membrane, which has been folded up to this time, becomes smooth, and there remains only one vertical ridge.

Etiology. Pathogeny.—For a long time all malformations of an organ were considered only caprices of nature. The first attempts at a rational explanation, based upon arrest of development, were made by E. L. Meissner and W. H. Busch, but it was Kussmaul who developed these ideas, and rendered them classic in a work which caused his predecessors to be forgotten. In France the new classification was described first by Le Fort. After him many cases were published. Fürst contributed much to the exact definition of the embryonic epoch which corresponded to each of the anomalies.

What is the initial cause of anomalies in the genital organs? Is it arrest of development, or shall we suppose a higher cause, namely, atavism, reproducing sporadically in one species the forms of some other by the effect of what Darwin terms reversion? I will not do more than indicate this interesting view.

The predisposing causes are very obscure. There is no doubt that heredity plays some part, although it is paradoxical to suppose that total absence of the uterus may be thus explained. Squary mentions the cases of three sisters who had never menstruated, three of whose aunts were sterile.

The immediate cause, the anatomical condition of the malformation, in the great majority of the cases is a simple arrest of development in the morphological evolution or the organic growth of the parts, but it is important to make a clear distinction between the facts of these two categories. In the first the organ may have the adult dimensions, but the type is embryonic; in the second, which may exist alone or combined with the first, an organ of the adult type is affected with aplasia and remains too small in whole or in part.

Finally, there are cases which we can explain only by supposing that there is a pathological process which has produced adhesions during the period of fœtal life. Of this order are certain vaginal bridles, and also the peritoneal bridle, which passes between the posterior wall of the bladder and the anterior wall of the rectum, which is often found in cases of bicornate uterus. But we must employ such comparisons sparingly, for they lead only to the neglect of all other investigation. The pathological influence which has been mentioned has been strongly questioned, and the vaginal adhesion explained by an arrest of development at the time when there is as yet no lumen in the canal; as to the peritoneal bridle, it is natural to admit that it is the effect of the malformation of which I have suggested the cause.

Malformations of the uterus and vagina are frequently solid, there may be complete absence of one of the segments of the canal with incomplete partition of the other. But as these may exist separately, it is of clinical value to describe them in distinct chapters.

Malformations of the Vagina.—*Complete Absence or Rudimentary Development—Pathology and Symptoms.*—Anatomically there is a radical difference between these two varieties, but clinically this disappears. In the complete form, there is no trace of vaginal tissue between the rectum

and the bladder; in the rudimentary, there is a fibrous cord of connective tissue occupying the position of the vagina.

The uterus may be entirely absent or reduced to a rudimentary nodule; in other cases it is normal and there are ovaries, but no menstrual molimen. Von Swiecicki has reported a case of absence of the vagina, uterus, and left ovary. Exceptionally there are periodic pains at the time of ovulation. L.

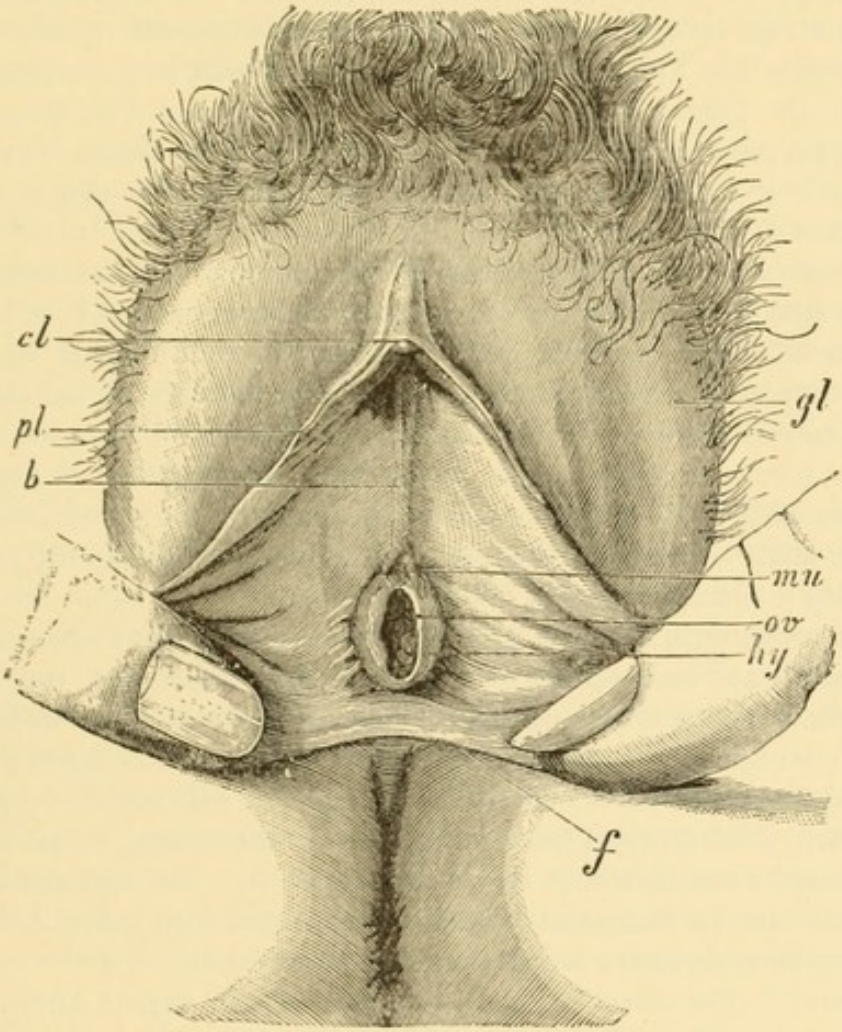


FIG. 584.—ABSENCE OF VAGINA AND UTERUS (OR RUDIMENTARY UTERUS), WITH WELL-DEVELOPED HYMEN. *cl*, Clitoris; *gl*, labium majus; *pl*, labium minus; *b*, frænum masculinum; *mu*, meatus urethræ; *ov*, closed vagina; *hy*, hymen; *f*, fourchette.

Le Fort observed one case in which the uterus existed and there were extreme pains at each menstrual period, with vicarious hemorrhages from the conjunctivæ or the skin of the legs which split spontaneously, or hæmoptysis. The vulva and the vagina may both be entirely absent at the same time, but more often the vulva is well formed and there is a funnel-shaped depression behind the well-developed nymphæ, and the hymen may also be perfectly normal (Fig. 584). The urethra is at times dilated by coitus.

There are two important varieties to be distinguished according as this complete absence or rudimentary development involves the whole length of

the canal or only one of its parts. The vagina is formed from the Müllerian ducts, and the process always goes on from above downward. It is therefore difficult to understand why it is the lower portion of the vagina which most frequently exists in these cases of arrested development. It seems to me that it is the normal elongation of the vestibular canal which persists, the anterior portion of the uro-genital sinus; this ectodermic opening, which is insignificant in the normal condition, takes on a new importance, predominating as it did in the embryo before the development of the Müllerian ducts exceeded it. This pouch, which is often found in the absence of the vagina and the uterus, may be 2 or 3 cm. in length and wide enough to admit the finger; but efforts of coitus increase these dimensions very considerably. The vestibular cul-de-sac is closed by a pearly, reticulated membrane with a cicatricial appearance.

The vagina may be absent in its middle portion, and its two ends are then separated by a membrane of variable thickness which is at times perforated; there is then without doubt an arrest of development in the Müllerian portion and a compensatory increase in the vestibular canal which endeavors to reach the upper part and fuse with it. These two segments have been seen to impinge upon each other without union of their canals. To suppose that in such cases one of the ducts of Müller is lacking in its lower part, and the other in its upper part, is to formulate a very improbable theory. My explanation seems more natural.

Rectal touch with the vesical sound, or even with the finger in the bladder, should always be carefully employed in such cases, and the expansion of the urethra produced by attempts at intercourse still more widely dilated by Hegar's bougies if necessary. The fibrous cord which exists in the case of rudimentary development will thus be felt, and will serve as a guide during operation. When the uterus is absent or rudimentary, rectal touch permits the sound to be felt both below and above it. The ovaries should be sought with care by bimanual palpation combined with rectal touch. The examination should always be made under anæsthesia.

Treatment.—The absence of all or a part of the vagina offers different indications according as the uterus is developed; if this organ is normal, the phenomena of hæmatometra occur at puberty and require interference, as I will describe later.

If there is no uterus, and the ovaries are well developed, the painful dysmenorrhœa which appears at the time of ovulation may be a sufficient reason for the performance of castration, which has been done several times with success.

Where there is only a deformity which renders the person sexually incompetent, and the woman demands the creation of a vagina simply for the purposes of coitus, are we justified in operating unless there are accidents from retention? The question has been answered in various ways. Schröder, Hegar, and Kaltenbach are inclined to the negative, considering the danger

and the risk of injury to the adjacent organs when there is no uterine tumor to serve as a guide. But Le Fort justly remarks that there are circumstances where the operation of compliance might become one of necessity. It was first performed by Amussat.

If we decide to make an artificial vagina, we proceed with the greatest precaution to the liberation of the septum at the bottom of the vulvar depression, using the fingers chiefly in the division of the soft parts, and proceeding step by step by combined tearing and dissection, the finger of the operator or an assistant being kept in the rectum and a sound in the bladder.

When the depth of 6 to 8 cm. has been reached, the second step of the operation should be performed, which is the investment of the funnel so created with integument to prevent cicatricial contraction. For this purpose the skin and mucous membrane of the adjacent parts may be employed; and the first incision must therefore be carefully made in the form of a transverse cut with two lateral branches, like the letter **H**. After the sutures have been applied, the artificial canal must be packed with iodoform gauze, and this treatment continued until cicatrization is complete; then a Gariel pessary may be substituted.

In spite of every care in the operation, of which Picqué has published an excellent example, the primary result is maintained with difficulty, for the angle which forms the bottom of the cavity is very hard to cover with graft, and, even when the graft has adhered well, there is an invincible tendency to draw the flap outward and gradually fill up the canal. Fortunately the surgeon's efforts find an auxiliary in the daily practice of coitus, which in certain cases has given results which surpassed hope.

Mackenrodt has covered the infundibulum which he had just formed with pieces of vaginal mucous membrane taken from cases of prolapsus.

Polaillon, who was able to reach to the uterus in one case, operated in two sessions after an interval of three weeks; and this method of several operations was advised by Amussat, who was the first to create an artificial vagina.

Le Fort has obtained remarkable success with electrolysis in a case in which there was a uterus and the menses were replaced by vicarious hemorrhages. He made a cylinder of boxwood, furnished with a copper end, which was connected to a six-element battery of Morin sulphate-of-copper cells, and a metallic plate placed on the abdomen with some wet compresses interposed, made the connection; this apparatus was used during the night. After a short time the cylinder had created a canal of about 8 cm. depth, which Le Fort enlarged progressively, at first with a forceps like a glove-stretcher, one of whose branches was tipped with copper, and afterward with a wooden dilator. The result was satisfactory, but we do not know whether it was permanent.

Unilateral Vagina.—It is probable that in this case but one of Müller's

ducts serves to form the vagina, although this anomaly of development may not be apparent; it is certainly the case in the one-horned uterus. It might be suspected from the narrowness of the canal. In cases of partially double vagina there is an incomplete development of one of the ducts, and the vagina is partly unilateral, but it is better to class these cases with the following.

Double Vagina.—When there is a septum which divides the entire vagina, the uterus is also double or divided. The hymen may be furnished with two openings, simulating a double hymen; or it may have the annular form, separated from the septum by a decided interval. The septum is generally placed in the middle in such a way that one of the canals is situated a little anterior to the other; when coitus is practised, it is by the larger of the two conduits.

An important variety of this condition is seen in what may be termed lateral vaginal atresia, constituted by the rudimentary development of one of the halves, whose lower end remains closed, but whose superior extremity receives one cervix of the double uterus; this condition is almost always found on the right side. Thus, there is a blind pouch by the side of the principal vagina, which may remain unnoticed until it becomes filled with blood at puberty, or with pus from an infection through a weak part of the septum; thus occur peculiar cases, which for a long time escape diagnosis, which are called lateral hæmatocolpos or pyocolpos.

The first, due to the retention of the menstrual blood, often coincides with lateral hæmatometra, but the collection of pus may be limited to the vaginal pouch without distention of the corresponding segment of the uterus, for it quickly makes an exit for itself by perforating the septum, as I have seen in one case. There may also be pyometritis, which is a grave condition; and the evacuation of the pus does not remove the danger, for the perforation may take place high up on the septum, even within the uterus, and the purulent material collects again.

When there is hæmatometra, the collection may be mistaken for an intraperitoneal pelvic hæmatocele. If the vaginal tumor alone is present, it may be considered as a cyst of the vagina, and Freund has even asserted that certain cysts were of this origin, which seems to me to confound two lesions which are really distinct.

The partition of the vagina may be only partial, and it is then the superior portion of the septum which is lacking, for the Müllerian ducts coalesce from above downward. But when the uterus is double, the upper portion of the vagina may be found to contain the septum, as if the division of the uterus were carried down into the vagina, while the fusion is complete below.

Usually the septum is thick and fleshy, resembling the recto-vaginal partition, but it may be very thin or even perforated in places; or the only traces which exist may be merely a few bridles stretching from side to side.

These lesions have been considered alternately as vestiges from the fusion of the canals of Müller and as adhesions formed during fœtal life.

The partition of the vagina may not be incompatible with normal labor. Dunning reports a case in which there were two vaginæ separated by a septum which began just above the vulva, and extended to the interval between the two small cervices, and the sound demonstrated that the division continued into the uterus. Pregnancy occurred on the right side, where the uterine cavity was larger, the cervices swelled equally, and the septum between the two uteri disappeared, probably by absorption. During labor the vaginal septum was torn from top to bottom, and only its lower portion persisted; the labor was accomplished without difficulty. The absorption of the septum during pregnancy is not unusual; the abnormal tissues seem to suffer great disturbances in their nutrition on account of the changes which take place in the puerperal state. The danger of uterine rupture is not great on account of the ease with which the septum is torn and the congenital bridles stretch. But it may happen that incomplete septa form an obstacle to the passage of the fœtal head, and in this case they should be divided during parturition; there is no danger of hemorrhage.

For the symptoms and treatment of hæmatometra complicating lateral hæmatocolpos, I refer to the following chapter.

Simple pyocolpos without dilatation of the uterus requires free incision, without which the suppuration cannot be controlled. I think that the indication is to make an excision of the whole wall of the purulent pouch at the same time; this may be performed with the scissors and the hemorrhage controlled by the thermo-cautery or the catgut suture, followed by antiseptic injections and tamponing with iodoform gauze. A septum or a bridle resulting from an incomplete septum which was an obstacle to coitus might be excised in the same manner.

Congenital Atresia and Stenosis—Transverse Bridles.—The history of atresia of the vagina, from an anatomical point of view, is confounded with that of imperforate hymen and of absence or imperfect development of the vagina, as already described. For the treatment of hæmatometra, I refer to the following chapter.

Stenosis or contraction of the congenital form, when it presents the appearance of partial adhesions or of transverse bridles, is undoubtedly due to the persistence of the fusion of the vaginal walls as Geigel has demonstrated on a fœtus of four months. But it may also be due to arrested development of Müller's ducts at a definite point of their course; the contraction may be so complete that the end of the sound will hardly pass, and it may occupy only the superior third of the canal, where contractions of this kind are usually found.

In the case of one-horned uteri the vagina may be very narrow, due to the fact that the canal is formed from only one of the ducts of Müller, the other having aborted throughout its entire length.

Contractions in the form of transverse bridles may take the form of crescents or of incomplete disphragms; these are probably the cases which are described as supplementary hymens. These atresiæ cause the retention of the menstrual blood within the uterus when any obstacle temporarily obstructs their lumen; then an overflow occurs, followed by new accumulation of fluid; and serious accidents may occur in this way.

The obstacle to copulation and to parturition may require operative interference. But here also the tissues swell so much under the influence of pregnancy that they stretch to an unexpected degree, which may render the proposed operation unnecessary. This elasticity has certain limits, and there should be no hesitation in cutting the bridle with the scissors if it offered a manifest obstacle at the moment of parturition; too long delay has permitted the uterus to rupture.

The anomaly which consists in the presence of transverse bands may be compared with the same condition which is normal in the vaginæ of certain animals. The vagina of the Cetaceæ has been found to contain as many as eight successive folds; in the chimpanzee the vaginal folds form crescents of great extent; and in the sheep these rings or diaphragms extend up to the cervix.

Malformations of the Uterus.—I. *Absence and Rudimentary Development of the Uterus.*—These two malformations do not require separate description, for the differences which distinguish them have no importance clinically, however interesting from the standpoint of teratology; in either case there is no uterus, whether we can find no trace of it or only an insignificant vestige.

Complete absence (defectus uteri) is extremely uncommon, and many cases of the anomaly which have been published are probably due to an error of interpretation; there are numerous autopsies where the rudimentary horns of the uterus were taken for the non-existent tubes. The exact insertion of the round ligaments is a valuable point in the decision of the question. In complete absence of the uterus the rectum and the bladder are in apposition, and the round ligaments are lost in the cellular tissue which separates these two viscera; the ovaries may also be wanting. A similar anomaly is met, with other grave deformities of the viscera, in non-viable infants.

The rudimentary uterus (uterus rudimentarius) is constituted by a mass of small size and variable form which occupies the place where the uterus should be. This vestige of the organ may be either a slight thickening of the posterior wall of the bladder, or, if reinforced with a few fibro-muscular bands, part of the broad ligament, or a small band stretched between the tubes. When it is joined to the cervix in the form of a T, it is called uterus bipartitus, being reduced to its two cornua and reproducing the type of some of the lower animals; these cornua may be hollow and carpeted with mucous membrane. The ovaries may be altogether wanting, or, if present,

may be atrophied, flattened, and shrunken; but they may also be perfectly developed (Figs. 585, 586).

Ovulation occurs in such cases, but causes no molimen as a general rule, and there is no menstruation. As to the rest of the genital organs, the va-

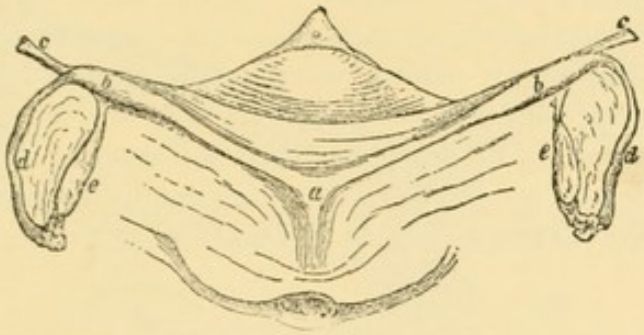


FIG. 585.—RUDIMENTARY UTERUS (VEIT). *a*, Imperforate uterus; *b b*, rudimentary cornua; *c c*, round ligaments; *d d*, tubes; *e e*, ovaries.

gina is most often wanting in whole or in part throughout its entire Müllerian portion, its place being taken below by a short vestibule; the external parts are well formed.

In rare cases, however, the vagina is completely developed, of which I have seen one example, and Mundé and Leopold have also observed one. Another case which is quite certain, in which castration was performed for the

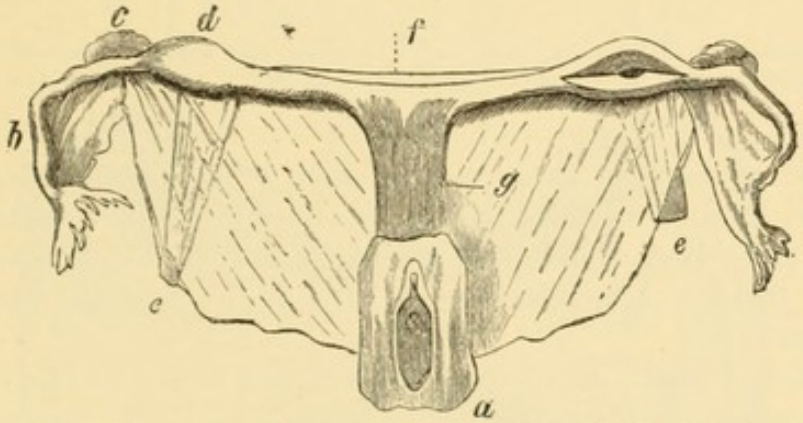


FIG. 586.—RUDIMENTARY UTERUS, VARIETY BIPARTITUS (ROKITANSKY). *a*, Vagina, closed; *g*, cervix; *d*, rudimentary cornu; *b*, Fallopian tube; *c*, ovary; *e*, round ligament.

pains caused by ovulation, belongs to Max Strauch. It is sometimes necessary to remove the ovaries when they have developed normally in spite of the atrophy of the uterus, as ovulation may cause periodic pain and nervous disorders. This is one of the indications for Battey's operation.

Women who present these anomalies have nothing externally which would lead one to suspect it; the form of the body, the voice, and the psychical characteristics are those of a well-made person, and the development of the breasts is normal. Usually they have relations with the other sex, and the result is to deepen the cul-de-sac of the vestibule till it becomes a large

canal; at other times it is the urethra which serves the purposes of copulation.

The diagnosis between a normal and an atrophied uterus is easily made by the aid of bimanual palpation and rectal touch, the latter combined with the sound or the finger in the bladder. At the same time the abdominal parietes should be strongly depressed above the pubes by an assistant. To determine upon the living patient whether the uterus is rudimentary or wholly absent is generally impossible.

Breisky has established a particular class for cases of absence or atrophy of the cervix, which often coexists with absence of the upper portion of the vagina. The uterus is atrophied, but differs from the rudimentary organ by

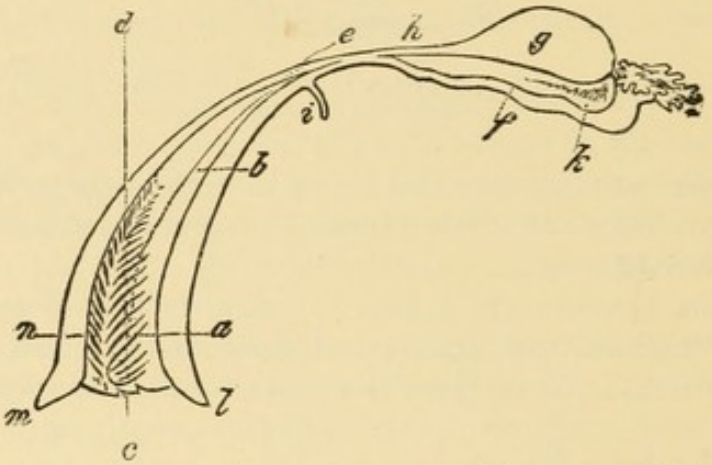


FIG. 587.—DIAGRAM OF AN INFANTILE UTERUS WITH ONLY THE LEFT CORNU (P. MULLER). *a*, Cervix; *b*, fundus; *c d*, longitudinal axis of the body of the organ; *f*, tube; *g*, ovary; *h*, ovarian ligament; *i*, round ligament; *k*, parovarium.

the presence of a cavity where menstruation occurs, constituting hæmatometra. The cervix is wholly lacking or represented by a small fold. If there is no effusion of blood into the uterine cavity, the symptoms do not differ from those of a rudimentary uterus; in the contrary case there is hæmatometra.

II. *Unicorn Uterus.*—The uterus is developed from only one of the Müllerian ducts, the other being atrophied; starting from the cervix, the organ is elongated and strongly curves toward the tube with which it is directly continuous, and of which it is simply the inferior expansion; its summit sustains the ovary. There is actually only a small part of the fundus of the organ and its cavity is small relatively to that of the cervix; the vagina is very narrow (Fig. 588). On the opposite side there may be no vestige of the other Müllerian canal, and then the uterus is absolutely unicorn.

An important variety is constituted by the presence of a rudimentary body. This may be formed of a band of compact muscular tissue, or it may be hollow with a small cavity which communicates with the larger cornu and forms a diverticulum from it. The rudimentary cornu is inserted at the

level of the internal os (for in such cases the fundus does not exist), and is very long, as if drawn out, and subject to many variations of form.

The unicorn uterus is an organ which is mutilated in its origin, but,

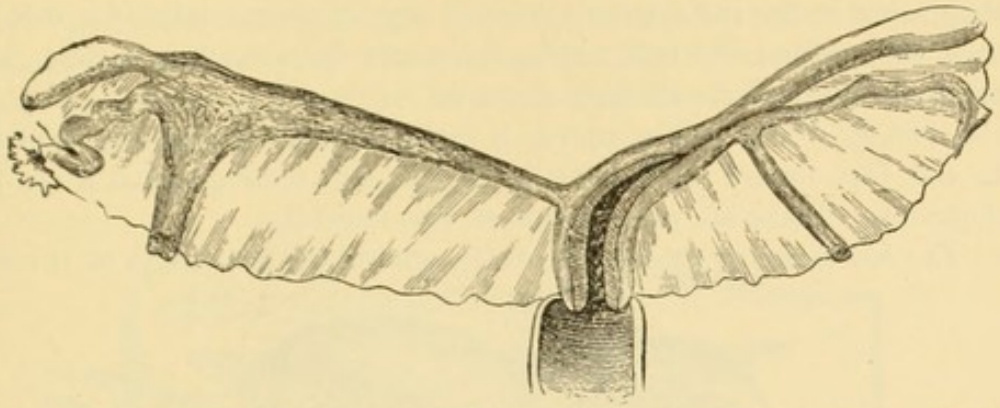


FIG. 588.—UNICORN UTERUS (SCHRÖDER). The left cornu is developed normally and in communication with the uterine cavity; the right cornu presents only an elongated band whose junction with the tube is indicated by the insertion of the hypertrophied round ligament.

when it arrives at the adult state, it functionates as a normal uterus; menstruation is regular, and pregnancy is accomplished without danger in the larger cornu. It is otherwise if the ovule is arrested in the rudimentary

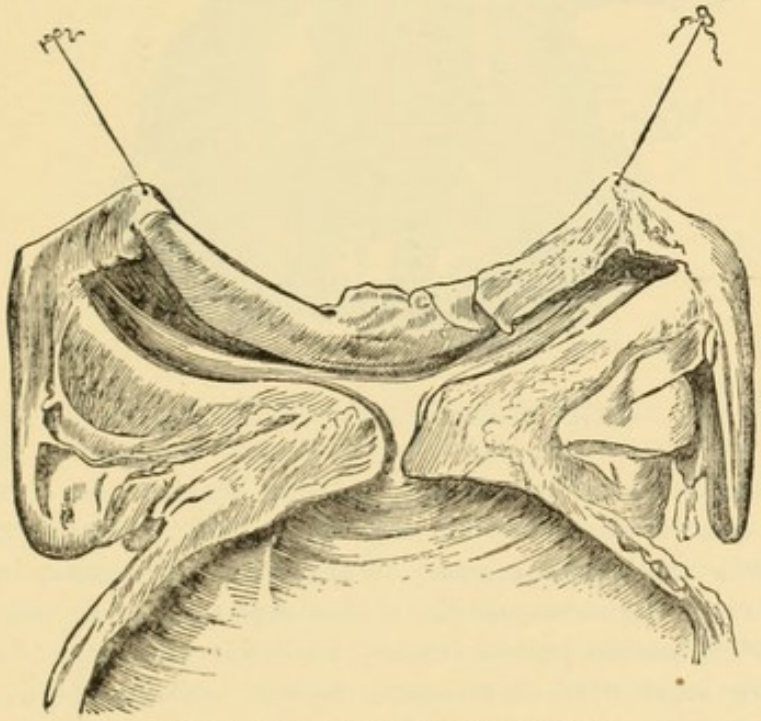


FIG. 589.—DOUBLE BICORN UTERUS (BARNES).

cornu; then its walls are incapable of furnishing the necessary material to form the cavity required for the growing contents, and it ruptures from the third to the sixth month. Pregnancy of this kind is classed with ectopic pregnancies and studied in the same chapter with extra-uterine pregnancy, with which it has many points in common.

The diagnosis is seldom made; but the malformation may be suspected when the vagina is very narrow, the cervix large and short, and the uterus, on bimanual palpation, of an elongated and curved form.

Pregnancy in the rudimentary horn is almost always taken for tubal because of the pedicle which separates the tumor from the larger tube, which simulates the body of a well-formed uterus.

III. *Double Uterus.*—The uterus is really double when the ducts of Müller do not fuse or are only partially joined, and undergo each a complete development. There are many kinds of this anomaly:

1. *The bicorn uterus* (uterus bicornis), where the two parts of the organ

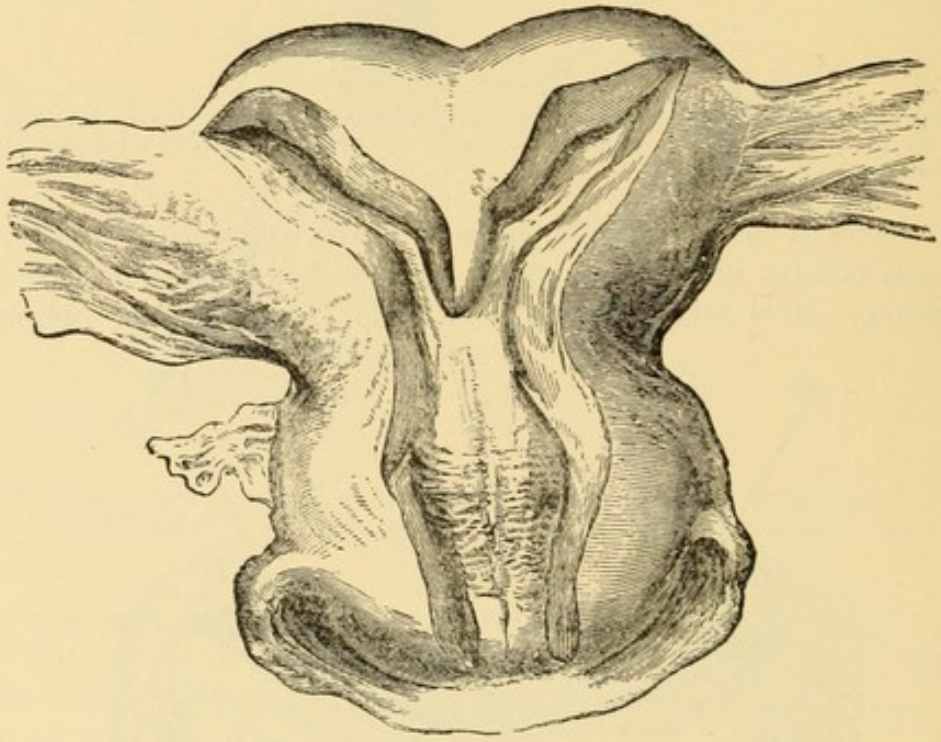


FIG. 590.—BICORN UNICERVICAL UTERUS (BARNES).

are separate from each other. If the division reaches the cervix, which is at the same time furnished with a septum, we have a double bicorn uterus (uterus bicornis duplex or septus). Then the coalescence is more pronounced, the cervix presents no trace of a septum, but is very large; this is the unicervical bicorn uterus (uterus bicornis unicollis). Finally, when the two uterine segments are almost complete, and this bifid condition is manifested only by a depression at the fundus, we have the arched bicorn uterus (uterus arcuatus), which is a transition form and the last stage before the normal organ (Figs. 589, 590, 591).

Usually the left cornu is directed forward in such a way that the uterus is twisted round its vertical axis. Frequently there is a bridle which goes to the anterior face of the rectum from the posterior aspect of the bladder above the notch in the fundus of the uterus; this is the result of a malfor-

mation; its importance is very great in pregnancy, for it may be the cause of dystocia.

The two portions of the uterus are seldom equal, and there are many transitions between the unicorn and bicorn varieties; the less developed side is apt to be the seat of a hæmatometra. The external organs and the breasts present no peculiarities, but the vagina is often double, and on one side there may be hæmatocolpos.

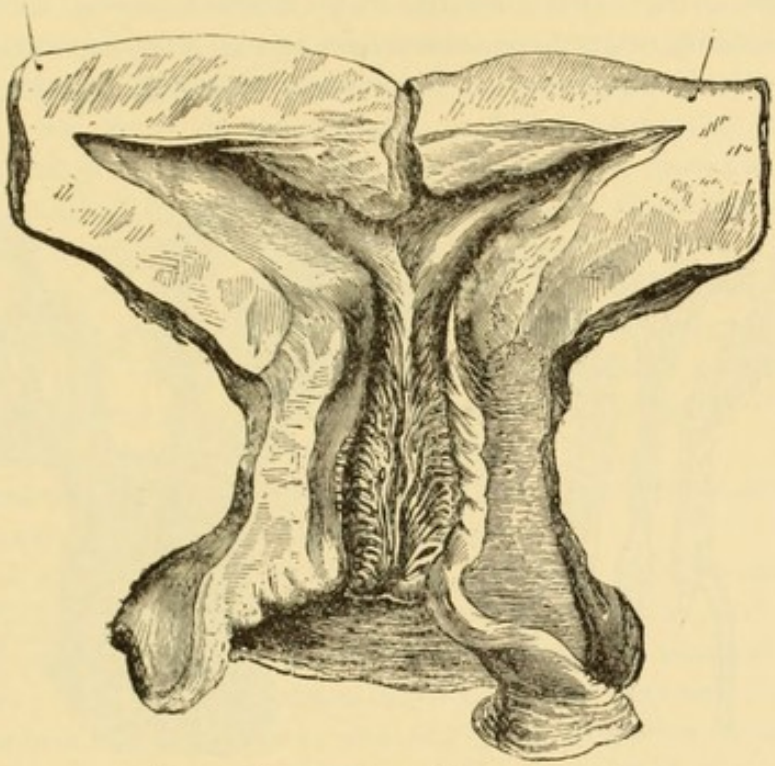


FIG. 591.—ARCUATE BICORN UTERUS (BARNES).

If both sides are developed equally, menstruation may occur in each segment, and pregnancy then interrupts the menstrual flow only on one side.

Pregnancy follows its normal course and the fœtus reaches full term, the hypertrophy of the non-gravid side keeping pace with that of the other, and membranes have been expelled from it; during labor both cornua contract.

Gontermann has reported a case in which the pregnancy seemed to occur alternately in either side. Twin pregnancies have been observed where there was a fœtus in each cornu; at other times both children will be developed in the same segment of the uterus. With the arcuate form of the organ transverse positions are frequent. This malformation of the uterus, like all the others, may be a cause of vicious attachment of the placenta; rupture of the organ has also been observed.

The vesico-rectal bridle may present an obstacle to the passage of the fœtal head. At times it is sufficient to alter the obliquity of the gravid

portion and allow the patient to lie on the opposite side; but it may be necessary to perform podalic version and extract the child. Bands in the vagina should be divided, and, if there is lateral hæmatometra, it should be evacuated. Finally, it is well to notice how often an anomaly of the uterus passes unrecognized through pregnancy and parturition, to be discovered much later; the septum is mistaken by the touch for the wall of the vagina or uterus.

2. *Bilocular Uterus* (*Uterus Bilocularis, Septus, Bipartitus*).—The characteristic feature of this variety consists in the normal external configuration of the organ, while its cavity is separated into two by a median partition. This division may be complete or it may cease inferiorly, forming the uterus

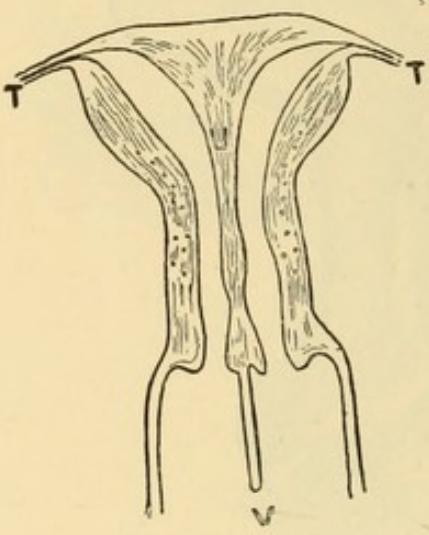


FIG. 592.—BILOCULAR UTERUS AND VAGINAL SEPTUM; VERTICAL SECTION (KUSSMAUL). *U*, Partition which divides the uterus into two halves; *T*, tubes; *V*, vagina divided by the uterine septum prolonged.

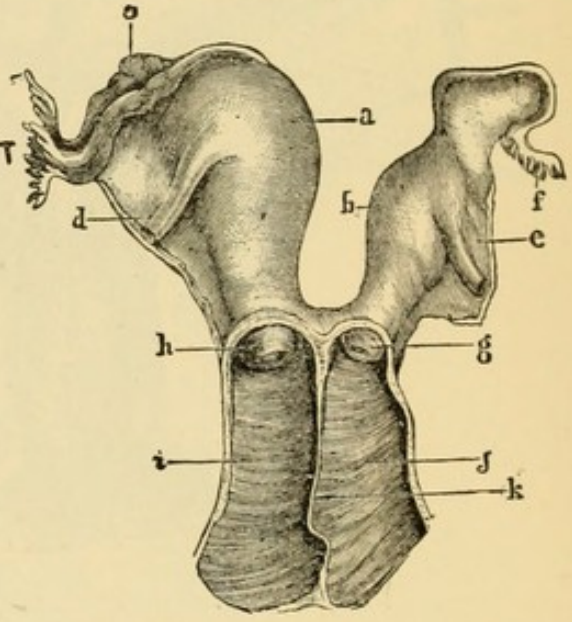


FIG. 593.—DIDELPHIC UTERUS AND DIVIDED VAGINA (OLIVIER). *a*, Right segment; *b*, left segment; *c d*, right ovary and round ligament; *f e*, left ovary and round ligament; *g j*, left cervix and vagina; *k*, vaginal septum; *h i*, right cervix and vagina.

subseptus; or the septum may be pierced with openings which leave only a number of bands across the cavity. The vagina may be either single or divided, and in the latter case each of its cavities corresponds to one of the segments of the cervix (Fig. 593). Corazza has reported an exceptional case in which the vagina was divided, and the uterus was not.

What has been said of the bicorn uterus as regards menstruation, pregnancy, and atresia of the segments, with hæmatometra, applies also to the bilocular variety of malformation.

3. *Didelphic Uterus* (*Uterus Duplex, Separatus, Diductus*).—In these cases there are actually two uteri, separated as far as the cervix and including it, and not two bodies more or less divergent as in the case of the bicorn variety. Here each segment presents the appearance of a complete uterus,

and may be said to be two unicorn uteri equally developed and apposed without fusion. It was thought that this malformation occurred only in non-viable embryos with deformities of a serious nature affecting other organs, and it has been seen with ectropion of the bladder, atresia of the anus, and persistence of the cloaca. Cases observed in adults are of comparatively recent date; but it is probable that many of the older cases of bicorn uterus ought to be revised and placed in this class. The most conclusive case of the didelphic uterus in the adults is that of Olivier, in which at the autopsy of a woman of forty-two years, the mother of six children, this malformation was discovered. Heitzmann reported a case of a young woman of twenty-three years where the vagina was double, with a septum which divided the cervix; and a sound in the two uterine cavities proved that they diverged from their cervical union and became two distinct and movable organs.

The recto-vesical ligament which so often passes above the bicorn uterus has not been described with the didelphic form.

In clinical examinations it is always difficult to decide whether the case is one of complete bicorn or of didelphic uterus; it can be certainly decided only on anatomical examination. The clinical histories of the two forms seem to be the same in each case, as far as we can judge by the few specimens of the didelphic form which we possess.

Atresia of one of the segments may produce lateral hæmatometra; pregnancy may occur in each side simultaneously.

4. *Fœtal or Infantile Uterus.*—This anomaly is produced when the uterus is completely developed in its general formation, but remains stationary and preserves the proportions and nearly the dimensions which it had at birth. A subtle distinction has been drawn between the fœtal type which represents the last stage of the embryonic evolution, with the mucous folds extending even into the fundus of the organ, and the infantile type where the organ resembles the uterus of the new-born child with the folds only in the cervix. It is but a refinement of anatomy which deserves mention merely; from all other points of view the two varieties are identical. The characteristic of both is the unequal development of the cervix and the fundus, reproducing the fœtal type. The cervix is twice or thrice the length of the body, and, while its walls are relatively thick, those of the fundus are thin or even membranous. The whole length of the cavity does not exceed 4 cm.; the cervical orifice is small, and the cervix is conical or tapiroid (in the shape of the tapir's muzzle). The vagina is usually short and narrow; the external organs may be well developed and the breasts small. There is complete amenorrhœa.



FIG. 594.—INFANTILE UTERUS (SCHRÖDER).

If the uterus is atrophied, the condition may be easily recognized on bimanual palpation with the aid of rectal touch. To distinguish the fœtal from the pubescent uterus, which presents the same reduced dimensions and

occasionally the same amenorrhœa, we may be guided theoretically by the size of the cervix. In the uterus of the fœtal type, the cervix is quite firm, especially in its supra-vaginal portion; in the pubescent uterus, on the contrary, the cervix is thin and relaxed. As a matter of fact, however, these distinctions are clinically without practical value, and are also a little illusory.

Minor Uterine Anomalies.—It is convenient to describe under this head a number of slight malformations which do not belong in the classes already treated.

Congenital Obliquity and Latero-position of the Uterus.—This condition is due to asymmetry of the organ where one part predominates and causes a distortion of the other, inclining it toward the well-developed side; the re-

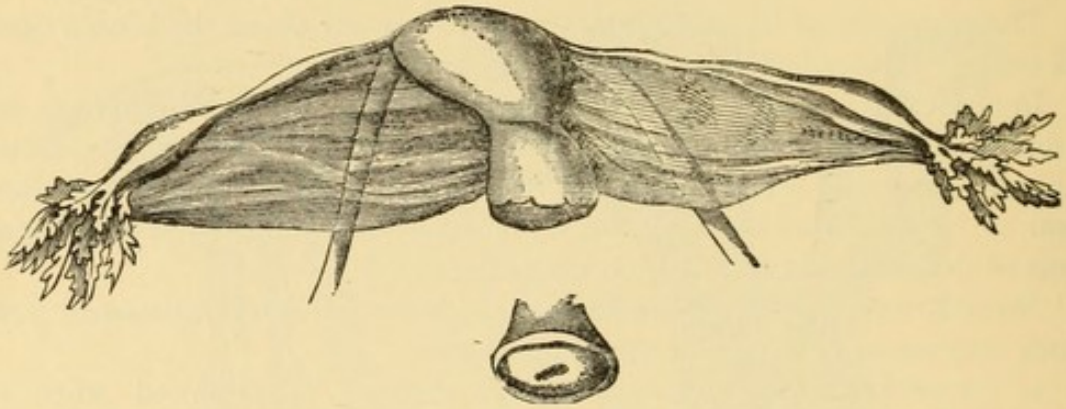


FIG. 595.—CONGENITAL OBLIQUITY OF THE UTERUS; INCOMPLETE DEVELOPMENT OF THE RIGHT SIDE (TIEDEMANN).

sult is a relative shortening of the broad ligament. In the cases in which this is not very pronounced a simple latero-version is found, which may be compared to congenital anteversion. When well marked, this anomaly might be confounded with the unicorn uterus if we were not apprised of the possible error.

Duplicity of the External Os (*Uterus Biforis*).—A double os may be found where the uterus itself is single. This anomaly has been the cause of accidents during delivery, but usually the bridle is either torn or pushed aside; serious bleeding has followed its laceration. If the physician is not aware of this deformity, he may easily be perplexed by it; if he recognize it, he will attempt to keep the band on one side and disengage the fœtal part which presents, or, if this fails, he will cut it between two ligatures.

Incomplete Transverse Division of the Cervix.—P. Müller described for the first time the presence of a transverse fold in the cervix which projected into its cavity. After dilating the part he found a second cervix fitted into the first one. Breisky has also seen this anomaly, but his case is not published. In both these cases, observed in the non-gravid uterus, the band appeared to be the cause of hemorrhages, acting like a fibroma or a polyp, and its excision caused the cessation of the symptoms.

Such bands may be an obstacle to delivery. Bidder has published a very instructive case of this kind. Recently Budin has again drawn attention to the subject by reporting two personal cases in which the septum was not a cause of dystocia, and two cases of Mme. Henry's in which the bands were situated at the internal os in one and about 2 cm. above it in the other, in the lower segment of the uterine cavity. Two similar cases are reported by E. Blanc. These bands may disappear with the labor or persist after it.

This anomaly has been compared with the transverse bands which exist normally in the genital canals of certain animals, as I have mentioned in the case of vaginal bridles.

CHAPTER XLVIII.

RETENTION ACCIDENTS FROM GENITAL ATRESIA.

HÆMATOMETRA; HÆMATOCOLPOS; HYDROMETRA; PYOMETRA; PYOCOLPOS; HÆMATO-SALPINX.

Etiology and Symptoms.—I have described in what conditions the genital canal may be closed by atresia situated at different parts of its course from the hymen to the distant portions of a rudimentary cornu. This occlusion may completely obstruct the canal, entirely closing one of the portions which are derived from its division, or may simply shut off a diverticulum which has arisen from defect in the conformation of its parts. However that may be, at the time of puberty, if the ovaries and the mucous membrane of the tubes permit the appearance of the menstrual phenomena, the blood which is voided from the tubes into the uterus may find no way of escape; it therefore accumulates in the closed spaces, which retain it, and distends them in various situations.

Hæmatocolpos occurs in imperforate conditions of the hymen and the lower portion of the vagina, under the form of a tumor which fills the cavity and exerts pressure on the rectum, and bulges forward the membrane which limits it at the vulva. The uterus is pushed upward, and at first only the cervix is distended, the cavity of the fundus resisting for a long time. Bimanual palpation and rectual touch perceive fluctuation, but the small hard tumor which surmounts the collection, which is the non-dilated portion of the uterus, often causes hesitation in diagnosis (Fig. 596).

When the inferior portion of the vagina is lacking, the collection is limited to the part about the cervix, but here also the uterus is not at first dilated, and if it become so it is only after the lapse of some time. When the pouch is opened and the fluid removed, the finger perceives no demarcation between the vagina and the distended cervix.

That hæmatometra may develop, the cavity of the uterus must alone receive the blood which accumulates; this occurs when the entire vagina is absent or when the internal os is occluded. Then the uterus becomes transformed into a pouch with fairly thick walls, seldom thinned, where fundus and cervix are continuous. If the atresia is at the internal os, the fundus alone may dilate and the cervix preserve its normal proportions (Fig. 597). In all cases of hæmatometra, and in many of hæmatocolpos, the tubes also are dilated, and we have hæmato-salpinx. The blood in the tubes does not come from reflux from the uterus, as is proved by the fact that there may be

no communication between the two collections, and that the former may be found by itself. We cannot refuse to admit that the blood in the tubes has come from the mucous membrane of the part, for its own discharge coincides with that from the uterus during menstruation. As the walls of the tubes are thinner, they may be widely distended when the pressure in the genital canal increases by the occlusion of the lower portion of the vagina, while the thick walls of the uterus resist for a long time.

These irregular and twisted tumors of the tube may acquire an enormous size. Small quantities of blood escape from time to time by the abdominal

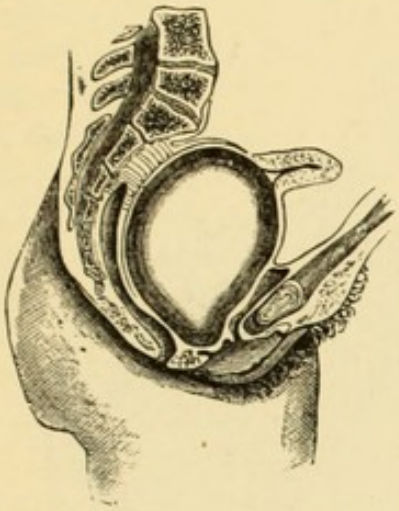


FIG. 596.—HÆMATOCOLPOS FROM ATRESIA OF THE HYMEN (SCHRÖDER).

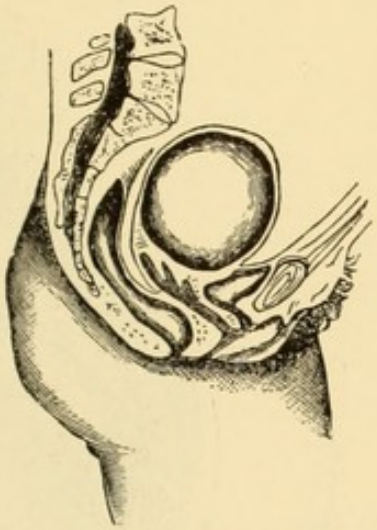


FIG. 597.—HÆMATOMETRA FROM ATRESIA OF THE INTERNAL OS.

end, and produce attacks of pelvic peritonitis (perimetro-salpingitis). If the amount of blood in the perineal cavity is large, it may not be absorbed, and then we have pelvic hæmatocele, which may coexist with general peritonitis.

The contents of these pouches formed by the retention of the menses will generally be thickened blood of a chocolate color and a syrupy consistence like tar, with its red corpuscles very much distorted. After puncture, the pouch may suppurate and transform the case into one of pyocolpos or pyometra; decomposition of the fluid may produce gases and physometra.

Besides the tumor which appears at puberty and gradually enlarges, we usually find pain at the time of menstruation in the form of colic, which is attributed to the distention and the escape of blood into the peritoneum. The pain becomes more frequent and then constant, causing the exhaustion of the patient.

In certain cases, in which the flow of blood is probably very slight owing to particular conditions of the ovaries and of the mucous membrane of the uterus, the accumulation of blood is slow and the principal symptom is the pain. The menses may be supplied by vicarious hemorrhages taking place at different points, and thus preventing the formation of hæmatometra. Finally the obliteration of the genital canal has at times coincided with a real

or apparent amenorrhœa; certain patients suffer only at the menstrual periods, and there are others in whom there is no pain, and in whom the ovaries probably do not functionate.

Diagnosis.—The absence of the menses, the imperforation more or less accessible to examination, and the appearance of a tumor which occupies the normal position of the genital cavities are the signs which together are pathognomonic.

Atresiæ at the hymen and a little behind it are often confounded, without any practical importance in the mistake. In either case the membrane

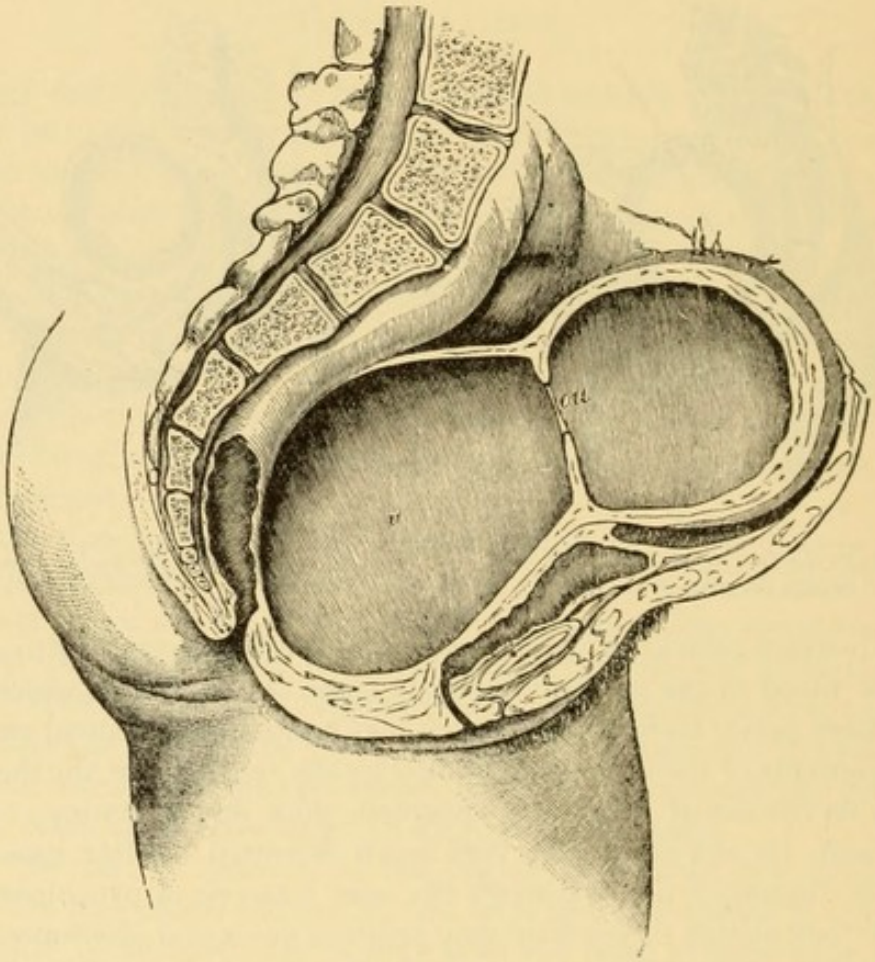


FIG. 598.—HÆMATOCOLPOS AND HÆMATOMETRA FROM ATRESIA OF THE INFERIOR PORTION OF THE VAGINA (BARNES). *v*, Distended vagina; *os*, internal os.

is depressible, although so thick that spontaneous perforation is very rare. The vulva and the perineum are prominent, their tension being comparable to that of the membranes before parturition.

The examination of the uterine and tubal tumors should be undertaken with care and without insisting on finding fluctuation, for fear of producing rupture. This symptom may in any case be absent; when the pouch is very tense, it is simply elastic.

There may be very grave doubts when there is hæmatometra from atresia

of the internal os with a normal cervix; then we have to decide between pregnancy, fibroma, cancer of the fundus, and the hæmatometra, according to the signs proper to each and the statements of the patient.

Where there is complete or partial division of the canal by a septum, the difficulties in the way of diagnosis are very great for hæmatocolpos or hæmatometra (Fig. 599) of one side. Lateral hæmatocolpos does not form a tumor which coincides with the vagina, but on account of an evolution, which Breisky has well described, it undergoes a semi-spiral torsion, so that its lower portion may be anterior and its upper posterior, or *vice versa*. Cystocele, vaginal cyst, vaginal enterocele, thrombus, and retro-uterine hæmatocele could hardly be confounded with hæmatometra or hæmatocolpos if proper care were exercised. The difficulty is, however, great when, with a divided vagina, the accumulation of blood takes place in one segment of a bicornate, bilocular, or didelphic uterus. We should endeavor carefully to mark out the limits of the tumor by the aid of bimanual palpation, and to discover the non-dilated portion of the organ, which is generally pushed far to the side. It is especially in the case of hæmatometra of a rudimentary cornu that there would be doubt, and a danger of mistaking it for a cystic tube, all the more if the other tube were dilated; fibroma should also be excluded. Pregnancy may occur in the free portion of the uterus and complicate the signs still more. Exploratory puncture I consider very dangerous, and prefer exploratory incision if necessary in a doubtful case.

Prognosis.—Left to themselves, collections of blood from atresiæ of the genital canal are very serious. Spontaneous evacuation does not produce a cure, but only a temporary relief, followed later by a return of the retention symptoms aggravated by suppuration. The spontaneous perforation is also generally insufficient, and quickly closes after permitting a partial evacuation and also the infection of the sac. When, as seldom happens, the accumulation is voided through an adjacent organ, like the intestine or even the stomach, the result is not the less fatal; renewed menstruation fills the pouch again and the patient succumbs. Death occurs from septicæmia after spontaneous rupture of the sac or from peritonitis after opening into the peritoneum.

In astresia of a single segment of a double canal, the prognosis is not so grave; lateral hæmatocolpos frequently terminates by rupture into the permeable vagina at the intra-cervical septum. But the suppuration of this cavity, which generally occurs, causes a pyocolpos which may be fatal if the opening is not freely enlarged. In partial hæmatometra of a rudimentary segment, the accumulation of blood may cease and the tumor remain stationary.

Before the period of antiseptics, opening a large collection of blood in the genital canal was frequently followed by septicæmia, whether the operation was a free incision without sufficient cleansing of the sac afterward, or a simple puncture with the idea of preventing the entrance of the air, which

was held responsible for all accidents, or to avoid the hasty removal of the pressure, which was considered the cause of internal rupture. These accidents are, as a matter of fact, produced by other causes, either primarily by too violent exploration, or, secondarily, from alteration in the wall of the sac as the result of septicæmia. The gravity of the operation has been considered so great that Boyer, Dupuytren, and Cazeaux have advised against it; and within recent years interference was strongly opposed. But many suc-

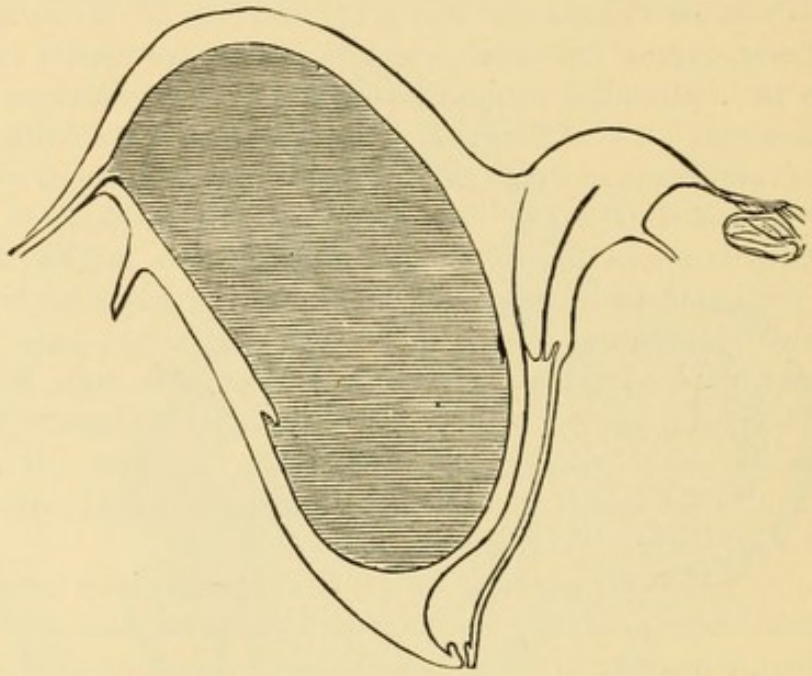


FIG. 599.—LATERAL HÆMATOCOLPOS AND HÆMATOMETRA, WITH DOUBLE UTERUS AND VAGINA, FROM COMPLETE ATRESIA OF ONE OF THE VAGINÆ AND IMPERFORATE SEPTUM IN THE GENITAL CANAL. Diagrammatic (Martin).

cessful cases prove that it is not an operation which is necessarily fatal if we proceed boldly and antiseptically; consequently, the therapeutic prognosis is completely changed.

Treatment.—1. *Total Hæmatocolpos and Partial (Cervical) Hæmatometra; Atresia at the Hymen or Behind It.*—Simple puncture not followed in the same session by incision appears to be a prudent operation, but it is really very grave and rash as it exposes to suppuration. We should therefore begin by slowly evacuating the fluid by a very small opening, a simple puncture with the bistoury, letting it escape gently for a half or a whole hour; then the incision should be enlarged in the form of a cross. It is worse than useless to excise the obturating membrane. The sac must be cleaned out with weak antiseptic solutions delivered with little force and the vagina lightly packed with iodoform gauze.

It has been objected to this manner of slowly but progressively evacuating the fluid that the tubes might be ruptured if they were distended and adherent to the adjacent parts; but this distention is very rare in hæmatocol-

pos with the atresia inferior, and the danger of rupturing the tubes is not so great when their walls are intact as it becomes by temporizing until they are altered by a certain degree of decomposition of their contents.

2. *Partial Hæmatocolpos and Partial or Complete Hæmatometra; Atresia of a Great Portion or the Whole of the Vagina.*—In this case we must proceed by an actual dissection, which is very dangerous on account of the closeness of the bladder and rectum. Amussat, who was the first operator bold

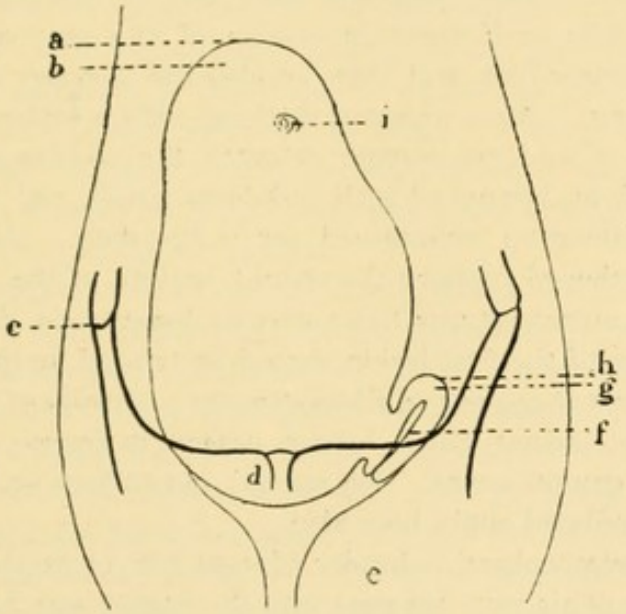


FIG. 600.—LATERAL HÆMATOMETRA IN A SEGMENT OF A DOUBLE UTERUS. Diagrammatic (Staude). *a*, *b*, Insertion of the right tube and round ligament; *c*, iliac bone; *d*, symphysis; *f*, uterus; *g*, *h*, insertion of left tube and round ligament; *i*, umbilicus.

enough to propose the creation of an artificial vagina permitting the immediate evacuation of the fluid and the regular escape of the menses afterward, operated in several sessions, each time securing the part acquired by packing it with prepared sponge; he rejected the cutting instrument, and used his fingers alone in the separation of the tissues. It is better, however, to operate in one session. When the case is one of hæmatometra, the presence of the tumor is a valuable guide in our dissection. When we arrive in its immediate vicinity, which we may recognize by rectal touch, a trocar is plunged into the fluctuating point; and as soon as it has penetrated, as is shown by the escape of the fluid, the opening should be rapidly enlarged by small cuts with a narrow-bladed bistoury on each side of the trocar.

Breisky recommends a bistoury with its blade concealed in a canula, but this instrument is not indispensable. The calibre of the canal must be maintained afterward by the use of cylinders of hard rubber or glass.

Puncture by the rectum has been advised by Dubois, Boyer, Scanzoni, and Baker Brown, but it should be rejected. Puncture or incision by the bladder, which was proposed by Simon and Spiegelberg in cases in which the perineal incision was too dangerous, should be taken into consideration; we

could thus certainly evacuate such a collection without opening the peritoneum where there was the danger of immediate rupture. But the penetration of the urine into the sac and its possible infection from cystitis, which the altered blood might produce, constitutes an actual danger. The parasacral or pararectal incision might be utilized in these cases.

3. *Total Hæmatometra; Atresia of the Uterine Cervix.*—The obliteration may be at the external or at the internal orifice. In the latter case we begin by dilating the cervix with laminaria tents, and we attempt to introduce a sound. If this fails, or if there is atresia of the external os, we should puncture with a trocar first, and then employ the bistoury or the scissors to enlarge the opening. After repeated washing with a feeble antiseptic solution with the aid of an intra-uterine catheter, the cavities of the cervix and the fundus should be tamponed with iodoform gauze, and thus an exaggerated degree of dilatation maintained for a few days. Afterward a glass canula or a cross-shaped rubber tube should be left in the uterus for a long time. When the uterus returns to its normal dimensions, the metritis which is the consequence of the first lesion should be treated by the curette.

4. *Lateral Hæmatocolpos and Hæmatometra; Atresia of Part of a Double Canal.*—All these lesions which I have passed in review may exist in one half of a double genital canal. No special indications are found; the precepts already formulated apply here also.

In lateral hæmatocolpos, Schröder advises not to excise the septum too freely, so that the penis may not pass into the vagina which was occluded, to avoid a pregnancy on that side; such a precaution seems to me illusory, for the spermatozoa find their way into the smallest openings. It appears to me preferable to excise the septum as freely as possible and transform the double vagina into a single canal.

There is a great difficulty in the treatment, as in the diagnosis, where there is an accumulation in a rudimentary cornu with a pedicle, which is often elongated, thus forming a tumor which appears to be independent of the uterus. It has been advised to reach the collection through the vagina, and Hegar recommends the practice, either by the cautery or by incision of the cul-de-sac and iodoform tamponing carried up to the tumor, to provoke adhesions. This seems to me more dangerous than laparatomy followed by the ablation of the cornu and the corresponding tube, which is distended by the blood. If extensive adhesions render the ablation too dangerous, we may suture the sac to the abdominal wall, open it, and provoke its obliteration by granulation.

Hysterectomy could also be performed in certain cases of bicorn uterus. The tumor is generally easy to furnish with a pedicle at the cervix, which is fixed externally. I think that this operation should be reserved for those cases in which it is not easy to reach the tumor by perineal dissection and those in which the evacuation of the blood offers difficulties from the solidification of the contents of the sac, which may be transformed into fibrous

masses, as in a case of Jeannel's. Hysterectomy might be done immediately if the conditions could be recognized beforehand, or it could follow the attempt to evacuate by the vagina. Manœuvres through this canal must not be too prolonged, for they cause pressure which may rupture the tubal dilatation. Hysterectomy has been performed with success by John Homans for a case of lateral hæmatometra in the bicorn uterus.

5. *Hæmato-salpinx.*—The hæmato-salpinx which so often complicates atresiæ of the genital canal should not be neglected, for the rupture of a thin-walled collection may produce death. Fuld has collected 66 cases of atresia, either congenital or acquired, in which the accident has occurred, and in 48 of them it was followed by death. Among these, 39 had followed a previous operation, and 9 occurred without surgical interference. Hæmato-salpinx existed in 27 in which there was atresia without a septum, and 12 in which the canal was double.

In order to appreciate the operative indications, we must know the natural evolution of a tubal collection after the vaginal or uterine tumor has been evacuated. In many cases, if the way of escape provided is sufficiently large and well maintained, the hæmato-salpinx empties itself and disappears. But there are cases in which the tumor of the tube suffered no change or in which it was renewed at every menstrual period; it is in these cases that we must operate; salpingotomy has given good results in the hands of Sutugin.

Simple evacuation of the hæmato-salpinx by puncture has been proposed; but though less important in appearance, this is really more dangerous than ablation. Puncture by the vaginal pouches has been followed by success, but there is a risk of injury to the intestines and of effusion of blood into the peritoneum, as well as of suppuration of the sac. Puncture through the abdominal wall is open to the same objections.

There is one other occasion when salpingotomy is required. It is when, after or before operation upon the vagina and uterus which are the seat of atresia, the tumor of the tube suddenly disappears without the external issue of a corresponding amount of blood; it is then very probably that rupture has occurred into the peritoneum; symptoms of grave internal hemorrhage render the diagnosis certain and demand immediate laparatomy.

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