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A HANDBOOK

OF

DISEASES OF WOMEN,

INCLUDING

DISEASES OF THE BLADDER AND URETHRA.

BY

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ROYAL COLLEGE OF PHYSICIANS, EDINB. LIBRARY

AUTHORISED TRANSLATION.

EDITED BY

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EDITOR'S PREFACE

TO THE

SECOND EDITION.

The translation of Winckel's "Lehrbuch der Frauenkrankheiten" has been very favorably received by the profession in this country and in Great Britain. It was my hope that a new German edition would appear before a second American issue was needed. But early last summer Professor Winckel wrote me that his professional duties so constantly occupied him, it would be impossible for him to do any work upon a second edition the present year. He, however, expressed his cordial approval of the plan made known to him, which has been carried out in this issue, adding to the original work a section upon Diseases of the Female Urethra and Bladder, derived chiefly from his own monograph upon the subject.

The translation of the "Lehrbuch" was made at my suggestion by Dr. J. H. Williamson, of Allegheny. In the revision of the translation, and in the proof-reading of the first issue, I had the valuable help of Dr. A. B. Hirsh; Dr. A. A. Eshnur has rendered me similar assistance in the preparation of the present issue—several corrections have been made and a few omissions supplied, and we have endeavored not only to secure accuracy of statement, but also clearness and fluency of expression.

Of course, as is elsewhere explained, it has been necessary in the added section to omit some and condense other parts of the original monograph; but I hope that neither condensation nor omission has been made to the serious detriment of the practical instruction.

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THE

DISEASES OF WOMEN.

SECTION I.

THE ANOMALIES AND DISEASES OF THE EXTERNAL SEXUAL ORGANS.

Historical.—The term vulva signifies the covering or envelope, or the external skin and its folds, and, according to Pliny, was used to designate the uterus of a lower animal. Bonacioli refers to it as follows: "Non vel a valva porta, vel a volendo, sed eo quod insatiabiliter coitum velit atque desideret, quantum mea fert opinio, vulva vocanda est." This probably is correct.

Ulcers and deformities of the vulva were known to Hippocrates. Celsus begins the 20th chapter of the fourth book, De vulvæ morbo, with the words: "Ex vulva quoque feminis vehemens malum nascitur."

He mentions remedies for vulva exulceranta, for dolores vulvæ, si sanguis profluit, and for condylomata.

Concerning hemorrhoids he says: "Idque vitium in ore vulvæ feminarum incidere consuevit, atque in quibusdam parum tuto supprimitur." In No. 10 he treats of the condition: si anus vel os vulvæ procedit, and in No. 11, fungus ani aut vulvæ, doubtless meaning epithelioma of the vulva. He also knew atresia of the hymen.

Paul of Ægina described (625–690) corroding ulcers of the vulva, mentioned nomas pudendarum, was familiar with hyperplasia of the nymphæ, and recommended clitoridectomy and nymphotomy. His description of thymi vulvæ corresponds to papilloma or elephantiasis, and he recommended that they, as

well as condylomata and hemorrhoids of the vulva, be removed with the knife. From these few historical facts it becomes evident that the physicians of antiquity knew the more common tumors of the vulva, and their operative treatment.

CHAPTER I.

DEFORMITIES OF THE VULVA.

The formation of the external sexual organs begins in the fourth week of embryonic life, with the appearance of a slight elevation in the caudal region, in which a depression is soon observed. This depression grows deeper toward the allantois, which is still connected with the intestine, later becoming a cloaca upon the disappearance of the wall separating the depression from the allantois, and into this the intestine and urachus open. Fourteen days later an eminence, the first indication of the sexual organs, appears above this opening, and on each side of it a large fold of skin. At the end of the next fourteen days a furrow may be recognized situated between the cloaca and genital eminence. Then the wall between the intestine and allantois grows from above downward into the cloaca, thus dividing the single opening into two, and forming the perineum. In the further development the genital eminence becomes the clitoris, the first folds of skin become the labia majora, the borders of the furrow forming the nymphæ or labia minora. Into the anterior division of the cloaca the ends of the ureters open, *i. e.*, the bladder developed from the urachus, and the ducts of the seminal glands, whence it now receives the name *sinus urogenitalis*. The sinus has a length of 1.5 millimeters, or about $\frac{1}{17}$ of an inch, in the embryo at four months.

The further downward this wall from which the perineum is formed grows, the more the ends of Müller's ducts are drawn down, the descent of the vagina occurs, and the uro-genital sinus thus becomes shorter; the urethra is formed, and hence as early as the fourth month of embryonic life the urethra and genital canal are completely differentiated.

At this time epithelial cells cause the clitoris and prepuce, as well as the glans penis and prepuce in the male, to be adherent. The orifices of the glands of Bartholin may already be distinguished, opening into the vestibule one millimeter, or $\frac{1}{26}$ of an inch, above the lower end of the uro-genital sinus, and one millimeter below the origin of the vagina and hymen. The glands themselves, which are either oval or round, and one or more millimeters in diameter, show well-formed glandular acini, and mucus may be found both in them and in their ducts, from which it is evident that they begin to furnish their peculiar secretion even at this early date.*

In place of this normal development of the external sexual organs, the following malformations may occur:—

I. If the genital fissure is not formed the skin remains entire, and the vulva is absent, *defectus vulvæ* or *atresia totalis*. In this case, neither the ends of the ureters, the seminal glands, nor the intestinal canal, have an external opening; the rectum, bladder, and genital canal may communicate internally,† or the intestine and bladder may remain separate, the seminal glands opening into the latter.

Instances of this malformation have only been found in non-viable, immature births; several illustrations have been given by Foerster,‡ some showing not the slightest trace of a vulva, as in the acephalus sympus; § others only a small pedunculated appendage, as occurs especially in the sirenian malformation.

II. If, after the formation of the cloaca, the septum between the bladder and intestine, which forms the perineum and which draws the vagina down with it, does not grow downward, the cloaca becomes permanent; then the intestine, the end of the urachus, and the seminal glands empty into a common canal. This condition has been called *atresia ani vaginalis*, but incorrectly, because the intestine does not end in the vagina, the latter beginning at a considerable distance above its lower opening.

III. If the uro-genital sinus remains very long and narrow, not being shortened by the descent of the united ducts of Müller,

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* R. Geigel.

† Olshausen's Case, *Archiv*, II, p. 280.

‡ Atlas, plates ix and x.

§ Plate ix, Fig. 6.

the urethra continues short and occupies an abnormally high position. This condition is to be considered as the beginning of hypospadia feminæ, a true hypospadias occurring when the bladder opens without the vagina into the vestibule. A case of this kind has been described by Heppner.

IV. If the formation of the urethra and the closure of the anterior parts of the vulva be prevented by a delayed communication of the allantois with the external surface, or if there be a defect in the anterior wall of the bladder with a cleft of the pubic symphysis, the condition is known as epispadias. Here the clitoris and nymphæ are cleft, and the anterior wall of the urethra is absent; cases of this kind have been described by Roeser, Gosselin, Testelin, and others.

The causes of all such arrests in development lie in part in the relations of the respective organs themselves, *e. g.*, a closure of ducts may interfere with the passage of the contents, and the consequent distention may prevent normal union, producing new separation. Again, they may be caused by neighboring organs, *e.g.*, by the omphalo-mesaraic duct, by the intestines, or from abnormalities in the larger abdominal organs, such as the liver, which, owing to its great size or unusual connections, may permanently dislocate the organs beneath it.

It is certainly incorrect to speak of a congenital vulvar atresia where there is an orifice beneath the hypertrophied clitoris leading to the uro-genital sinus, through which the urinary and genital secretions pass out, for here there is no complete closure and the vulva is not imperforate. The condition which Hildebrandt represents in his work, p. 5. Fig. 3, does not, therefore, show an atresia of the vulva, but hyperplasia of the clitoris, persistence of the uro-genital sinus, and an abnormal shortening of the recto-vaginal septum.

V. A peculiar malformation of the external genitals is that which has been designated hermaphroditism. Here some parts of the vulva, especially the clitoris and labia majora, are developed to an unusual degree. The labia, uniting at a higher level, present a sort of raphe and not infrequently contain the ovaries, increasing the resemblance to the scrotum. Other parts, on the contrary, especially the nymphæ, have been arrested in

development, and hence the glans is partially exposed or the prepuce is too short. Yet usually such cases are not examples of true hermaphroditism, but of individuals of only one sex. There are, however, cases of true hermaphroditism in which testicles and ovaries may be microscopically demonstrated in the same individual, but, as a rule, the parts peculiar to one sex are much better and completely developed, while the others are rudimentary.

The following combinations are possible :—

(*a*) Bilateral hermaphroditism, when a testicle and ovary are found on each side. Heppner's case of a two months' child * probably belongs in this category ; still it cannot be accepted without reserve that the glandular body connected with the par-ovarium was a testicle, because radiating tubes passing toward the hilus have been found in it ; and, moreover, there was no trace of an epididymis.

(*b*) Unilateral hermaphroditism, when an ovary or a testicle is found on one side, and on the other both ovary and testicle. No verified case of this kind has been observed.

(*c*) On the other hand, numerous cases of lateral hermaphroditism have been described, *i.e.*, a testicle on one side and an ovary on the other ; this has been proved microscopically by careful observers. The best authenticated case is that of H. Meyer,† in which, the subject an infant, a normal testicle was found on one side, the ovary on the other, the uterus, tubes, vagina, and urogenital sinus being present. The penis was long and imperforate, the left half of the scrotum contained the testicle, the vas deferens of the normal testicle alone being wanting.

The condition of things was similar in the case of the well-known hermaphrodite, Catharine Holman. Menstruation had been conclusively proved to occur from the rudimentary uterus, an ovary had been found, and spermatozoids repeatedly demonstrated in the ejaculated genital fluid. Here the ovary and the testicle must have been unusually well developed.

I have had the opportunity of examining another her-

* *Müller's Archiv*, 1870, p. 679.

† *Virchow's Archiv*, XI, p. 420, and Klebs, I, 2 A, p. 750, "Path Anat."

maphrodite, a person who had been brought up as a girl, with a smooth face, large breasts, hairy mons veneris, short penis, and two large labia; later, in an operation for hernia, a testicle and epididymis were found.

Treatment.—That the physician may be forced to operate, even in cases of monstrosities with the above-mentioned deformities, is proved by that of Olshausen.*

Here, owing to the complete absence of the vulva, the bladder, uterus, tubes and intestines were so distended with urine that it was necessary after the head was born to open the abdomen and remove part of its contents before the body could be delivered.

Should the uro-genital sinus persist, the intestine opening into its lower end, the latter may be freed and made to unite with an opening in the skin at the normal position; the narrow genital canal may then be dilated.

An operation is decidedly indicated if there be a defect in the superior wall of the urethra, *i. e.*, epispadias, for these patients generally suffer much inconvenience from dribbling of urine. By forming a superior or lateral flap, and liberating the posterior wall of the urethra, and then carefully uniting the two, a normal urethra may be made. Roeser has performed this operation successfully,† and K. Schroeder reports two cases in which the mons veneris and clitoris were cleft, and the anterior wall of the urethra was wanting, successfully operated upon.‡ Kleinwächter's patient, fifteen years old, persistently refused to be operated upon, notwithstanding constant dribbling of urine.§

As a matter of course no operation is admissible in hermaphroditism. The diagnosis, that is, the determination of sex, is of most importance in early life, on account of the education; later, because of the choice of an avocation, and not at all infrequently on account of intended marriage. It is, however, often impossible to determine the sex, even after the most thorough examination.

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* *Archiv*, II, 280.

† *Würtemberger Correspondenzblatt*, 1881, No. 20.

‡ "Lehrbuch der Gyn.," v Auflage, p. 510.

§ *Monatsschrift*, 34, p. 81.

The final conclusion should be based not only upon inspection, the sounding of all canals, palpation and examination per rectum, but all the secretions of the individual must be examined with the microscope and reagents. The decision may then require months of close observation. Success may not attend our efforts even though this precaution is taken, as has recently been proved by Sippel's case.*

With regard to marriage, we may learn much from a case reported by Magitot. The individual referred to had a penis five centimeters (nearly two inches) in length, but having been married to a man for twelve years, upon the death of the husband decided, for the sake of variety, to play the man, and got a mistress.

CHAPTER II.

HYPERPLASIA AND HYPERTROPHY OF THE VULVA.

1. Hypertrophy of the labia majora, so that these organs hang down to the anus like thick lips, as is observed in the new-born, seldom occurs. I once found what appeared to indicate a reduplication of the labia majora.†

2. Supernumerary nymphæ are oftener met with ; an illustration is given in my Atlas.‡ I have seen only one other. On the other hand, we more frequently observe that one or both nymphæ have two or even several peduncles which lose themselves in the mons veneris, or originate by two just above the clitoris.

3. Hypertrophy of the nymphæ is far more frequently observed, one generally being larger than the other, or both may be enlarged and hang down below the labia majora. This condition, known as the Hottentot apron, from its frequency in that race of people, is quite common among the European races; *e. g.*, I once measured nymphæ 11.5 centim. (4.6 inches) and 9.5 centim. (3.7 inches) in length. Nineteen per cent. of pregnant

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* *Archiv für Gynæcol.*, XIV. † Entlassungsbefund 94 der Wöchner.

‡ Plate id., Fig. 3, p. 265.

women have one of the nymphæ more developed than the other.

In 3000 lying-in women I found one or the other nympha wing-shaped and elongated in 108 cases. The prepuce may also be elongated and project over the clitoris.

Hypertrophied nymphæ may cause great inconvenience; it is, therefore, interesting to note that H. Carrard has very recently been able to show that the cause is an increase of their nerve-fibres in the form of Meissner's tactile bodies, also in the form of club-shaped terminations and peculiar tactile bodies with an aggregation of adenoid tissue.*

4. Hypertrophy of the clitoris, which may become as long as the penis, was found by Parent-Duchatelet in 3 cases among 6000 prostitutes. Bainbridge and Appin removed tumors 3″ to 4½″ in length and 2″ to 4″ thick; Mason extirpated one 4″ long, having a periphery of 4½ inches.† The greatest enlargement of the clitoris which I have seen, excepting from tumors, occurred in the glans, which was the size of a bean.‡ Hyrtl states that the clitoris is larger in the tropics than in the northern and temperate latitudes. The clitoris is also enlarged among the Abyssinians, Suzees, Mandingos, the androgynous and lascivious women, and to such an extent among the first-named races as to sanction the custom of removing it with the knife. John Matthews § states that the extremity of the clitoris is removed with special ceremonies.|| I myself have never heard of attaching the hypertrophied clitoris by rings to the perineum as a protection to virginity, a custom mentioned by Hyrtl and Hildebrandt, but I succeeded, with the help of my colleague, Dr. Wildt, in examining three Arabian girls in Cairo in 1880, and I really found, in the place of the glans, a radiating scar in regard to which they could tell me nothing. Salem Pacha, director of the medical faculty in Cairo, believed that such scars were not universal, but found only in Fellah girls. Blumenbach

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* *Zeitschrift für Geburtsh.* von K. Schroeder, x, 62.

† Virchow-Hirsch f. 1868, II, 607.

‡ Nr. 1554, d. W. Bef. § "Journey to Sierra Leone," 1785–87.

|| *Stark's Archiv*, 1792, IV, 188.

portrays the vulva of a girl eighteen years old, whose nymphæ alone were cut off, the clitoris remaining intact.*

It has been asserted that the clitoris becomes hypertrophied in consequence of masturbation, but this is a mistake; males do not have hypertrophy of the penis from the same practice. I have often been unable to see a trace of any change in the clitoris in patients who have confessed they masturbated, yet two decades ago great numbers of patients, victims of this vice, were supposed to be cured by performing clitoridectomy. Baker Brown in 1866 recommended the operation for certain forms of insanity, epilepsy, catalepsy, and hysteria, and many Germans followed his example, although G. Braun could find no pathological changes in the clitorides amputated by him.†

This is a dark page in the history of our progress, and the operation has not yet been abandoned. A short time ago I examined a young girl whose clitoris had been partially removed, and the cicatrix afterward cauterized because the irritation had returned. What was the result? The irritation is more severe than ever, and manifests itself even when the patient looks at naked figures in galleries, etc. West‡ has protested against the operation, and at this time the majority of gynecologists are firmly convinced that it is quite useless in epilepsy, hysteria, or masturbation.

Treatment.—When the hypertrophy causes chafing of the parts, burning, itching, œdema, general irritation, interferes with coition or with walking and standing, the symptoms may be temporarily removed by the application of lead-water dressings, of salicylic acid, vaseline with boric acid, or iodoform, and by frequent bathing, or sitz-baths containing a decoction of oak-bark, etc. If, however, the symptoms persistently return, it is best to partially remove the hypertrophied tissue with scissors, the knife, Paquelin's cautery, or the galvano-caustic loop; then the patient is not made imperfect or deprived of important organs, but simply restored to a normal condition.

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* "De gen. human. var. not., Gott.," 1781, p. 100, plate ii.

† *Wiener Med. Wochenschrift*, 1866.

‡ *British Medical Journal*, 1866.

CHAPTER III.

HERNIÆ OF THE VULVA.

The herniæ which alter the shape and position of the external sexual organs are three.

1. The most frequent is inguinal hernia. Inguinal labial hernia, so named because the hernia passes along the round ligament and appears in one or both labia majora. The contents of the sac may be omentum, intestine, ovary, Fallopian tube, and even the pregnant uterus. In 5600 private patients I found inguinal labial, or anterior labial hernia in only six cases; in one, an ovary was found in the left side; in a second, each ovary in a hernial sac; in a third, the uterus, and in the fourth the pregnant uterus.

2. The second variety, vagino-labial hernia, or posterior labial hernia, is much rarer. The hernia passes down in front of the broad ligament into an opening or rent in the pelvic fascia and levator ani, and appears at the posterior extremity of one of the labia majora. Stoltz, Veit and Koenig have each seen but one case of this kind.* I have met with two. The first is represented in the Atlas.† The tumor was very peculiar, and in it I could also feel the ovary. Upon the external surface there was an appendage as large as a walnut (Fig. 1, *a*), which must have been an inverted gland of Bartholin. I removed this by an operation, then secured the retention of the hernia by using Scarpa's pad and a pelvic band with a semicircular spring to which the pad was attached.

This hernia, which was the size of a man's fist, could not be retained with the largest round pessaries. The patient was a multipara with wide, dilated pelvic organs, in consequence of numerous labors. The second case was an unmarried primigravida, 27 years of age, in the ninth week of pregnancy, and with a history of previous good health. Shortly after she

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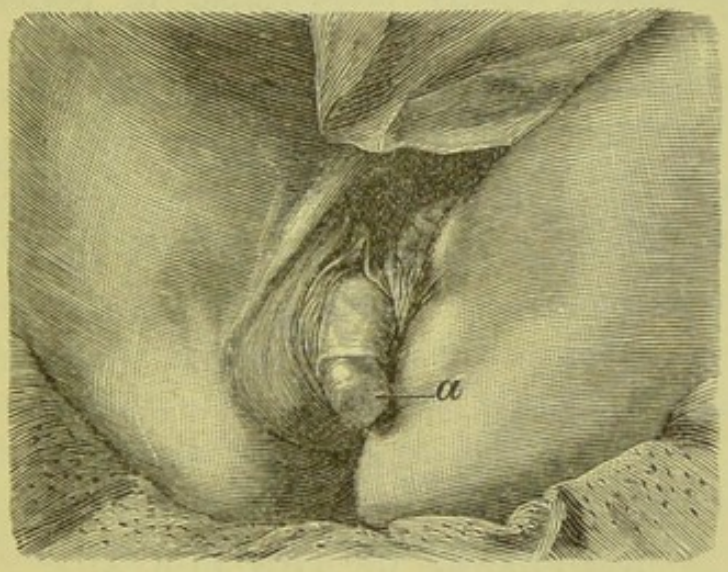
* *Gaz. Méd. de Strasbourg*, 30, i, 1845, and *Lehrbuch*, 1867; *Lehrbuch der Chirurgie*, 1877, Bd. II, p. 201.

† Plate iii[a], p. 282.

became pregnant, she discovered this tumor, which was elastic and reducible, in the posterior extremity of the left labium majus. Upon coughing and bearing down after the hernia had been reduced, it passed along the vagina and out of the pelvis. The fundus of the uterus could be felt just above the symphysis. The hernia was easily reduced, and retained by a round pessary.

3. With regard to the third variety, named perineal hernia,* I agree with Klob:† for anatomical reasons I consider such

FIG. 1.



Vagino-Labial Hernia.

herniæ improbable, and have not been able to find a single authenticated case in literature.

The diagnosis of labial hernia ought to be readily made. The variable size, increasing upon bearing down, the reduction attended by gurgling sounds, the disappearance of the fluid contents upon pressure, palpation of the abdominal ring, the sudden reappearance of the hernia when the pressure is removed, are all so easily demonstrable that errors in diagnosis can hardly

* Straatmann, "Ueber den Perinealbruch," Griefswald, b. Kunike, 1867.

† *Vide* "Path. d. w. Sex. Org.," p. 285.

occur. A case reported by Michelson and Lukin* seems to belong here, though it was not very accurately described, and may have been a vaginal enterocele. The tumor, three inches long and two and a half wide, protruding between the labia majora, was thought to be a polyp and was cut off; the woman died from hemorrhage, and when the tumor was examined it was found to consist of 24 centimeters (9½ inches) of omentum and 10 centimeters (nearly 4 inches) of the colon. I have been unable to confirm the statement of Bardeleben, that in inguinal labial hernia the tumor is in two parts, because the tense anterior inguinal ring retains part of the tumor in the canal. This view is, of course, wholly inapplicable to posterior labial hernia.

The treatment of anterior labial hernia is the same as that of all inguinal herniæ. Retention is to be secured in vagino-labial hernia by applying either Scarpa's pad, or a firm, hollow, hard rubber ring, which should as far as possible fill up the pelvic cavity.

CHAPTER IV.

NEOPLASMS OF THE VULVA.

Tumors appearing as neoplasms on separate parts or on all parts of the vulva are far less frequent than on other organs, *e. g.*, the uterus, and especially the ovaries. They are characterized by their great diversity, even exceeding in variety those of the ovary.

In 11,140 cases of women with benign and malignant tumors, Gurlt† found the following relative frequency of tumors involving the sexual organs: Vulva, 89; vagina, 114; uterus and vagina, 604; uterus alone, 2845; ovaries, 71. Gurlt found only 106 cases of this character recorded in the Vienna hospitals

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* *Centralblatt f. Gynaec.*, 1879, p. 203.

† *Langenbeck's Archiv*, xxv.

during a period of many years, while the author met with 58 cases in 10,218 female patients—

	Gurlt found		The Author found	
In	—	women with myxoma,	—	vulvar myxoma, 1
"	647	" " fibroma,	2	" fibroma, 4
"	—	" " elephantiasis,	—	" elephantiasis, 2
"	115	" " cav. angioma,	2	" cav. angioma, —
"	—	" " sarcoma,	—	" sarcoma, 3
"	—	" " lupus,	—	" lupus, 4
"	191	" " lipoma,	7	" lipoma, 3
"	937	" " cysts,	9	" cysts, 19
"	53	" " papilloma,	14	" papilloma, 5
"	4107	" " genital carcinoma,	72	" carcinoma, 17

1. Papillomata.

The hard papilloma of the skin, or the wart, is very similar to the papillomata of the vulva as they are shown in my Atlas, Plate ii, Figs. 1, 2, and iii, Fig. 4. They are hypertrophied papillæ, the epithelium often being more exuberant than the stroma. All sizes are met with, from those which scarcely project beyond the mucous membrane, appearing like small points the size of a millet seed, to those the size of a cherry, or larger. Hundreds of the first variety may be found on the same patient (compare Fig. 2). They are simple, not divided. Klob found in one case which he examined, that the larger part of the nodule consisted of an enormous development of nuclei similar to a tubercular formation; he does not believe that these growths have any connection with the sebaceous glands.*

According to my experience they occur with especial frequency on the mons veneris, and have short pedicles like mushrooms; they also are found on the labia majora and nymphæ. They are not caused by infection, neither do they infect the skin with which they come in contact; they occur in young and in old women with or without leucorrhœa. Very closely related to them are condylomata, to be next described.

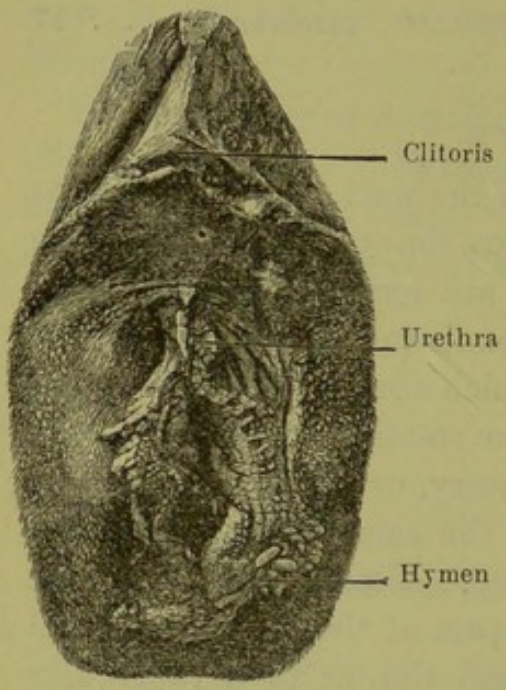
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* "Path. Anat. d. weib. Sexualorgane," p. 461.

2. Condylomata.

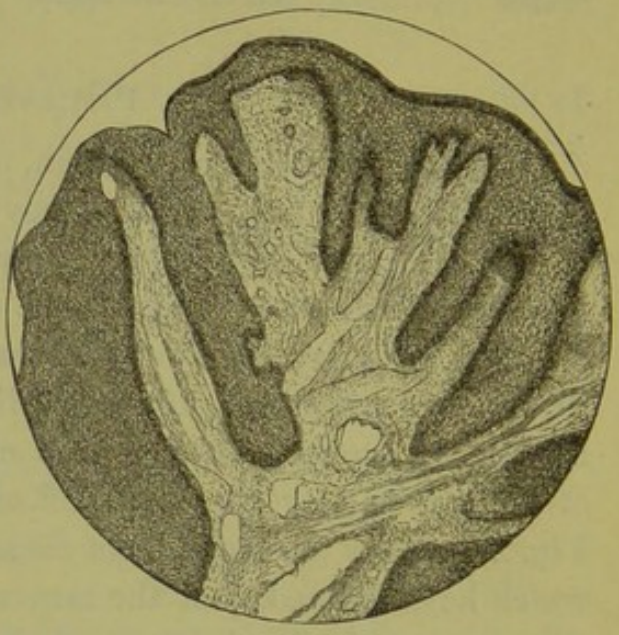
The sharp or acuminate condylomata (see Fig. 3) arise also from a multiplication of papillæ, but occur too upon parts devoid of papillæ. Ranging in size from that of a millet seed almost to that of a walnut, they are always pedunculated, generally flat, at first fringed or shaped like a cock's comb, much softer than papillomata and often easily broken off. They are found upon all parts of the vulva from the perineum to above the mons veneris, over the thighs and upon the abdomen.

Fig. 2.



Multiple Papillomata of the Nymphæ and the Hymen.

Fig. 3.



Acuminate Condylomata of the Vulva. (*Hartnack.*)

They infect the healthy skin with which they come in contact, causing similar formations. They are found singly, and also crowded together in great numbers, and extending both internally and externally. It is not definitely known whether these structures are caused by gonorrhœal infection, by contact of the parts during coitus, or whether they may not appear spontaneously in pregnancy, independent of any such infection ; neither is it known that they have any connection with syphilis proper. Müller recommends the following test: "Those who have the

hardihood to doubt or to deny the infectiousness of acuminate condylomata, should possess the courage to substantiate this assertion by a practical test, *i. e.*, sexual intercourse with a woman having condylomata on her genital organs."*

Inoculations have not been invariably successful. Mechanical irritation resulting from cohabitation with individuals affected with catarrh of the genitals, or cohabitation with different men, one or the other of whom deposits an infectious mucous secretion, has certainly much ætiological significance. That it is not simply leucorrhœa, though this is present in almost all cases without exception, is best proved by considering the frequency of these catarrhs compared with the infrequency of acuminate condylomata. Müller acknowledges that condylomata may appear independently of contagion, and that in this case their cause is unknown.

During pregnancy they grow rapidly and are difficult of removal, while in the puerperal state they become paler, smaller, and shrivel up, and often, though by no means invariably, may spontaneously disappear.

3. Cysts.

Cysts of Cowper's glands are often met with, but in addition to these, cysts are not uncommon upon the vulva, usually located between the orifice of the urethra and the clitoris. They vary in size from a lentil to a bean, and their contents may be a thin, serous fluid, or a yellow clay-colored material. In some instances they are lined with cylindrical epithelium. The majority of the patients having these cysts, 10 out of 18, were multiparæ. Klob's opinion is that they may be produced by dilatation of the lymphatic vessels, probably the result of thrombosis. When the contents are the color of clay or of chocolate, admixture with blood is generally indicated.

(*a*) They usually proceed from the glands which, on the hairy portions of the labia majora, are appendages of the hair bulbs; internally, however, their excretory ducts open directly upon the surface. The glands are most numerous on the internal surfaces

* "Grundriss der venerischen Krankheiten," Leipzig, 1884.

of the nymphæ, their excretory ducts being scarcely a millimeter, or $\frac{1}{26}$ of an inch, apart.

In infants the nymphæ are not provided with glands, these being developed at puberty.*

(*b*) Atheromata of the sebaceous glands are, according to Klebs, most common on the inferior portions of the labia majora; here they form encysted tumors with contents of a more or less liquid consistence. The inner surface of the cyst wall is rough and irregular, and of a whitish color from the epithelium covering it. Syme found an encysted tumor as large as a cherry on the prepuce of a girl 8 years old. I removed, from a woman 33 years of age, an atheroma nearly as large as a hen's egg; it was upon the nates near the vulva.

(*c*) Klebs and Hildebrandt mention true dermoid cysts, their walls having the elements of the skin, papillæ and sebaceous glands, and containing hair and teeth, but neither of these authors presents the proof.†

It is also questionable whether a case reported by R. Froriep belongs to this class of vulvar affections. He described a compound cystic tumor, which grew from behind forwards into the left labium majus.

4. Myxomata.

In general, myxomata of the vulva are uncommon. They are soft, yielding tumors, containing a mucous or fibrillated elementary substance; round or spindle-shaped cells communicate with each other by means of prolongations or projections. If the tissue be fibrillated, the tumor is called a myxo-fibroma. A tumor of this kind which I extirpated was large as an egg, and single.‡ They may also be multiple, and it is said may be produced by metastasis.

5. Fibromata and Fibro-myomata.

These tumors are developed from the connective tissue and muscular portions of the vulva, usually from the subcutaneous

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* Henle, "Harn- u. Geschlectsapparat," 1864, p. 441.

† Klebs, Handbuch, 1873, p. 987; Hildebrandt, l. c., p. 57.

‡ Koppe, Klinik, 1882, Nr. 179; "18 Jähr. Individ. mit Myxome der rechten Nymphe."

tissue and muscular fibres of the round ligaments. Varying in size from that of a cherry to that of a man's head, they gradually become pedunculated and may hang down quite low. More frequently they are made up of several small tumors, hence presenting prominences and depressions upon the surface. They are moved about and bruised in walking, causing excoriations and œdematous swelling of the tissues, or extravasation of blood into them. In this way some parts of the tumor become softer, or may even fluctuate; occasionally abscesses are formed. They increase in size during menstruation and in pregnancy, returning to their usual proportions in the intervals.

The tumor may be eliminated spontaneously by the inflammatory processes caused by the irritation to which it is subjected. According to Klebs, Paget diagnosticated and extirpated a fibromyoma of the vulva. Zweifel extirpated a fibroma the size of a child's head from the left labium majus.*

6. Lipomata.

The fatty tumors of the vulva may attain great size, even hanging down to the knees. The largest of the kind were extirpated by Koch† and Stiegele;‡ one of the tumors measured 55 centimeters or nearly 22 inches in length, and weighed 10 pounds.

Lipomata are found not only on the mons veneris and labia majora, as stated by K. Schroeder and Hildebrandt, but also on the nymphæ. A lipoma, situated on the free border of the right nympha, is represented in my Atlas, plate iv, p. 100. These tumors are, as a rule, lobulated, tolerably soft, slightly sensitive, often grow rapidly, and are, on account of their form, consistence, sensitiveness, and the burning sensation produced by them, most frequently confounded with sarcoma of the vulva.

7. Elephantiasis of the Vulva.

Elephantiasis most frequently occurs on the labia majora and clitoris, though the nymphæ may also be affected. Compare Fig. 4, with plate i, Fig. 1, p. 266, Atlas.

* Schiele, *loc. cit.*, p. 10.

† *Graeffe und Walther's Journal*, 1856, Bd. 24, S. 308.

‡ *Zeitschrift f. Chir. und Geb.*, 1856, ix, 243.

The hypertrophy of the different parts of the skin is quite variable, so that the tumor may appear globular, lobulated, or like a massive condyloma. It is still a mooted question whether the deeper layers of the cutis are first affected, or the capillary lymph vessels of the corium, or whether the lymph stasis caused by the hyperplasia is produced by the pressure of the swollen glands upon the lymphatics. The following varieties of elephantiasis are recognized, the division being based upon the external appearance:

Fig. 4.



Elephantiasis of the Nymphæ.

Elephantiasis glabra (smooth;) E. verrucosa (warty); and E. papillomatosa (papillary); according to their consistence, they are designated E. dura and E. mollis; when there is much hypertrophy of the horny layer of the skin the condition is known as ichthyosis vulvæ.

Klebs makes the following divisions, dependent upon the nature of the disorder:

The lymphangiectomatic, epidermoidal, and elephantiasis of

the connective tissue. He and Petters have described a case showing most marked lymphatic disturbance.*

Mechanical irritation, excess in venery, climatic influences—the disease is said to occur more commonly in the Orient—but especially syphilitic infection, are all of great importance in causing this disease. In my second case the patient positively asserted that syphilis was the only cause.

Veh has recently reported two cases, in one of which syphilitic infection could be proven, in the other scrofula only. Upon section of such a tumor, considerable quantities of a serous fluid

FIG. 5.



Elephantiasis of the Nymphæ. (*Hartnack*, S. 4, O. 2.)

escape, the epidermis (see Fig. 5) is thickened by several new layers, the papillæ are hypertrophied, the cutis much thicker than normal, its deeper portions often changed into dark-brown indurated striæ, and the fatty tissue more or less absent. Pale, dense connective tissue alternates with softer portions; they are quite vascular and contain spindle and round cells and abundant nuclei.

Ætiology.—These tumors are produced gradually, often growing very slowly for years, then suddenly rapidly increasing

* *Prager Vierteljahrsschrift*, Bd. 124.

in size, it may be with the occurrence of pregnancy or of the menopause. When they have once reached a certain size, formed a pedicle, and thus by their weight increased the local congestion, they appear to grow much more rapidly. Menstruation causes swelling, a greater degree of congestion, and some pain. In some cases the tumor decreases during the puerperal state, as occurred in one of my patients (Atlas, p. 371). Elephantiasis occurs most frequently before the fortieth year, between the twentieth and thirtieth years. When we consider that in some cases there are acute lesions, in others more permanent but less considerable irritations, such as the smarting and itching of vulvitis, eczema, leucorrhœa, etc., we see that these slight affections, and especially pruritus of the vulva, are so very common, and so seldom lead to elephantiasis, it seems probable that other wholly specific causes are to be sought for, probably in a peculiar bacillus which may be similar to the bacillus lepræ.

The symptoms are at first often insignificant; some burning pain in the tumor, pain on urinating, and a purulent discharge; the tumors are more painful only after they have become inflamed and the surface ulcerated, or when they have begun to cause inconvenience in walking. Then the symptoms are aggravated, unpleasant odors, dragging upon the urethra, and very great difficulty in urination, bring about disturbances of general nutrition, loss of sleep, and emaciation. Gangrene may occur, and Klebs reports a case of death from peritonitis in a lying-in woman who had elephantiasis.*

Treatment.—Such tumors may generally be extirpated with little danger or trouble; they seldom recur, but in one of our cases the next pregnancy brought with it a return of the disease, and that in a very aggravated form. The operation, therefore, becomes imperative; one may choose between the knife, scissors, Paquelin's thermo-cautery, and the galvano-caustic loop. The écraseur is no longer employed, becauses it stretches or lacerates the soft tissues, and may even injure the urethra and bladder.†

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* "Path. Anat.," p. 983.

† Bourguet, 1867: *Gaz. des Hôp.*, No. 140.

If the pedicle be small, or if the tumor originate from the clitoris alone or from a labium majus, it may be easily removed with a red-hot wire. If several parts of the vulva are involved, and the tumor has a broad base, the lower portions should be excised with the knife, and the opposite margins of the wound united by sutures at once, and then the most vascular portions removed with the galvano-caustic loop.

Ligation with an elastic ligature, with silk or other material, is not to be recommended, because excessively painful, slow in action, and it may cause suppuration.

8. Lupus of the Vulva.

This is a very uncommon affection. I have seen it but four times. Two of the cases have been described in the Atlas, pp. 268–70, and another is shown in plate iii, Fig. 3. The forms usually met are, hypertrophic and perforating lupus.

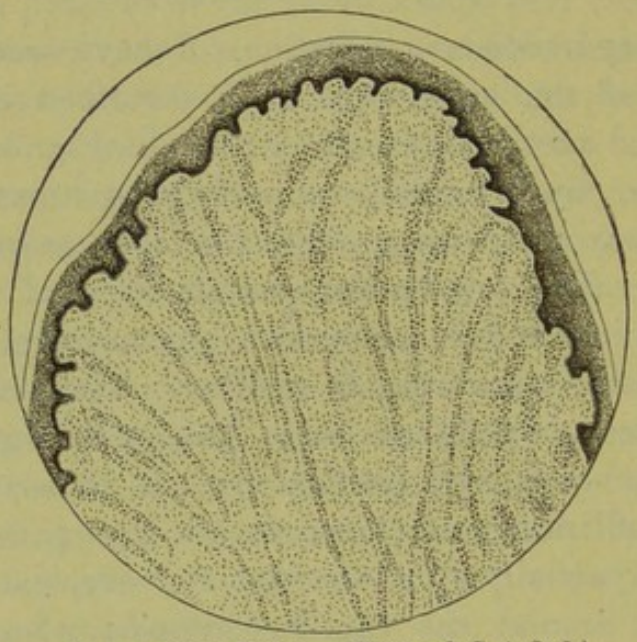
The first may occur upon either the labia majora or minora, or upon both. The tumors are smooth, often of a bright-red color, varying in size from a pea to a pigeon's egg, and healing in one place while ulcerating in another. The tumors are also found on the prepuce and frenulum. The inguinal glands are not enlarged. The cutis and papillæ are not hypertrophied (see Fig. 6), the infiltration, as shown in the figure, is composed of small cells, is partially circumscribed and atypical, and in concentric layers around the capillary vessels whose walls are thickened. Other parts of the infiltration are more diffuse, and involve the papillæ, the sebaceous and sweat glands, and the muscles of the skin. In some sections the lupus is principally located in the papillary bodies, in others in the deeper layers of the cutis. The infiltrated cells are round, the size of a white blood corpuscle, and show a granular cloudiness, or the débris of degeneration.

The condition is different in perforating lupus. In our case all parts of the vulva were swollen and resistant, with flat indurations and œdematous parts here and there upon the labia majora and nymphæ. At the base of the clitoris, and between the nymphæ and right labium majus, were several rather long, sup-

purating fissures, one of which had perforated the right nympha. A similar fissure was found at the posterior commissure.

Microscopical examination of excised pieces showed a moderate hyperplasia of the epithelial stratum, partly in the form of shaggy villous growths, partly in a sprouting out and hypertrophy of the interpapillary cones. In the connective tissue was a new formation, consisting of round cells and an accumulation of nuclei, especially marked in the layer next to the rete malpighi. More internally the growth became less compact, single nodules and bundles appeared, containing in many places numbers of

FIG. 6.



Lupus of the Vulva. (*Hartnack*, S. 4, O. 2.)

giant cells. This microscopical examination reveals, therefore, the characteristics of a granulation tumor, situated for the most part in the subcutaneous tissue and chorion, and forming nodules of variable size particularly in the vicinity of the vessels.

Clinical observation teaches us, that, though all affected parts be excised or destroyed by cauterization, the poison will after a time be reproduced, *i. e.*, the disease recurs. It is certainly remarkable that during all this time the general condition is comparatively good, and the suffering but slight. The tumors grow slowly, the fissures are painful on urination or when examined,

but no inconvenience whatever is experienced in walking, and though we have observed a patient for years no disease of other organs was developed, and in spite of the long continuance of the affection, the inguinal glands were never swollen to any great degree.

Until recently the cause of lupus was entirely unknown. Our two patients were not syphilitic; one was a prostitute, however, and had been scrofulous from her youth. Recently Koch and Doutrelepont have demonstrated the presence of the bacillus tuberculosis in lupus.

The disease was at first described by Guibourt and Huguier as esthiomène, or herpes exedens or lupus.* It was also studied by Ed. Martin, Lorent, Veit, Matthews Duncan, Ch. West, Cayla, Taylor, and Martineau. Not more than 25 authenticated cases have been observed, four of my own included. The disease is curable in its earlier stages, but many cases, *e.g.*, our second, are incurable, death resulting from intestinal stenosis and peritonitis.

The diagnosis may be made with certainty both clinically and microscopically, and is based upon the presence of single nodules unattended by hypertrophy or hyperplasia of the papillæ or epidermis; again, upon the character of the infiltration, the slow growth, the affection continuing local, the lymphatic glands not being implicated, and the general condition being comparatively good.

It is differentiated from syphilis, first, by the diffuse induration, and by the slow progress of the ulcerative processes; the cicatrices in lupus are reddish-violet instead of a brownish-white, as in syphilis, and the secretion is less profuse than from a syphilitic ulceration.

Therapeutically, there is but one indication, namely, to remove as quickly and thoroughly as possible the entire infiltration by means of the knife and scissors, the galvano-cautery or escharotics. Of the latter agents, the following have been employed: arsenic and fuming nitric acid (Huguier), caustic potash (Veit), injections of carbolic acid into the surrounding tissues (C.

* *L'Union Médic.*, 1847.

Hueter), compresses of a 5 per cent. solution of chloral hydrate (Cregny), and electro-puncture (van Holsenbeck).

From its disposition to recur, and its incurability, lupus occupies a position on the boundary between the benign and malignant tumors of the vulva.

We now study the *malignant* tumors of the vulva, beginning with

9. Sarcoma.

In this variety of tumor the cellular elements, as regards number and size, predominate over the intercellular substance. These tumors are not common on the vulva, only three cases having come under my observation. L. Mayer saw only two cases of sarcomatous warts.* Hildebrandt describes one case of medullary sarcoma observed by him.† In addition to these, cases have been reported by G. Simon,‡ by Kleeburg,§ by Goth, Lannois and Thomas. In 483 women with sarcoma, not one had sarcoma of the vulva. From these statistics the infrequency of this disease is at once apparent, for these 483 cases were selected from a record of 11,140 women with tumors of all kinds and during a period of twenty-four years.

All varieties of sarcomatous tumors may be found upon the vulva. My first case was a round-celled sarcoma nearly the size of a man's head, attached by a pedicle as large as a child's arm to the left labium minus. The surface of this tumor was bluish and œdematous in places, and covered here and there with large dry epithelial scales and yellow masses of sebaceous material. The second was a case of myxo-sarcoma as large as a child's head and situated near the urethra to the right of the labium minus. Parts of this tumor consisted of compact strands of spindle-shaped cells; other portions of spindle-shaped, stellate, and round cells lying in an intercellular substance rich in mucin; it was not remarkably vascular. In the last case the tumor was a fibro-sarcoma as large as the fist; it was situated upon the right labium majus.

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* *Monatsschrift*, xxxii, p 250. † *Loc. cit.*, p. 62.

‡ *Monatsschrift*, xiii, p. 68.

§ *St. Petersburger med. Zeitschrift*, 1868, 11 and 12 parts.

A very interesting case has been reported from A. Martin's clinic, in which a melanotic sarcoma of the clitoris, the size of a goose's egg, was extirpated, the patient dying soon afterward. At the autopsy nodules the size of a millet- or hemp-seed were found in Douglas's cul-de-sac, and a tumor the size of a bean on one of the round ligaments. The lymphatic glands of the inguinal region were swollen and filled with black nodules.*

In my first patient, a pregnant woman aged seventeen years, the tumor was first noticed eight years before and had grown rapidly. In the second, the tumor had existed for fifteen years.

The symptoms arising from the presence of such tumors are not very severe if we except the painful erosions and ulcerations caused by friction in walking, etc. In one patient urination was rendered difficult from drawing downward of the urethra by the tumor. When the tumors are small and have a broad base, they require no attention for many years. Sometimes they grow very rapidly from the first, and in a short time may cause great danger to life.

Diagnosis.—Sarcoma of the vulva may be soft or resistant, œdematous or even fluctuating, compound or lobulated, and is most liable to be confounded with a pendulous lipoma of the vulva. The skin covering sarcomatous tumors is often very closely adherent. They are most frequent in young persons. In the absence of cachexia or metastatic growths a positive diagnosis can be made only by examination with the microscope; by this examination the multiplicity of round, stellate, or spindle-shaped cells everywhere surrounded with intercellular tissue, will render the diagnosis comparatively easy and certain.

Their malignancy is often proved by their rapid recurrence after an operation. Though there was no recurrence in my two cases as long as they were under observation, in those reported by Hildebrandt, Simon, and A. Martin, the disease reappeared in a few days.

Treatment.—A perfect cure can be hoped for only when these tumors are early and completely removed. In my cases the tumors were extirpated with the knife. If the pedicle be

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* *Berliner Kl. Wochenschrift*, 1881, XVIII, p. 446.

not too thick it may be ligated with an elastic cord to prevent serious hemorrhage, the tumor cut off, and after the vessels of the skin have been tied, the edges of the wound are sutured and the cord removed. In case of recurrence another operation must be promptly done. Metastatic sarcomatous tumors are usually found in the peritoneum, the round ligaments, ovaries, liver, lungs and other organs. Simon operated four times for recurrent sarcoma, and the patient afterward died with metastatic tumors in the liver, the periosteum of the sternum and the glands above the clavicle.* The inguinal glands on each side were enlarged to the size of a pigeon's egg, and pressed against each other.

10. Cancer of the Vulva.

Two of the more important forms of cancer of the skin occur upon the vulva, viz.: *cancroid* and *fibrous carcinoma.* But when compared with cancroid the latter variety is so uncommon that, until two years ago, I had never seen a primary vulvar carcinoma of this kind. Gurlt found 7479 cases of carcinoma in 11,140 women with different varieties of tumors, and of this number 72 or nearly 1.0 per cent. had cancroid of the vulva. This agrees with my own observations, for I found 9 cases in 1068 women examined at the polyclinic. Altogether I have treated 17 cases of cancer of the vulva; 16 were cancroid, and 1 was primary carcinoma.

(*a*) *Cancroid of the vulva* usually appears as a prominence on the skin, which is slightly reddened; the size is that of a lentil or pea. The skin is flat, and has slight red elevations; it is rough as if it were corroded with nitric acid, horny, pale, and resistant; occasionally there is a small raw surface which secretes a thin, badly-smelling pus. The base of the tumor is solid and resistant, and the edges are livid. In the surrounding parts small erosions or nodules may be seen upon the skin, with occasional erosions and flattened swellings on the opposite portions of the vulva. The neoplasm then extends from the labium majus to the nympha, frenulum, prepuce of the clitoris, the cli-

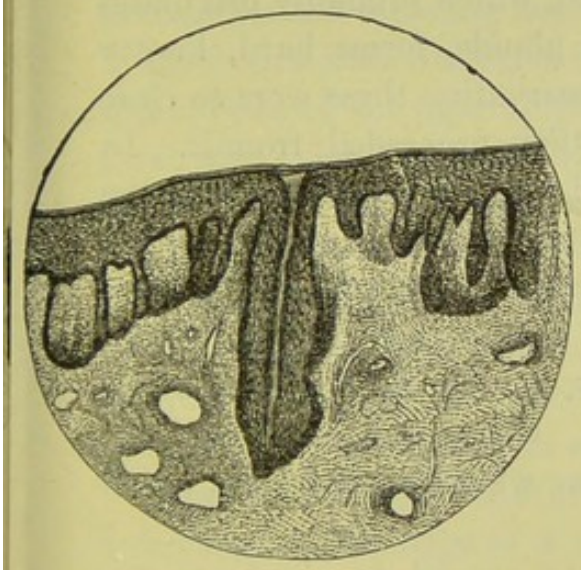
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* *Monatsschrift*, xii, 68.

toris, and to the opposite side; it may also extend down over the perineum, and up into the vagina, though the latter is not common. In the case of primary fibroid carcinoma of the vulva, in which I was obliged to penetrate deeply into the muscular structures of the floor of the pelvis in order to remove all diseased portions, the affection did not extend upward.

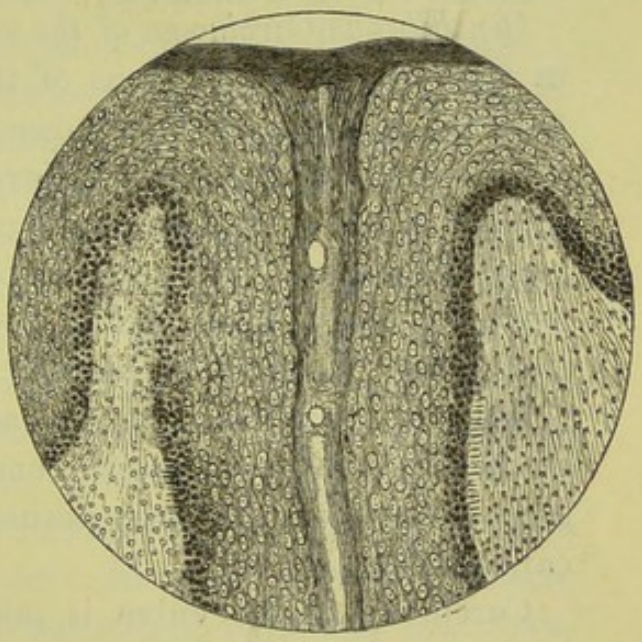
This condition is quite remarkable, for the disease usually extends rapidly from the uterus to the vagina, while it is very unusual for it to pass from the vulva to the vagina. The inguinal glands on the side first affected become hard and swollen,

FIG. 7.



(*Hartnack.* S. 4, O. 2.)

FIG. 8.



(*Hartnack.* S. 4, O. 2.)

Cancroid of the Vulva.

gradually increasing in size for months and years until finally the skin becomes red, and weeks after breaks, and then the discharge of a thin, puriform fluid is followed by a cancerous glandular ulcer.

The edges of the ulcer are copper-colored, flat, irregularly hypertrophied, and thus the new growth appears like a fungus. The glandular affection now extends to the ilium, the suppuration increases, and deep cancerous ulcerations occur which lead into the pelvic cavity. Then comes the erosion of the branches of the common iliac artery, or of the hypogastric artery, and

serious hemorrhage. In a patient of mine with a cancroid of the left side of the vulva, the inguinal glands were not much swollen, though the clitoris and right side became affected, the entire mons veneris undermined, and the suppuration very extensive. In the case of primary fibrous carcinoma of the vulva, the left groin remained wholly unaffected, though the tumor was on that side; after the second operation, which removed the disease at that point, the inguinal glands on the right side enlarged, thus indicating the extension of the disease.

According to Klob's observations, with which my own agree, cancroid of the vulva is an epithelioma of the pavement epithelium.

(*b*) *Fibrous Carcinoma of the vulva*, which probably originates in the deep-seated portions of the glands, forms hard, knotty tumors; in a case under my own observation these were so close to the bone that one might believe they proceeded from it. In operating, however, they were found entirely separate from the bony structure. These nodules soften, ulcerate, open and form sinuous ulcers. Klob, Bailly, Prescott Hewitt, and Martin have seen melanotic cancerous nodules of the vulva.*

Küstner thought he saw two cases, in one of which the carcinoma originated from an atheroma. I have seen secondary carcinomatous nodes upon the perineum, which came from a rectal carcinoma.†

Carcinoma of the vulva is said to extend, as a rule, to the vagina, uterus, or ovary, though this did not take place in my case mentioned above.

The first symptom of vulval cancroid is excessive itching, which may exist a long time before the slightest trace of nodes or indurations appears. In Cushier's case this itching was present for ten years. With the appearance of the first raw spots, the patients usually, though not invariably, suffer lancinating, darting pains. Occasionally the only symptom is inconvenience in walking, standing or sitting. In my case of primary carcinoma of the vulva, the node was accidentally discovered by the

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* *Berliner Kl. Wochenschrift*, 1881, p. 447.

† Atlas, plate i, Fig. 3.

patient, who afterward made no complaint whatever except the sensation of sitting on a ball. Friction and pressure of course cause some pain, and there may be slight hemorrhage. Severe hemorrhages are uncommon, occurring only after erosion of large vessels toward the close of the disease.

The *duration* of the disease is, on the average, about two years, at least in those cases in which early operations are performed. When the disease recurs death results from inanition, pulmonary embolism,* or from metastasis and cerebral affection. L. Mayer observed such a termination from scirrhus of the vulva.† The inanition is the consequence of the sleeplessness, the sharp, lancinating pains, anorexia, disordered digestion with the constant drain from the secreting surfaces, and, finally, of hemorrhage.

Up to this time but little is known concerning the *cause*. A comparison of the ages of patients having vulval cancroid, and those with uterine carcinoma, shows a preponderance of the former disease in the old.‡ But it occurs in the young as well, and the last patient upon whom I operated was a virgin. In one case§ there was a fungoid cancroid of the clitoris, which was said to have developed from a congenital wart. With regard to the number of labors, no conclusion can be drawn; some of the patients had given birth to many children.

West mentions one case in which the disease was attributed to a fall against the edge of a chair. In other cases it is possible that the constant scratching, on account of itching of the vulva, may have some significance, though the occurrence of cancroids, compared with pruritus of the vulva, is very rare.

Treatment.—Every suspicious prominence, all large warts and all surfaces secreting abundantly or condylomata, which have existed for any considerable time, especially in patients above middle age, should be carefully treated, and, if possible, removed at once. When, however, a cancroid has been recognized, which ought not to be difficult after the above description, no time should be lost, and the extirpation must be performed with the

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* See case, Atlas, plate 35*a*.

† *Monatsschrift für Geburtsh.*, 32, 246. ‡ Atlas, p. 275.

§ "Die Pathologie, etc.," pp. 275, 276.

greatest possible care. An incision should be made in the sound tissues around the tumor, and, if it be situated near the clitoris, the base of the latter should be dissected out in such a way that the corpora cavernosa may be removed with the galvano-caustic without the loss of any blood. The wound should now be sutured, after providing against hemorrhage, and the greater part will unite by first intention. It is still a mooted question whether the inguinal glands, if they be at all swollen, should be extirpated at the same time. Küstner has recently reopened the discussion of this question. In my experience, I have often seen the inguinal glands decrease in size after an operation for cancroid of the vulva, and have never extirpated them with the first operation, even if they were swollen. This complication of the operation I consider inadvisable, for it lengthens the time during which the patient will be confined to bed, which is all the more to be avoided because, as we have seen, the subjects are generally old, and long confinement to bed may be injurious. If, however, the superficial inguinal glands, *i. e.*, those above the fascia, are more enlarged than on the sound side, I agree with Küstner that, after exposing them by an incision, they should be removed with a blunt instrument. Or, as Küstner advised, all the glands should be removed, to do which it is necessary to split the fascia lata, expose the crural vessels, and then remove the glands near them. This appears to me a very hazardous proceeding, both from the fact that the glands on the sound side may not be free from disease, and the wound is very large, and, moreover, because a successful issue is by no means insured.

But the operation proposed by A. Martin seems still more hazardous. He advises that the fluctuating glandular tumor be split, the cavity scraped out with a sharp spoon, and the wound bound up with the regulation iodine bandage.*

The case, described in the same journal, in which a carcinomatous gland tumor, the size of a hen's egg, was extirpated, the wound beginning to fill with healthy granulations in eight days, and the patient leaving the clinic after three weeks with a healing wound, which continued to do well, proves nothing whatever;

* *Berl. Kl. Wochenschrift*, 1881, p. 448.

for we do *not* learn whether the wound *entirely* healed, whether the patient was cured, or whether her life was prolonged.

On the other hand, I approve of Martin's recommendation to close by acupressure the vessels leading to the vulva, before proceeding to extirpation.

The operation is usually well borne even when it is necessary to remove large portions of the vulva in very old subjects. Fever can be entirely prevented, and twelve to fourteen days in bed is usually sufficient. The cure may be promoted by sitz-baths to which are added bran, carbolic acid, or corrosive sublimate.

If the process has reached such a stage that it is no longer possible to completely extirpate the neoplasm, energetic cauterization with the actual cautery is indicated; it materially lessens the suppuration. The suppurating surfaces may also be powdered with the potassic chlorate, or iodoform, or washed with carbolic acid or corrosive-sublimate solution. The patient is rendered more comfortable by the application of cold compresses and injections, and frequent warm baths, and indeed many seem to be permanently benefited by these means.

11. Osteomata, Enchondromata, Neuromata.

We must here refer to other tumors of the vulva, which have been described by reputable observers, but which are so exceedingly uncommon, that they have not been seen by others. According to Beigel, Bartholin found, in a Venetian prostitute, ossification of the clitoris to such a degree that she injured her consorts with it.* According to the same author, Bellamy showed a preparation to the Pathological Society in London, which was obtained from a woman, seventy years of age, and which consisted of a hard, horny tumor, of the shape and size of a tiger's claw, projecting from under the prepuce of the clitoris. Schneevogt describes a tumor larger than the fist, connected with the clitoris by a pedicle 3 centim. (a little more than an inch) in length, which was irregular and knotty on the surface, firm in consistence, and upon section showed cartilaginous structure

* "Krankh. der Weib.," Geschlects, II, 728.

with here and there softer parts.* Neither any recent observers nor I have ever seen anything similar to this.

Only one case of *neuroma* of the vulva has been described.† This was an excessively painful, submucous nodule situated near the orifice of the urethra.

Closely related to these are the "sensitive papillæ and warts," observed by Kennedy.‡ These growths are very sensitive, situated on the internal surfaces of the nymphæ and vestibule, and are said to consist of the débris of imperfectly cured ulcerations, granulations and doubtful epithelieum with congeries of blood-vessels. I have never seen anything of the kind, but think that if these warts were not simple papillomata, they may have been the remains of an hyperæsthetic hymen, which have been known to cause such symptoms.

Affections of the vascular system and tumors resulting from injury will be referred to later (see Varices and Thrombus of the Vulva).

12. Hydrocele of Woman.

Acting upon Henle's suggestion, Niemann examined the peritoneal vaginal process in forty-six embryos and children; he discovered that it begins to form in the female embryo in the third month, that it was present in more than one-half the cases, and that it is oftenest found between the fifth and seventh month. It is usually on both sides; if on one side only, generally on the right, which accounts for the greater frequency of inguinal hernia on the right side. If this prolongation of the peritoneum reach below to the mons veneris, *i. e.*, through the inguinal ring and about the round ligament, and if the mouth of this sac becomes adherent to the inguinal ring, a transudation of fluid into the cavity may occur; or, before adhering to the ring, fluid from the peritoneal cavity may pass into it. This condition, in which a more or less firm fluctuating tumor is found in one of the labia, has been designated *hydrocele of the round ligament* of the uterus. The tumor may be as large as an egg, is transparent, and has several times been mistaken for hernia and even herniotomy performed. K. Schroeder saw a case which permitted the return

* Hildebrandt, l. c., 52. † Sir J. Simpson. ‡ Hildebrandt.

of the serous contents into the abdominal cavity, *i. e.*, in which the communication between the vaginal process and the abdominal cavity was still open.* I have had no opportunity to sketch a hydrocele; Niemann produced good drawings of his two cases.

Recently such tumors have been described by Earnest, Ellen, and Ingersoll,† which were cured by incision, evacuation, and disinfection with carbolic acid. In Paletta's cases the incision alone effected a cure.

Hydrocele may also be interpreted as dropsy of the empty sac. Cases of this kind have been noted by Sacchi and Fleming.‡ Finally, fluid may collect in a sac not lined with serous membrane, but formed in the cellular tissue of the labium majus, which consists of two layers, prolongations of the superficial abdominal fascia. Between these two layers, the analogue of the dartos tunic, a tumor may form, which has the best claim to the named *hydrocele.*

If the fluid can be returned a truss will suffice; but if the upper part of the process be closed the tumor must be incised, the fluid pressed out, and after it has filled again the sac obliterated by injections of tincture of iodine, or 5 per cent. solution of carbolic acid. Scanzoni found the excision of a part of the sac wall to be unsuccessful.§ If obliteration cannot be brought about, the complete excision of the sac becomes necessary.

CHAPTER V.

NUTRITIVE DISTURBANCES, INFLAMMATIONS, AND EXANTHEMATA OF THE VULVA.

Inflammatory changes may be situated or originate in the skin, mucous membrane, glands and vessels of the vulva, singly or unitedly. There are, therefore, numerous forms of nutritive dis-

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* "Krankh. d. Weib.," Geschlectsung, v Auflage, 1881.

† Virchow-Hirsch f. 1882, II.

‡ *Gaz. des Hôp.*, 1855, p. 21; Busch, l. c., 82.

§ Lehrbuch, IV Aufl., p. 319.

turbance, many of them occurring in early childhood and infancy. We also meet with them in persons above middle age or very old, and after the menopause, at which time they may cause almost unendurable suffering. On no other portion of the female person can be found such a number of vessels and erectile tissues; the tissues here are sensitive, prone to secretion and transudation, and are exposed to contamination by the excretions, *e. g.*, blood, urine, and feces. Very many of these disorders are grouped as pruritus of the vulva, because from want of exact observation their special character is not known. This name indicates nothing more than that pruritus is the most important symptom, and at the same time shows that the study of these disorders has not been interesting enough to excite close observation. While most authors devote a large chapter to this one symptom of the various diseases of the vulva, vagina, uterus and rectum, they pass over the characteristic anatomical changes caused by them, with the simple statement that these exanthemata differ in no particular from those upon other portions of the body. This is unjust, for patients suffer greatly therefrom—"*Qui bene distinguit, bene medebitur.*"

The diseases of this category may be divided into the simple, the local exanthematous, and the infectious. By local exanthematous we understand such non-infectious diseases as are met with only on the vulva.

A. Simple inflammations of the vulva, .	Catarrhal vulvitis, Œdema, Folliculitis, Furuncle, and Gangrene.
B. Local exanthemata, ...	Eczema, Herpes, Prurigo.
C. Infectious, ...	Erysipelas, Diphtheritic and syphilitic infections.

A. The Simple Inflammations of the Vulva.

Catarrhal Vulvitis. Phlegmon. Furuncle. Folliculitis of the Vulva.

Inflammation of the vulva begins with redness, swelling, and increase of secretion on different portions depending upon the cause. If there be only a simple reddening we call it dermatitis simplex; if the corium and subcutaneous tissue be implicated and if general, it is known as phlegmon of the vulva, but if partial, furuncle of the vulva. If the follicles are principally affected, the disease is known as folliculitis of the vulva.

In phlegmon of the vulva the skin is much swollen, is of a red or bluish-red color, and œdematous; not infrequently abscesses are formed. In *folliculitis* the follicles are swollen to the size of a pin-head, often contain pus, and look much like the glands of Montgomery in the mammary areola.*

The fever, pain and loss of substance from the formation of abscesses are caused by the inflammation, hypersecretion, and plugging of the excretory ducts of the hair-bulbs, sebaceous and sweat glands. These abscesses grow as large as a cherry and are distributed over the different parts of the vulva.

If a furuncle be developed in one of the labia majora or minora, the skin is more swollen, more resistant, there is more œdema, the nodule marking the seat of inflammation becomes larger, and the suppuration leads to the discharge of a slough.

Ætiology.—Young children are predisposed to simple vulvitis, especially when they are not kept clean, and the external genitals are irritated by urine and feces. After the age of puberty inflammations of this sort are most frequently caused by the menstrual fluid, perhaps in connection with some irritating vaginal secretion, the affection then being of the menstrual type.

Matthews Duncan does not believe that scrofula, or worms—oxyures vermiculares—finding their way from the rectum to the folds of the vulva, and there inducing scratching and excoriations, often cause vulvitis. Obesity is a common cause, predisposing as it does to stagnation in the capillaries of the skin,

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* See cut in Martin's Hand Atlas, II Aufl., Berlin, 1878; plate xxx, Fig. 1, after Huguier.

intertrigo, and profuse secretion. Other causes are external injuries, such as bruises and frost-bites, or affections of deep-seated organs, and of the pelvic connective tissue. Kühn found comedones, follicular enlargements with induration of the adjoining tissues and exfoliation of the epithelium, common in prostitutes.

Finally, all these simple forms are most frequent in the puerperal state, either from the hyperæmia and uncleanliness of the organs during gestation, or from accidents during labor. These changes may become chronic if the causes above mentioned persist. The symptoms are itching, burning, and stinging, which cause rubbing and scratching of the parts, through which the suffering is increased instead of diminished, and excoriations and profuse secretion mixed with blood result. The contact of urine with the raw surfaces causes violent burning pain ; the menstrual congestion brings about an aggravation of the general symptoms. If the inflammatory process proceed to the formation of abscesses or furuncles, walking and sitting become extremely difficult, and tenseness of the parts with throbbing pain supervenes.

An acute attack of the disease lasts in adults one and a half to three weeks, but a longer period in children. The indications are frequent bathing of the parts, or the application of tepid or cool fluids by compresses ; for adults, sitz-baths, to which astringents are added. The symptoms are also relieved by the application of vaseline containing tannin, ext. rhatany, alum, etc. In obstinate cases frequent bathing, with a 2 to 5 per cent. solution of carbolic acid, or corrosive sublimate solution 1 to 2 : 1000 is of advantage. If there be extensive excoriations or raw surfaces it is well to try dusting them with iodoform, or covering them with iodoform ointment ; for this condition, also, the application of powdered oxide of zinc has been recently recommended. I wish to remark concerning the last remedy that it does not always give favorable results when applied to suppurating wounds. For the leucorrhœa of children Pott recommended that iodoform bougies 5 to 8 centimeters (about 2 to 3 in.) in length and the thickness of a small lead-pencil be placed in the vagina. One bougie was usually sufficient, and even chronic cases were thus remarkably benefited. Phlegmons and abscesses should be incised as soon as suppuration

becomes apparent, the contents thoroughly pressed out, and the wound dressed antiseptically. In case of furuncles the hair should be shaved off, and soap plaster, warm sitz-baths, or emollient cataplasms used. Folliculitis is best treated by washing the parts with solution of carbonate of potassium. According to Behrend a radical cure may be effected by cauterizing the parts with lunar caustic.

Here it becomes necessary to allude to another form of this affection which, though it is not simple vulvitis, still cannot be included under the exanthematous or infectious forms, viz., *vulvitis diabetica*. I have seen this variety very often, and in individual cases have been able to observe it for a number of years, until the death of the patient. Though the diabetes is here the more important ailment, and, as this is incurable, we may not hope to entirely remove the vulvitis caused by it, still the continual itching and burning, the hypersecretion, sleeplessness, pain, difficult defecation, and loss of appetite so reduce the patient, that the local affection without doubt hastens the fatal termination. The sufferings of such patients are really deplorable. All parts of the vulva are of a coppery red color, much swollen, in places as though powdered, in others moist, with hemorrhages here and there from the constant scratching. The tissues are dry, brittle, wrinkled, and rigid. As a rule the affection soon creeps into the folds of the groin, and over the mons veneris, or yet more frequently into the fold of the nates and around the anus.

With improvement of the condition, the skin becomes paler or bluish-gray, exfoliations occur in places, and the fissures heal. But, as a rule, this does not proceed to a complete cure, the process passes to another part, or there is a temporary improvement corresponding to a better general condition of the patient, followed by a return of the trouble with increased severity. I have seen the greatest intensity in the symptoms in patients who had 4 to 5 per cent. of sugar in their urine, and one case in particular I attended for years, a woman in whose family there were many cases of diabetes, and whose husband had died with this disease.

The diagnosis is so simple that often a glance at the vulva, in the condition above described, suffices to call attention to the

diabetic state. In some cases, however, I was much surprised to find no sugar in the urine, though the appearance of the vulva was very characteristic. I recall one case in which repeated examinations of the urine revealed no trace of sugar, but the pruritus was excessive and the appearance of the vulva thoroughly characteristic of diabetes; finally, a vaginal carcinoma was very rapidly developed. Fungi, *e. g.*, leptothrix and leptomitus, and possibly a variety of oïdium albicans are, doubtless, the cause of certain forms of this affection. I have, however, not been able to find them in all cases, and have been compelled to differ from Haussmann on this point, who, while he never observed any cases of the kind, simply asserted *a priori* that the fungi must invariably be present. We know that affections of the skin are frequent complications of diabetes; in severe cases the skin is dry and scaly, intense itching, and especially pruritus of the vulva is therefore given as a common symptom by physicians who have much to do with this disease.*

There is a strong predisposition to furuncle and carbuncle as is well known, and French physicians have considered the appearance of eczema—*E. glycosurique*—to be the cause of the saccharine urine. This designation is, however, not wholly applicable to diabetic vulvitis. Here there are no small nodules and vesicles, but early diffuse swelling, redness, and dry, brittle skin, alternating with moist spots. It has been asserted that there is a strong tendency to gangrene in grave cases of diabetes, but I have never seen it occur even in the most severe and fatal. When one examines the cases reported by Seegen it will be found that in the thirty-seven only two had eczema, and two slight furuncular inflammation of the vulva, and that the affection appears to have been of moderate severity in all four. We would, moreover, conclude from the experience of such a careful practical physician as Seegen, who but briefly treats this subject in the text of his work, that this is not a frequent condition, and that it is of minor importance. I believe, however, that many such cases are not diagnosticated by the physicians at watering-places, because patients are disinclined to examination of these

* Seegen, "Diabetes Mellitus," II Aufl., 1875, pp. 108–110.

portions of their person, many of them probably intentionally concealing their condition. It may be concluded, however, that the affection is not uncommon, for in my own practice I have met with at least twenty cases of greater or less severity.

Treatment will first of all be directed toward the cause, *i. e.*, the diabetes, and will consist in the careful regulation of the diet, the use of animal food, quinine internally, and of mild laxatives, especially of Carlsbad salts, or Carlsbad mineral waters. But the patient will persistently demand relief from the intolerable itching and burning. Many remedies may be employed for this purpose with more or less temporary success, but frequent changes in treatment are necessary because most of them cease to be effective after a short time. I recommend, first of all, thorough washing with a tepid solution of salicylic acid or corrosive sublimate 1 to 1000, and after drying, in moderately severe cases, the application of vaseline to all affected parts; later a small quantity of salicylic acid should be added to the vaseline, 1 to 300. It is often of advantage to cover the surface with zinc ointment, or with the addition of white precipitate ointment, or the latter may be used alone; iodoform ointment is also of service.

Many patients are greatly relieved by the sitz-bath at 78.8° F.–82.4° F., which may be continued from one-half to two hours daily, and to which one-half to one pound of wheat bran, or mild astringents such as tannin, decoction of oak-bark, alum, etc., may be added. In drying the parts, they should not be rubbed, but gently pressed. In this manner irritation resulting from the drying of the secretions and the formation of scabs on the vulva may be avoided. This is much more easily thus accomplished than by the dry treatment; neither is dusting the parts with powders advisable, because there is already a strong tendency to dryness and brittleness of the skin. The application in the evening of compresses wet with the fluid used for the bath, or of some of the above-mentioned ointments, will tend to relieve the suffering which during the night usually increases in severity.

Schroeder recommends solutions of carbolic acid of different strengths, 1 : 40 to 1 : 10, for bathing the parts and for com-

presses. Different anodynes have also been applied locally, *e.g.*, chloroform in almond oil, 1 to 5, may be put on the painful parts. Belladonna and morphia ointments may be used for the same purpose, though but little can be expected from them. I consider the internal use of narcotics contraindicated in these cases, for they accomplish nothing and lower the vitality of the patient. I must warn against the use of morphia and chloral, except in the most severe cases, and in the last stages of the disease. I have nothing to say, however, against the employment of tincture of cannabis indica, or paraldehyd. Warm baths, nourishing food, red wine, and the various preparations of quinine are always of service, while amylaceous food should be avoided.

B. Local Exanthemata.

Under the *local exanthematous affections of the vulva* are included: Eczema, herpes, and prurigo.

1. Eczema may be either acute or chronic. The eruption consists of nodules, vesicles, pustules, and scabs, with a more or less reddened, swollen, and moist skin. The mildest form is known as eczema papulosum; the most violent, characterized by scabs under which pus is formed, being called eczema impetiginosum. The infiltration of the skin with fluid and cellular exudation sometimes extends to the subcutaneous tissue. An acute attack usually runs its course in eight to fourteen days, when the dry scabs fall off, showing beneath them a tender, newly-formed epidermis. If the process becomes chronic it extends to the mons veneris, the thighs and nates, and is associated with swelling, and usually a purulent secretion from these parts.

The *symptoms* are the same as in vulvitis, differing only with the degree of intensity and extension of the disease. This is an uncommon disease, and is mentioned by only a few authors. Hildebrandt has observed it exclusively in pregnant women. I have seen it four times in the non-gravid during middle and advanced age, and in women with eczema on other parts of the body.* In one case of this sort, a brunette, 39 years old, who

* Stiegert, IX, 148, Liebnau, X, 202, Weinaug, VII, 287.

had given birth to two children, the vulva was covered with a thick mass of small vesicles; she had been suffering with the disease for two years.

Treatment.—Cataplasms, dusting powder of flowers of zinc, 2 parts, with starch, 40 parts, ointment of white precipitate, and, in severe cases, the application of a solution of caustic potash, 1 to 300, after the scabs are removed, have all been recommended. Kühn found that eczema marginata was of frequent occurrence in fleshy prostitutes; according to Kaposi this variety is caused by trichophytes, dependent upon the occurrence of a local irritation during menstruation.

2. The same author frequently saw during menstruation an *herpetic* eruption in groups on the labia, differing from eczema in that the tissues are not reddened by inflammation or swollen.* This eruption may also dry up or the vesicles may burst, scabs be formed and detached, or there may be some suppuration or pouring out of a serous fluid. But, as a rule, they disappear spontaneously and cause far less suffering than eczema.

The appearance of this eruption and the stages through which it passes are precisely similar to those of herpes so often observed on the upper lip. If the bursting of the vesicles has caused the formation of thick scabs, it might be confounded with an infectious ulcer, but the usual rapid spontaneous disappearance of the affection soon removes this source of error.

3. Prurigo has also been seen on the vulva. The eruption consists of pale or reddish papules in the epidermis, from the size of a millet-seed to a pin-head, with a moderate cellular infiltration of the papillæ in which, according to Klebs, there is often dilatation of the lymphatics, causing irritation of the sensitive nerve fibres, pain and itching.

Kühn says, that there is a dark spot, the size of a pin-head, in their centre, which is somewhat depressed, and that they contain a tenacious, reddish, gland-like mass attached to the bottom of the papilla, and when this is removed, a cure soon takes place.

* Brunneau, Frédéric, "Étude sur les éruptions herpetiques qui se font aux Organs Génitaux chez la Femme." Paris, 1880.

4. *Miliaria rubra* and *M. crystallina* may extend from the abdominal walls to the mons veneris and labia majora, but without causing any peculiar manifestations.

C. The Infectious Inflammations of the Vulva.

1. The *soft* and the *indurated ulcers* may be simply mentioned, referring their description to syphilitic affections, in which category they belong.

2. *Erysipelas of the vulva* occurs most frequently in early infancy or during the first few days after birth. It then appears as an extension of erysipelas of the navel, is a very serious affection, and is often fatal. It may also occur during childhood in scrofulous or filthy children; in adults, during menstruation, and in consequence of obesity. The skin is bright-red, tense, and sometimes vesicles are formed. The affection may extend to the thighs and nates. It is not of infrequent occurrence in the puerpera; it begins upon one or the other buttock, and extends to the vulva, mons veneris and thighs; the prognosis is doubtful. *The usual treatment* is employed: internally, carbolic acid; locally, lead-water, carbolic acid, and the application of cold.

3. *Croupous and diphtheritic vulvitis*—excepting as a complication of the puerperal state when it is really not a true diphtheria—also are most common during childhood. Grayish-yellow spots appear at first, soon followed by ulceration and redness of the adjacent parts. In diphtheria, the eschar is firmly adherent, but in croup it may be easily removed. The ulceration causes considerable loss of substance and extensive cicatrices. These are found on all parts of the vulva.

Diphtheritis also differs from croup in that, in the latter, a coagulated membrane is deposited upon the inflamed mucous membrane, while, in the former, the mucous membrane itself is transformed into a dead coagulated mass.

I have seen primary diphtheritis of the vulva but in a single case—a child of one and a half to two years. Other authors have seen it as a complication in epidemics of pharyngeal diphtheria.

4. The disease known as *noma of the vulva* also belongs to this category. In this affection, which is similar to noma of the cheek, a slight infiltration first appears in one of the labia majora; this

soon has a grayish-green color; vesicles are formed, the color then changes to a dark brown, sloughing and finally extensive loss of substance occur. In this form, it is an occasional complication of measles, smallpox, scarlet fever, typhus and erysipelas. West saw three cases in twenty years. I have never seen a case of this kind, but have frequently seen gangrene of the vulva follow the rupture of a large hematoma, or severe infectious cases during the puerperal state, and in renal and cardiac diseases in which the vulva was so necrosed from great œdema that gangrene supervened after labor.*

I have also seen post-mortem, in the case of a girl eighteen years old, who died from typhus fever, large gangrenous ulcers which began in the right nympha, and had extended into the vagina as far as the vaginal portion.

In these severe infectious diseases there is high fever, as a rule, though it may be slight or entirely absent. As to the time of its appearance, gangrene has been divided into primary and secondary. As to origin and course, primary gangrene is divided into three forms: *a*. Serous, putrid infiltration, followed by erythema and degeneration of the tissues; *b*. Herpetic vesicles and blebs with rapidly extending ulceration; *c*. Livid swelling or œdema and early breaking down. This classification appears to me to be too artificial. The affection usually terminates in death from septicæmia or pulmonary embolism. The middle cerebral artery may also be plugged. If recovery occur, cicatrization takes place in three or four weeks.

About one case of noma and gangrene is seen in 1500 sick children, who are usually inmates of foundling asylums, unhealthy hospitals, or in epidemics of scarlet fever, typhus, or measles. It seems worthy of remark that, in my own experience, I have seen but one case of diphtheritis, and no case of noma of the vulva, for, if the course of labor has any influence in producing these affections, they must certainly have occurred much more frequently, considering the great number of pelvic presentations which have come under my notice.

Treatment.—The general condition should first receive

* "Path. d. Woch.," III Aufl., Krankengeschichte, No. 113.

attention, the children be well cared for and supplied with an abundance of fresh air. Local applications are next in importance; in diphtheritis of the vulva, the parts should be thoroughly cleansed with a concentrated solution of salicylic acid, 5 per cent. solution of thymol, lime-water, or dusted with iodoform, boric acid, or chlorate of potasssium.

Internally, quinine and the mineral acids are indicated. If the strength fail, administer wine, camphor, or ether, the last either internally or hypodermatically. When gangrene of the vulva appears, the affected portions should be at once completely destroyed; remove the gangrenous masses with the knife and scissors, and cauterize the underlying tissues with the actual cautery. In connection with the above, good will be accomplished by sitz or entire baths and antiseptic dressings. The strength must be sustained by stimulants, *e. g.*, large doses of quinine, nourishment with strong liquid food, analeptics, wine, champagne, alcohol, cognac, etc.

4. Vascular Anomalies of the Vulva.

(*a*) *Teleangioma.*—This may be congenital or acquired. Henning saw a vascular mole 5 millimeters (about one-fifth of an inch) in diameter on one of the labia majora of a child two years old. Vidal likewise describes one which he saw on one of the labia majora of a very small child, and which healed spontaneously, though it had already extended into the vagina.*

If these vascular neoplasms continue to enlarge, they may be removed as from other portions of the body by thorough cauterization with fuming nitric acid or by extirpation with the knife. Dieffenbach successfully removed by ligation a large erectile tumor of the nympha.

(*b*) *Phlebectasia of the vulva* is met with in young and in old persons, during pregnancy and in the non-gravid state. It may be found upon any part of the vulva, upon the right as often as upon the left side, but especially on the mons veneris, and toward the thighs; sometimes the dividing walls are broken down and a *cavernous tumor* results, grape-like in appearance, and in some

* Aubenas, l. c., p. 27.

instances of considerable size. I have been consulted eleven times on account of such varicose tumors of the vulva by non-gravid women. They may also take the form of a single varix projecting from the nymphæ, the prepuce, or from between these and the labium majus. Thrombi may form in them.* They swell when the patient stands or walks, cause itching and burning pain, especially in old women; scratching is resorted to, to obtain relief, and in this way they may be ruptured, causing severe or even fatal hemorrhage. A tumor of this kind is shown in the Atlas, plate ii, Fig. 4, § 36. In 3000 lying-in women I found, when they were dismissed, 61 with large varices of the vulva. So far as I know, the largest tumor of this character was observed by Holden; this one when the patient was standing became the size of a child's head.† I have often found this condition in old women associated with violent pruritus of the vulva. It is not true, as stated by Hildebrandt, that they are developed only in the gravid state, for in 1869 I found a varicose tumor as large as a hen's egg in the left labium majus of a woman who had not been pregnant, but who suffered from very obstinate constipation.

When itching and burning occur the bowels should be regulated, and at intervals during the day, the patient should lie down and apply compresses wet with lead water to the vulva.

Wearing a tightly fitting T-bandage may be of service to many patients, but if the tumors are large and a rupture is feared, more can be accomplished by shaving the parts and applying broad strips of adhesive plaster, which must be replaced as they become loosened; pads, which compress the tumor against the anterior pelvic wall, may also be used. In one of my cases such a pad rendered excellent service.

If a varix burst subcutaneously or beneath the mucous membrane, the blood escapes into the tissues, forming—

(*c*) *Thrombus, or Hematoma of the Vulva.*—Such tumors are most common during labor and the puerperal state, but may

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* *Policl.*, 1879, Nr. 25, Rolle.

† "Hart and Barbour's Manual of Gynecology," Edinburgh, 1882, p. 54.

occur in the non-gravid as well. Von Franque saw a hematoma of this variety result from violent efforts at defecation in an old woman who had never given birth to a child. Gempe observed a similar tumor in a nurse twenty years of age who had lifted patients a great deal. I saw a hematoma of the right labium majus in a woman who was not pregnant, which resulted from a fall against a bath tub. Altogether, I have met with five cases of vulvar hematoma of this sort.

Blood may also escape into the remains of the hymen and distend these until tumors as large as a bean or a hen's egg result. I have seen one such tumor.

If the tumor be small it will usually be completely absorbed without causing any great inconvenience.

If it be large itching is the initial symptom, followed by an intense local pain and increased swelling. The tumor is hot, of a bluish-red color, elastic, extremely painful to the touch, closes up the entrance of the vulva, and may render urination difficult. Even tumors of this sort, as in Gempe's case, may be completely absorbed in a few days under the application of an ice-bag.

If they increase beyond a certain size so that the skin is discolored from the tension, they must be incised, the blood-clots turned out, the cavity thoroughly disinfected, then packed with iodoform gauze, and compression applied.*

Appendix.

Acquired Atresia of the Vulva.

These various forms of inflammation of the external genitals may, during childhood, as also at later periods, result in complete adhesion of the parts, or acquired atresia of the vulva.

Adhesions, resulting from the raw surfaces of the labia coming in contact, are not often complete, for the discharge of the urine separates the surfaces, at least at the upper portions, but still in very young children only quite small fistulæ may remain, a sort of raphe indicating the margins of the labia. The longer the adhesions remain, the firmer they become. It is obvious

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* For further details, see "Pathology of Childbed."

that retention of the vaginal and uterine secretions may result. In severe cases even the parts in front of the urethral orifice may adhere, and urine be passed only after much straining.

As a usual thing it does not proceed to this extent, for the children have difficulty in urinating which attracts the attention of the parents, and an examination reveals the cause. Generally it is quite sufficient to pull the labia apart, thus separating the adhesions, but if not, they should be divided with the knife. Placing salicylated cotton between the lips of the wound will counteract the tendency to adhere, or, if this prove insufficient, cauterizing the surfaces, or, if the wound be large, pulling back the lips by means of sutures introduced in each side will most effectually prevent a recurrence of the adhesions.

CHAPTER VI.

DEFORMITIES AND DISEASES OF THE VULVO-VAGINAL GLANDS.

Cowper's glands in the female are 15 to 20 mill. ($\frac{6}{10}$ to $\frac{8}{10}$ in.) in length, smooth, irregularly lobulated, and open through an excretory duct of about the same length and with a lumen of 1 to 3 mill. ($\frac{1}{26}$ to $\frac{3}{26}$ in.), upon that part of the internal surface of the introitus which marks about the middle of the hymen, and just in front of the latter. The gland is embraced by the bulbo-cavernous muscle, contraction of which causes the ejaculation of its contents. During coition the gland is compressed, prostitutes therefore being especially liable to diseases of these glands. Lascivious dreams likewise cause a reflex ejaculation of their secretion, *i. e.*, pollution in the female, and this too may happen in sensitive individuals during a gynecological examination.* When the labia majora are imperfectly developed, these glands may be wanting (Zeissl). Their most common disease is

* Erich., "Paroxysms in the Female Resembling Nocturnal Emissions in the Male." *Maryland Med. Jour.*, Balt., 1882–3, IX, 348.

A. Catarrh, Hypersecretion.

Boerhaave is said to have been acquainted with this disease as a form of gonorrhœa in the female. I have observed it clinically for months in a young person. The orifice of the excretory ducts will be found distended so that a sound may readily be introduced. The adjacent surface is reddened, and when the introitus is put on the stretch a drop of transparent tenacious mucus will be seen to exude from them. The quantity secreted is much increased when either external or internal pressure is exerted upon the glands; in long-standing catarrh the secretion is opaque, the mouth of the duct becomes occluded, causing *retention*. This causes, first, an ovoidal distention of the duct which may later affect the gland, and lead to the formation of

B. Cysts.

As long as the duct alone is implicated the tumor will be globular and the walls uniformly smooth. When the gland also is affected the tumor appears compound, and while, as a rule, appropriating only the posterior and external third of the labium majus, may occasionally grow into the vagina and pelvic cavity even above the vaults of the vagina. A case described by Hoening* will serve as an example. The tumor, palpated through the abdominal walls, was as large as a goose's egg and extraordinarily soft and elastic; below, a tumor of a bright red color, which occluded the entrance to the vagina, was seen. The tumor contained a tenacious, thick, grayish, fatty mass, consisting of normal and degenerated epithelium, and drops and crystals of fat. The inner surface of the cyst wall was alternately smooth and rough.

Huguier reports a similar case though the cyst was not so large. The ordinary contents of simple cysts of these organs are serous fluid, and mucus or blood, and vary in consistence.

Cysts of Bartholin's glands occur upon the right as well as upon the left side—according to Huguier eighteen times upon the left side, eleven times on the right, and five times in both labia majora. I have observed them five times on the left, six times on the

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* *Monatsschrift*, xxxiv, p. 130.

right side, and once on both sides. In cysts of the excretory ducts the labia appear as though divided into an inferior and superior portion. In cysts of the gland itself the distention is more in the lower and posterior portions, while, according to Huguier, when the tumor is developed from the most superficial acini, it may ascend along the edge of the ramus of the ischium above the middle line and even above the urethra. If the process proceed to the

C. Formation of Abscesses,

The pus may be spontaneously evacuated. In abscess of the excretory duct Huguier says the evacuation occurs about 1 centim. ($\frac{2}{5}$ in.) below its orifice; in inflammation of the gland the perforation invariably is found on the internal surface of the labium majus. Evacuation of the pus is usually followed by a rapid recovery, but fistulæ may occasionally be formed. These inflammations are characterized by redness and swelling of the skin, a feeling of heat and weight, and shooting, piercing pain along the ischium. Standing and sitting become intolerable, and cohabitation is impossible. The inguinal glands are generally enlarged, though painless. The abscess may be as large as a hen's egg. I have seen this disease thirteen times, in two cases the abscesses occurring on both sides, in seven on the left side. One case was associated with cancroid of the vaginal portion.

Diagnosis.—The diagnosis is confirmed by the location of the tumor in the middle and lower half of the labium majus, its circumscribed character, the enlarged gland, the presence of fluctuation, and the impossibility of lessening or pressing out the contents. These tumors may be differentiated from hernia, first, by the percussion dullness; second, by the limitation of the tumor, as a general thing, to the labium majus, though not always, as Hoening's case shows; again, by the redness and swelling of the skin in abscesses. Hydrocele of the vulva is located in the superior portion of the labium majus, is covered by healthy skin, and is not painful. When a hematoma situated in the lower third of the vulva has begun to suppurate, it may easily be confounded with an abscess of the gland, but they can usually be differentiated if attention is paid to the previous history, to changes in the skin, especially suffusion, to pre-

existing varices, and to its rapid development. Moreover, the confusion of these conditions would produce no unfavorable results. Congestive abscesses and abscesses from paracolpitis involve the same parts of the vulva; the first are covered with normal skin, reach higher in the vagina, generally originate in disease of the vertebral column, and after incision a sound may be passed high up in their course.

Phlegmonous abscesses are the result of a trauma or of diffuse inflammation; are consequently not limited to certain portions of the vulva; usually open not internally but externally, or in several places; often cause fistulæ; are much more painful, and the general symptoms are graver. When once healed, there is no tendency to a recurrence.*

There is, however, another form of abscess met with in this region which is still more liable to become confounded with those of Bartholin's glands, viz., abscesses caused by *periproctitis abscedens*, or, as they have been named by the French, *stercoro-vulvaires*. I have seen several examples of this variety, even in young persons, associated with periproctitis and rectal carcinoma. A careful examination will always reveal the fact that in such cases the rectum was first diseased; we will find hemorrhoids, swelling, fistulæ and fissures; when the finger is introduced it causes excessive pain, and, if fistulæ are present, a sound will pass through them as far as or into the rectum. We also discover the swelling in the vicinity and the disease of the rectal wall.

According to the statements of French authors prærecto-vulvar abscesses also occur in the septum between the vagina and rectum, resulting from excesses in venery, or from some lack of symmetry in the two sides of the genital apparatus at the beginning of the menstrual process. They are said to open at the same points as gland abscesses, and, as a rule, to heal rapidly and without the formation of fistulæ.† I have never seen a case of this kind.

Ætiology.—Diseases of Bartholin's glands are comparatively rare in the better classes but very common in clinical and poly-

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* Huguier—Aubenas, *loc. cit.*, p. 16. † Aubenas, *loc. cit.*, p. 17.

clinical practice. Young persons after the age of puberty are especially liable. It is possible that trauma and great changes in the temperature of the parts may exert an influence favorable to their occurrence. Imprudence during menstruation may cause catarrh which, if neglected, leads to abscesses. But it is beyond question that the disease is most common among prostitutes and women who have been exposed to gonorrhœal infection. Kühn found, for example, 30 cases of inflammation of these glands in 239 syphilitics. According to Breton, the so-called Bartholinitis is the most common form of female gonorrhœa, and during an epidemic of this disease in the Strasburg garrison, very many cases of inflamed glands were observed. Arning has demonstrated the presence of gonococci in inflammation of Bartholin's glands.

Treatment.—In cysts of the excretory ducts and of the glands, an incision and complete evacuation of the contents may first be tried. The cyst may then be permanently healed if the continuity of the excretory duct from the cavity to the surface can be restored. If this be impossible, or if the cyst refill, a piece of the anterior wall should be excised, and the remainder of the sac thoroughly cauterized with tincture of iodine, or with fuming nitric acid which will completely destroy it. Total extirpation of the gland has been proposed for cases in which persistent suppuration or fistulous openings follow the incision of the cyst or abscess. To perform this operation an incision about 4 centim. (1.5 in.) long should be made in the course of the middle of the tumor, two or three small arteries ligated, and then, carefully avoiding injuring the sac, the entire gland should be shelled out, and the wound united with seven or eight sutures. In a case in which I performed total extirpation, the wound healed by first intention, the patient had no fever and was discharged in ten days. The operation should not be resorted to, however, unless it be strongly indicated, and if the disease is bilateral one side should be treated at a time.

In light grades of inflammation, the local abstraction of blood with leeches, and the application of cold and cataplasms, have been used with more or less success. Fistulæ must be split open, and their channel freshened with the knife or destroyed with caustics; otherwise they may persist for months.

Chronic catarrh of these organs is very difficult to cure. I have attempted cauterization of the canals, and injections in these cases, but the ducts are so small, and so little of the remedy will enter, that the effect is slight. Hildebrandt's experience, with which my own agrees, is that *the glands of Bartholin are the seat of female pollution* (Hildebrandt remarks incidentally that the latter is often associated with painful spasm of the constrictor cunni); and as, if this occurs frequently, the woman is much reduced and weakened, it becomes evident that, provided permanent improvement, and the removal of this irritable condition, cannot be effected by other means, *e. g.*, massage, the milk cure, baths, and abundant exercise, it may be advisable to resort to extirpation of both glands.

In all diseases of this kind, attention should be paid to the condition of the vagina and uterus. Catarrh, when present, should be treated, and protracted sexual continence insisted upon. The functions of the glandular organs of the sexual apparatus should be regulated by injections, sitz-baths, etc., and in order to prevent a recurrence during menstruation, injections of warm water and frequent bathing of the parts should be used at this time.

CHAPTER VII.

INJURIES OF THE EXTERNAL GENITALS.

Lesions of the external genitals occur most frequently during labor and are referred to at length in obstetrical treatises; but, inasmuch as these injuries, even when sutures are at once applied, do not always heal, and as many are neglected or not discovered at the time, these cases often come under the notice of the gynecologist. Next to the perineum, the nymphæ are oftenest injured, being torn diagonally or transversely, or perforated. For example, I found laceration or perforation of the nymphæ sixty-seven times in 3000 lying-in women. These lesions, however, very seldom require operative treatment, for they cause no suffering. A deep tear in the perineum, on the other hand, soon

leads to a variety of symptoms: In the first place, the anterior vaginal wall, and with it the wall of the bladder, sinks down into the distended genital aperture, gradually dragging the uterus with it, so that vaginal cystocele finally causes prolapse. If the laceration extend into the anal sphincter, there is incontinence of feces, fluid and flatus escape; unformed stools cannot be retained, and catarrh of the rectum is developed, manifesting itself by discharges of glairy mucus, occurring daily, and causing much suffering. The thin band-like cicatrices resulting from deep lacerations of the vagina lead to protrusion of a tumor of the anterior rectal mucous membrane above them; this increases in size from time to time, bleeds readily, and is very sensitive. It is really wonderful how rapidly the discharges cease when the perineum is restored. An obstinate catarrh, characterized by increased secretion and a feeling of heat and burning, very soon affects the vagina which, under these circumstances, is exposed to contact with the external air. These catarrhs persistently recur until the perineum is repaired and the vagina closed in the normal manner. From timidity patients will often quietly endure all these sufferings for a time, but if they are made to know that the operation is comparatively simple and promises speedy relief, they will often, even in old age, gladly submit to it. I have relieved sixty-five patients by surgical treatment; thirty-one others would not consent to an operation.

Some examples of recent injuries of the vulva or perineum in the unimpregnated, caused by a fall or by the penetration of a foreign body, have recently been brought to notice. Children or adults may fall on the edge of an object in such a way that a sharp point or splinter injures or penetrates the vulva. Kaltenbach, Leopold, Braun, and Bauer have described such cases. Kaltenbach's patient was a girl, nineteen years of age, who fell against the sharp edge of a chair; Leopold's, a child in its fourth year, who while climbing upon a sofa fell against the arm of a baby-chair; a second patient, a servant girl, twenty years old, while cleaning windows, fell astride the back of a chair; Braun's cases, one a woman of thirty-five years, and the other a child of eight years, each fell upon a fence picket. In all cases the wounds were oblique, generally small and parallel to the descending

ramus of the ischium, and situated at the base of the clitoris penetrating the nymphæ. The hemorrhage was in each case excessive, almost fatal; was parenchymatous, and came principally from the clitoris, in Braun's first case the right corpus cavernosum being lacerated. In such cases, the individual falling upon the edge of some object, the force of the fall is largely spent upon the rami of the ischium, but, if a person fall from a certain height upon a sharp object, complete laceration of the perineum with recto-vaginal fistula may result.* An interesting case of this kind is reported by Bauer. A girl, while in a stooping posture, was attacked by a bull, whose horn penetrated the vulva and completely ruptured the perineum, in addition causing an extensive laceration of the buttock. The latter wound healed by first intention, the former only by suppuration, *i. e.*, with loss of substance, in three weeks.

Treatment.—It is obvious that something must be done immediately in recent wounds that are bleeding freely. The patient, being placed upon a high table, and two women holding the thighs, has her pelvis moved to the edge of the table in such a position that the physician sitting before it can obtain a view of the vaginal orifice. Bleeding arteries should be at once ligated, then the wound thoroughly cleansed, disinfected, and the necessary sutures made, or, if need be, the perineum completely restored.

The operative repair of old injuries of the perineum, if they are of considerable extent, is also advisable. If the puerperal woman is otherwise in good health, the operation may be undertaken in from fourteen to twenty-one days after delivery, as the hemorrhage is usually slight, and the process generally requires but one-half to one hour. The patient should be anæsthetized. The preparations for the operation consist in washing out the vagina, drawing off the urine, and evacuating the rectum for a few days previous to and just before it. It is advisable to thus thoroughly empty the rectum during these two or three days by means of injections and castor oil internally, as the frequent

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*Case No. 2, Braun; patient fell from a tree, and was impaled upon a picket fence.

copious discharges which are so likely to occur both obstruct the view of the operator, and may prevent union by fecal particles getting between the lips of the wound.

Almost any table will answer for the operation, provided the legs be fixed with some such contrivance as that mentioned by Fritsch.*

I always use chloroform in these operations. It is immaterial as to what is used for stitches; if the lips of the wound are properly prepared and adjusted, either silk, iron or silver wire, catgut, or silkworm gut may be used. It is human nature to attribute our failures and mistakes to other than the true cause, and so it is here. Want of success has been charged to the material used for sutures, until now almost every operator recommends a different kind.

The operation is quite easy in theory, but there are peculiar difficulties connected with it which every operator must master if he would succeed in curing all his cases. These difficulties are, the surfaces of the wound are kept clean with greater trouble here than on other parts of the body, and the parts to be united are of different areas and are exposed to tension in different directions. Those places which will be first subjected to tension must be the most firmly united. The shape of the denuded surface is of minor importance; it is unnecessary to follow any given scheme too closely. One should be governed, as Freund advised, by the length, breadth and direction of the cicatrix. Do not—and this is of great importance—denude the surfaces too perpendicularly, or else some of the descending fecal mass may be pressed between the sutures and toward the vagina. The denudations should, therefore, be made diagonally or slanting, and at the expense of the less vascular vagina instead of the rectum; then the bridge will be thicker and the septum more resistant.

Secondly, the vaginal sutures should be passed so low down that they are almost on a level with the hymeneal caruncles; they should be close together and deep, that is, through the entire thickness of the exposed surface so that the mucous membrane

* "Krankh. d. Frauen," Braunschweig, 1881, p. 105, Fig. 52.

is included. In this way the septum toward the perineum will increase in width, and the sutures which are to unite the perineum will not need to be so deep, and they will not be subjected to nearly as much tension, as the broad base of the septum furnishes them with a firm foundation. The lateral denudations, however, should be carried so high that the new perineum will extend to the vaginal tubercle, thus giving necessary support to the whole anterior vaginal wall. The anterior portion of this perineum will gradually become thinner so that the rima of the vulva is in no danger of being too narrow.

I further recommend that vaginal and perineal sutures only be passed and none from the rectum, because, when the operation is performed in the manner described, they are unnecessary. I had resorted to the plan of the sole use of these two varieties of sutures long before their description by Hirschberg.*

The patient being placed in the proper position and anæsthetized with chloroform, the vaginal wall above the posterior end of the cicatrix should be seized with a tenaculum forceps, and pulled into the vulva until the assistant holds the instrument almost vertically with one hand, while with a blunt hook in the other hand he draws the upper part of one nympha aside. A second assistant holds the other nympha aside by a tenaculum, and should a part of the septum still remain, draws it somewhat tense. In this way the field of operation is not only well exposed, but the parts to be denuded are rendered tense, permitting dissection of the vaginal mucous membrane to be done more easily and rapidly. If the patient should vomit, or mucus or fecal matter be forced out of the rectum, the latter should be syringed, wiped with a sponge, and finally a tampon of salicylated cotton as large as a walnut and with a string attached to it, be pushed up into the bowel. After these precautions it is scarcely to be feared that the wound will be contaminated a second time during the operation. Accordingly as the defect extends high up, will the denuded surface resemble a hat, the crown of which is in the vagina (Hildebrandt); or, in case there are two lateral cicatrices,

* "Verhandl. der Deutschen Gesellschaft für Chirurg.," IX Congress, 1880, plate viii, p. 203.

it will be like an artist's hat (Freund), or like butterfly wings (Hegar). In the simplest cases it will be an oblong surface. The denudation must extend close to the forceps, about 2 centimeters ($\frac{4}{5}$ in.) above the upper end of the vaginal cicatrix. If the mucous membrane of the rectum be everted, it should be removed at the same time. The larger arterial branches must be at once ligated with catgut, and the small ones included in the suture and not separately ligated. Before the sutures are introduced the whole surface of the wound must be made as smooth as possible, so that no little cavities are left when the tissues are brought in apposition.

Coaptation should be made under a constant stream of a 2 to 3 per cent. solution of carbolic acid, and the upper vaginal sutures tied first. As I usually employ silkworm gut, and this substance may be allowed to remain for weeks without producing irritation, I do not remove the stitches till the perineal cicatrix is so old and firm that it will bear distention with a large speculum. When all the sutures are well fastened, the plug should be removed from the rectum, and the vagina irrigated with a 2 per cent. carbolized solution until the fluid passing away is colorless. Adjacent parts are then thoroughly cleansed and dried, and the patient put to bed with the knees fastened together so that she will not stretch her limbs apart when coming from under the anæsthetic, thereby reopening the wound. Formerly I covered the wound with benzoated or salicylated cotton, but this is a necessary precaution only until after the first urination. From this time the wound heals better when uncovered, or if painted with iodoform collodion.

The bowels should be moved by capsules of castor oil on the third day. If the sutures are firm, the passage of even solid fecal masses need cause no anxiety. At the present day the use of opium, to keep the bowels constipated as long as possible, has been abandoned. If the castor oil does not produce the desired effect, one-half to one quart of warm water should be thrown into the bowel till an evacuation occurs.

The removal of the external sutures should be governed by the reaction in their vicinity. If this occur early, and some are cutting into the tissues, they may be removed separately, begin-

ning on the fourth day; the majority may remain till the sixth or to the eighth day, or even longer. The patient should not leave the bed nor attempt to sit nor walk before the fourteenth day.

Formerly, when I did not pass the sutures so far downward, it frequently happened that at the point where the vaginal and perineal sutures met a small opening—a recto-vaginal fistula—remained, which was gradually widened by defecation. Fistulæ at this point are difficult to heal, and I have often been compelled to completely reopen the perineum and sew it up again before union was perfect. Should a small round opening remain in the perineum proper, a minor operation, in which the upper and lower parts are undisturbed, is sufficient to close the fistula. I will here take occasion to remark that one of my patients, who had undergone several unsuccessful operations in New York, was prostrated on the morning of the fourth day after the operation by an excessive venous hemorrhage from the vagina. This was so great and the patient so anemic that no time could be spent in seeking the source of the hemorrhage, but it was checked at once by tamponing the vagina. We did not ascertain whether this accident was caused by the sudden rupture of a varix, or whether some vein included in the suture had been cut through. The patient had slept quietly and the hemorrhage occurred in the early morning. A small perineal opening remained in this case. If less experienced operators should fail entirely in securing union, the operation may be repeated in two or three weeks, subject to the desire and condition of the patient; but in these subsequent operations great care must be taken to remove all granulations and bring only smooth surfaces in apposition.

Appendix.

1. *Incontinence, or Garrulity of the Vulva, or Vaginal Flatus.*

Gases, the products of decomposition, are often produced by sloughing tumors of the uterus and vagina, as well as during labor, and may be discharged during respiratory movements. As a general thing, however, the air which audibly escapes from the vagina is the result of suction which occurs from the position of the patient, *e. g.*, the knee-elbow or dorsal or lateral position, causing the intestines to recede from the pelvic cavity, the lips

of the vulva being open. Again, the bladder may be distended like a balloon by the entrance of air after the introduction of a urethral speculum in the dorso-coccygeal position. But, just as in this case the action of the sphincter is diminished, so the passage of air into the vagina occurs only because the constrictor cunni is weakened, or its contractions prevented by the introduction of some instrument, such as a pessary or speculum. Now, when the abdominal pressure is increased, this air is forced out with a bubbling, blowing, clucking, or hissing sound. This is often observed in cattle and mares (Hennig). Löhlein demonstrated that emaciation, varices of the vulva, and lateral tears of the vaginal orifice caused this interference with the action of the constrictor. He named this condition vaginal flatus, while it seems to me that the designation vulval incontinence is more appropriate.

Recently I had under my care a patient who was annoyed by this affection during cohabitation ; in her case the disease originated in a cicatrix which resulted from a long laceration of the left side of the vagina, caused by delivery with the forceps. The condition was improved by applying cacao butter. As a rule the suffering is slight; still, in case the entrance of air cause an obstinate catarrh, it might be advisable to operate by excising existing cicatrices (Löhlein), or by narrowing the vulva by colpoperineorraphy, an operation performed with success by Löhlein.

2. *Neuralgia and Inflammation of the Coccyx. Coccygodynia.*

This condition, although not strictly a disease of the vulva, is yet so closely connected with such diseases as a symptom, though it may occur primarily and idiopathically, that it has been thought well to consider it here. Pain in the coccyx may be a symptom of a great variety of diseases of the genital apparatus, *e. g.*, diseases of the os uteri, the ovaries, vagina, rectum or the vulva. At the same time the coccyx is neither swollen, inflamed, abnormally fixed nor movable ; but still is painful to the touch, though not in the degree found in local disease of the bone. The trouble gradually disappears as the original disease is removed, or it may cease as the result of intravaginal pressure from the introduction of a round, elastic pessary, etc. Scanzoni claims

to have caused an immediate cessation of pain by rectifying an existing anteflexion.

Moreover, distortion and periostitis of the coccyx may be produced by a trauma, *e. g.*, from riding, by difficult deliveries, or from a fall; I have seen one case from the last named cause. Luxation of the coccyx and synostosis of the luxated bone have also been observed, a condition which may cause the patient much suffering. In a case of this variety which came under my notice the patient was greatly inconvenienced in sitting; the coccyx formed, posteriorly, an obtuse angle with the sacrum and was immovable; I proposed its extirpation, but she would not consent. Before resorting to an operation one should always try to break up the union, and fix the bone in its normal position with a pad or T-bandage. Hyrtl * and Luschka found a great many deformities of the coccyx which must have resulted from fractures or luxations. These are usually produced during labor. Scanzoni found nine cases following delivery in a total of twenty-four in four years. Simpson, who called particular attention to this disease, regards rheumatism as a cause.

The affection is very obstinate and often recurs. Scanzoni reports ten complete cures and nine improved in a total of twenty-four cases, the majority being of traumatic origin.

Treatment.—When coccygodynia is a symptom of some sexual disease, the latter must be diagnosticated and treated. If it be a primary inflammatory affection, rest, lateral posture, lead-water compresses, ice bags and rectal suppositories of opium or belladonna are indicated. Cathartics may be given internally to facilitate defecation which is particularly painful. If the inflammation be intense, leeches should be applied to the sacrum. When fluctuation appears, the pus must be evacuated. If the trouble recur and the suffering be great, Simpson recommended the subcutaneous division of the muscular and fibrous tissues inserted into the coccyx, and says it was often of permanent advantage; he, however, failed to cure one case after operating repeatedly. Kidd reports good results from this operation.† Bryant and Simpson have each successfully extirpated the coccyx

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* "Anatomy," pp. 32 and 180. † Virchow-Hirsch, 1867, p. 626.

for anchylosis.* Amann has done the same, and Bugge performed a partial resection.† Of late years little has been heard of these operations. Nott has also recommended the removal of the coccyx, and successfully performed the operation.‡

When coccygodynia is of purely rheumatic origin, *e. g.*, in washerwomen and little children, it should be treated by warmth, the application of cotton-wadding or cataplasms, and with wine of colchicum seed internally. Morphine injections should be used when the pain is severe. Hörschelmann claims to have cured two children of the disease with 3-drop doses of tincture of aconite, every two hours day and night.

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* *Medical Times*, 1860, p. 363.

‡ Virchow-Hirsch, 1870, pp. 514 and 575.

§ *American Journal of Obstet.*, vol. I, p. 243

SECTION II.

ABNORMALITIES AND DISEASES OF THE VAGINA.

CHAPTER I.

THE AFFECTIONS OF THE HYMEN.

The ducts of Müller have united by the eighth week of embryonic life, but open by a double orifice into the uro-genital sinus; by the twelfth week this has become a single orifice; until this time there is no appearance of a hymen. After the vaginal portion has been formed from the ducts, its walls, which have hitherto been smooth, are thrown into numerous transverse folds from a rapid increase in their longitudinal development. This occurs in the beginning of the fifth month of gestation; but in the nineteenth week the first trace of the hymen may be recognized as a slight protuberance on the posterior wall of the introitus, just above the point where the vagina unites with the uro-genital sinus. From the anterior vaginal wall a smaller projection at a higher level then appears, and these two soon unite at the sides. The hymen is, therefore, not a perforated portion of the allantois, as Klebs and Hennig maintain, but is formed by folds in the vagina which was previously open below. A case very recently published from Grohe's Institute in Greifswald favors this view: The patient had atresia of the vagina; just below the urethral orifice a hymen is said to have been found which almost certainly was not a remnant of the allantois; at the very least it might have been a part of the external furrow growing toward the allantois. Upon the internal surface of the hymen are found the papillæ of the vagina, but its external surface is smooth like the vestibule. Broader and thicker at its base, it becomes gradually thinner as the edge is approached, and forms a crescentic fold, the two horns being continuous with

the border of the urethral orifice and the urethral mucous membrane. Generally it is one-half to one centim. ($\frac{1}{5}$ to $\frac{2}{5}$ in.) deep; but sometimes only a very slight fold. The hymen is composed of a fibrillated stroma of connective tissue, contains many arterial vessels, with fewer veins, and is rich in elastic tissue. Muscular fibres have repeatedly been found in it. Nerves are said to be present, but only in small number. Roze denies the existence of nerves in the hymen because he could find none, and stated that tearing it with the finger-nail was absolutely painless; but numerous cases, in which simply pressing it causes excessive pain, just as conclusively prove their presence.

It is formed about the middle of intrauterine life, not only in the human female, but in apes,* bitches, the bear, donkey, hyena, and giraffe; its use in the fœtus seems to be preventing the amnial fluid from entering the genital canal, especially during labor pains. In infants and small children, in whom the rima of the vulva is more nearly vertical than at a later period, the hymen prevents the urine from flowing into the vagina.

A. Malformations.

1. The hymen may be entirely wanting, or simply a trace of it be present. Tolberg, Hartmann, Blasius, Heuermann, Lieutaud, and Roze† have observed cases of this kind; but they are doubtless often confounded with those in which the uro-genital sinus persists, and a hymen is sought in the wrong place.

2. It may have a double orifice, as observed by Callisen, Goering and Veit. I have examined six patients who had this anomaly. In three of them the septum was vertical and median; one patient had two openings directly under the urethra so small that the finger could not be introduced, though she had been married several months, and was already pregnant. Here conception must have occurred without the entrance of the penis. In a third case (No. 1594), the septum extended diagonally from the lower border of the urethra toward the left, thus forming two unequal orifices.

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* Bischoff declares that a proper hymen is wanting in the anthropoid apes. *Aeussere Weib. Geschlechts und Begattungsorgane der Menschen und der Affen*, etc.

† *Loc. cit.*, p. 7.

3. Again, a second hymen has been found higher up in the vagina (Mende, Lisfranc, Ruysch); these observations were made, however, at a time when the development of the organs from Müller's ducts was imperfectly understood, and the cases were probably confounded with acquired stenosis of the vagina or vaginal septum.

4. Hyperplasia of the hymen has been reported by Scanzoni, who saw one projecting one to three centim. ($\frac{2}{5}$ to $1\frac{1}{5}$ inches) beyond the labia majora. I have repeatedly seen the points of a hymen carinatus projecting from the rima of the vulva in the newly born. The same condition has been described by Boivin and Dugès. In some cases the hymen is so broad and long that it may be unfolded and a Cusco speculum introduced into the orifice without injuring it. In a virgin of seventeen years (Case No. 2979), I saw the lower part of the hymen project beyond the urethra in the form of a flap.

5. A variety of hymen, which may easily be mistaken for lacerations of the hymen, has been named *hymen fimbriatus* by Luschka.

Roze called this variety the hymen dentilated at its free border, but entire. In another place he says: "The superficial fissures found upon the free border of the hymen may be normal, for this border is not absolutely uniform."

Luschka found the fimbriated hymen set with a delicate fringe, provided with large papillæ of different forms and containing a fibrillated cortical substance, with or without loops of blood-vessels. In Plate ii, Fig. 1, p. 36, I have shown a hymen fimbriatus, similar to the one just described (see Chapter IV, p. 30, Fig. 2).

B. Structural Anomalies of the Hymen.

In this category belong:—

1. *Unusually great vascular development.*

According to Roze, Wachsmuth narrates a case, in which a bride of twenty years, who, by the way, was a bleeder, bled to death from laceration of the hymen on her wedding night.*

Chiara was sent for, to see a similar case; the young husband, not being able to rupture a strong hymen, had torn it with his

* Bordmann, "Thèse de Strasbourg," 1851, No. 230, p. 45.

finger. The hemorrhage was excessive, the young wife anæmic and unconscious, and the bleeding was stopped only by the use of powerful styptics.*

In another case severe hemorrhage occurred from tears in the hymen of a girl in consequence of rape.

Thompson, also, reports a case of bleeding from a ruptured hymen.†

2. The connective tissue of the hymen may be developed to such an extent as to be unusually hard and resistant. Velpeau found, in such a hymen which had prevented coition, muscular fibres.

While cases may exist in which, on the one hand, the hymen is too resistant, the force employed may be so great in others, that it is not lacerated but is detached in places at its base. Two orifices will be found in the introitus, a large one inferiorly where the hymen has been torn loose, and a small one superiorly which is the original opening.‡

The hymen may also be lacerated laterally in its substance.§

3. Not only one or two, but several orifices may exist in the hymen — *hymen cribriformis.* This form may interfere with coition, but offers no impediment whatever to conception (see Velpeau's case above). In Chambon's case, a person who was separated from her husband on account of the impossibility of coition, was found to have a hymen with two small openings not larger than the end of a sound. She had lived with her husband 14 days, and was pregnant with twins.

The hymen may, moreover, have two large and a number of smaller orifices.‖

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* *Wochenblatt der Zeitschrift der Wiener Aerzte*, 19, x, 57, *Monatssch.*, xi, p. 143.

† "Hemorrhage due to Rupture of an Over-vascular Hymen," *Nashville Jour. Med. and Surg.*, 1880, xxv, 53.

‡ Budin reports such a case ("Recherches sur l'hymen et l'orifice vaginal," *Public. du progrès médical.* Paris, 1879, p. 36, Fig. 22). Reverdin, also ("Décollement circulaire presque total de l'hymen." *Médecin*, Paris, 1883, ix, No. 26). Veit, also, saw such a case, and I saw the same in a pregnant woman, in October, 1869 ("Frauenkrankheiten," 2d edition, p. 338).

§ *Vide* Budin, *loc. cit.*, p. 38, Fig. 24, A and B. ‖ Roze, Figs. 6 and 7.

4. On the other hand, the hymen may be abnormally distensible, so much so that it is not ruptured in cohabitation, nor even at the birth of a 5-months' fœtus as in Tolberg's case,* or, without tearing, it may be drawn entirely into the vaginal wall when pressed upon by the descending head.†

All of the above-described anomalies may prevent the discharge of secretions and the menses, interfere with coition or even render it impossible, and still, as we have seen, not prevent conception. A rigid hymen may also interfere with labor. To confound this condition with any other, is hardly possible; inspection and touch render the diagnosis easy. In the majority of cases, making an incision into the membrane, or notching the edges will suffice to remove the difficulty. If the septum is of such material that hemorrhage is feared, two ligatures of catgut may be applied and a piece excised between them. Should any part of the hymen bleed profusely, it must be removed with the scissors, and the bleeding point ligated with fine catgut.

But, in most cases, the application of a tampon, the size of the introitus, wet with vinegar or with the solution of the sesquichloride of iron, will check the hemorrhage; the thighs when approximated easily retain this tampon.

C. Neoplasms of the Hymen.

But little is known of these. In addition to papillomata of the hymen, which have already been referred to, and which give the hymen a fringed appearance, I have seen

1. Congenital cysts of the hymen twice within a short interval in the Munich Clinic, one case upon December 6th, 1883, and the second soon afterward. To the best of my knowledge this affection has never been described. Dr. Bastelberger will publish the cases with illustrations of the microscopical structure of the cysts. In both patients the cysts were situated close to the median line on the outer border of the hymen near the external navicular fossa. The cyst was almost globular, imbedded in the connective tissue of the hymen, looked like an inversion

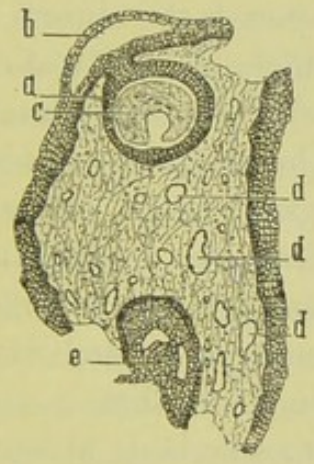
* "De varietate hymenum," Halis, 1791.

† Credé, "Verhandl. der Gesellschaft für Geburt," IV, 59.

of the epithelium and covered the vulval surface of the hymen (see *a*).

It was separated from the loose connective tissue of the hymen by a well-defined border, and composed of several layers of broad flat cells, of the same character as the epithelial cells which lined the deeper layers. The free covering of the cyst, springing over the surface of the hymen, was likewise a continuation of its cellular layers (Fig. 9). The contents of the cyst were a conglomerate mass of exfoliated, more or less degenerated epithelial cells, partly arranged in lamellæ, and débris (*c*). It was not a retention cyst, but a true primary formation, a neoplasm.

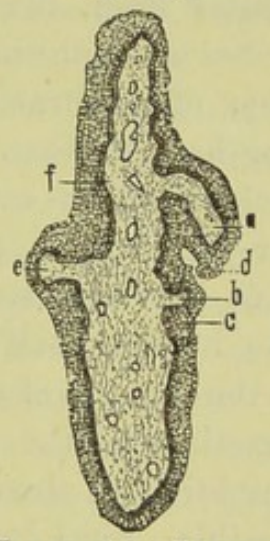
Fig. 9.



Cyst of the Hymen.

a Cyst. c. Contents.
b. Superficial epithelium.
d. Vessels.
e. Inversion of the epithelium.

Fig. 10.



Tumor of the Hymen.

a, b, e. Prominences on surface of the hymen.
c, d. Epithelium.
f. Stroma.

In the second case, in which the cyst was 2 mm. ($\frac{1}{13}$ in.) long and 1 mm. ($\frac{1}{26}$ in.) wide, it was also in connection with the surface, and had been formed by an inversion or growing-together of two prominences (Fig. 10, *a*, *b*, *c*).

Both cysts were excised by the scissors without causing any deep lesion of the hymen. Now that these affections have once been brought to notice, they will probably be found more frequently.

D. Vaginismus.

The diseased condition which has received this designation is doubtless the result of structural changes in the hymen. The

name was given the affection by Marion Sims who first observed it in 1857 and 1859, and who in December, 1861, wrote a paper upon the subject for the Obstetrical Society of London.* The name is derived by analogy from blepharismus or blepharospasmus, and denotes painful spasmodic contraction of the vaginal orifice.† Other authors, *e. g.*, Molènes and Catrin, have applied the term *vulvismus* to the same condition, a name which is by no means appropriate since touching different parts of the vulva causes neither pain nor spasm.

The anatomical changes usually observed in this disease are, redness, erosions, swelling of the follicles, increased secretion, and in many cases closely aggregated papillary excrescences at the navicular fossa, the latter said to be characteristic.‡ Fritsch describes as vaginismus a case of fissure beneath the clitoris, and another of urethral caruncle, diseases which obviously do not belong here, for then all cases of vulvitis, syphilis, or lupus might be included in this category, as Matthews Duncan, who considered under this head a case of recurrent vaginal ulcer, really has done.§ We understand the affection as described by Sims to be of the hymen itself or of its remains, contact with which, or even the thought of contact, being sufficient to cause such violent contractions of the muscles of the pelvic floor, that a digital examination of these patients without anæsthesia is absolutely impossible. Sims describes the seat and the character of the pain very accurately, and locates it in the base of the hymen, or at the upper margin nearest the urethral commissure. He also emphasizes the fact that the most characteristic cases which he saw, were not associated with inflammation, though he also met with cases in which some redness of the commissure was present. Usually the hymen felt thick and large, and the free edge was as resistant to the examining finger as if a cord or wire surrounded it. He further says that Prof. Alonzo Clark had never found

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* "Obstet. Transac.," 1862, vols. II and III, p. 356.

† "Klinik der Geb. Chir.," übers. von Beigel, 1866, p. 247.

‡ K. Schroeder, Lehrbuch, 1874, p. 489.

§ "Clinical Lectures on the Diseases of Women," London, 1883, Churchill, pp. 142–152.

any enlarged nerve fibres in making microscopical examinations, and that it had always appeared to him, Sims, as though the disease were of nervous origin. I have treated about 45 patients for vaginismus, and in 1878 reported nineteen cases,* stating that I had usually been unable to find a trace of inflammation in the hymen, at most only slight redness and papillary excrescences, and these not constant. I was obliged to admit that we were entirely ignorant of the anatomical changes causing the hyperæsthesia. Birch-Hirschfeld likewise failed to demonstrate the presence of any abnormal elements in cases in which the pain and muscular spasm were excessive. More recently, however, I have seen cases in which there were important structural alterations in the hymen, and to some of them I will briefly refer.

Case I. The extirpated hymen showed thickening and increase in the number and size of the papillæ, which were covered with a very thick layer of pavement epithelium.

Case II. Here there was perceptible thickening of the epithelial stratum, partly in the form of small papillary proliferation with rather deep depressions. The epithelium was of the characteristic pavement variety. The connective tissue was much increased and contained remarkably thick-walled vessels. All these changes considered together might be termed an hypertrophic fibro-papillary proliferation.

Case III. This also showed much thickening of the stroma, which consisted of firm, fibrillated connective tissue with a few round and spindle-shaped or fusiform cells. The surface was covered with a massive layer of large, nucleated pavement epithelial cells; this layer also sent cone-shaped prolongations into the stroma, and was arranged on the surface in shaggy prominences containing but little fibrillated stroma. The changes here were therefore fibrous hypertrophy of the stroma with papillary proliferation of the epithelial surface.

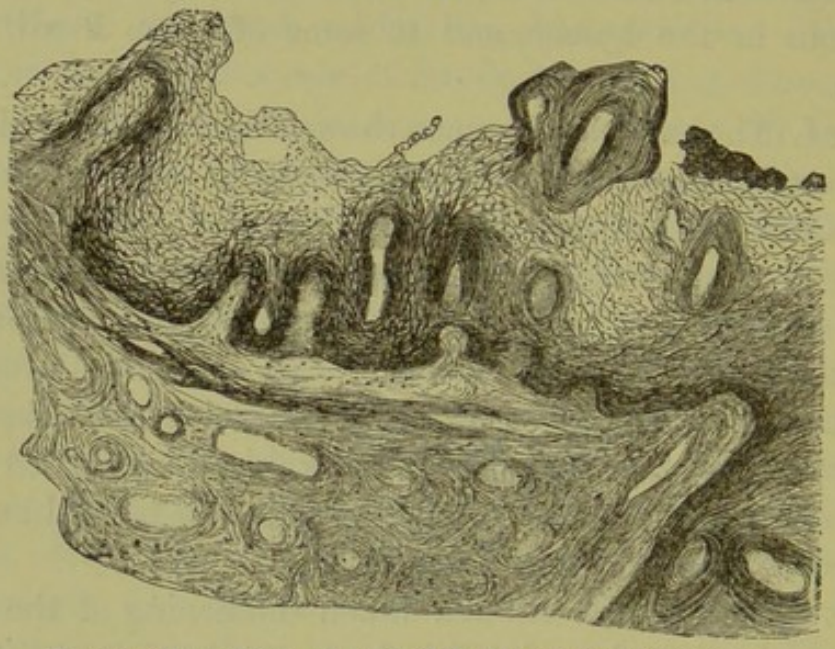
This microscopical condition is similar to that found in a hymen which I excised for vaginismus, and which is represented in plate vii, Fig. 4; in this preparation one could see with the

* Atlas, I, 15.

naked eye the rough, warty surface, particularly on the upper part near the urethra.

If still more proof were needed that the diseased condition of the hymen itself is the cause of these characteristic symptoms, it would be furnished by the fact that in the great majority of the cases all the symptoms which so tortured the patient, permanently disappear when the hymen is completely removed. The newly-married oftenest suffer from this affection. Coition is rendered impossible, each repetition of the attempt being more painful than the preceding one. Hence, great anxiety, violent

FIG. 11.



Fibro-papillary Hypertrophy of the Hymen in Vaginismus.

excitement and mental disturbance on the part of the wife, with increasing vexation on that of the husband at the persistence of the obstruction. He who loving his wife has regard for her sufferings, waits patiently, repeats the attempt at longer or shorter intervals but always with the same result, and so years may pass until the wife becomes nervous, melancholy and emaciated, or the husband eventually insists upon his rights or threatens separation, when the case is finally brought to the notice of the physician. The history is here of great significance and can scarcely leave us in doubt. If we now attempt an examination, the most violent excitement results, the patient throwing herself off the

examining table, screaming loudly and resisting every attempt at instrumental or digital examination on account of the pain it causes her; or, at most, she permits the physician to separate the vulva and make simply an ocular examination, as this produces no suffering. Upon inspection, we see at once that the hymen is intact and the orifice in most cases closed by the approximation of its edges; if we now undertake to separate them, the patient starts back as though struck by lightning, and further examination becomes impossible. If an anæsthetic be administered and, after the patient is completely under its influence, we expose the hymen and take up its free edge with a tenaculum, we may still observe evidences of pain on her part notwithstanding the anæsthesia, an experiment which has been demonstrated by my assistants in all cases that have been under my care. There is nothing to be seen upon the hymen itself, if we except a few warty excrescences.

Indeed, there may be cases of injury or wounding of the introitus—fissures and lupus of the vulva have been previously mentioned—which may make exploration painful or impossible. Again, there may be angiomata of the urethra, which are so excessively painful that every movement causes the greatest anxiety, and the patients remain virgins though married for years. Furthermore, there are cases of general or unilateral spasm of the pelvic muscles in recurring vaginal ulcers (aphthæ, Matthews Duncan's case), or in prolapsed neuralgic ovary (Bozeman's case), which will be referred to hereafter. During the examination of these patients we can pass the finger in all parts of the vagina without causing pain or muscular spasm, as long as we avoid touching the diseased portion. I do not accept the statement that touching fissures or urethral angiomata will constantly produce spasmodic contractions of the muscles of the pelvic floor.

Why should we classify under one name and according to one symptom, that is even by no means common to all, so many wholly distinct affections which we can differentiate anatomically and microscopically, and for many of which we have far better names, *e. g.*, angioma, lupus, and oöphoritis, names which at once indicate the seat and nature of the disease? Whenever we have classified a number of affections of the hymen from the

experience acquired in many cases, it will be proper to use an anatomical name for this disease instead of its symptomatic one, but the time for such a change has not yet come.

The *Ætiology* of the structural anomalies of the hymen is quite obscure. We only know that attempts at cohabitation gradually produce this condition. I have repeatedly found it in women whose husbands were impotent.

I could see no reason for attaching any significance to the temperament or age of the patient. I met with vaginismus in the young, the old, and the middle aged. Neither was it associated with other diseases of the sexual apparatus, nor with neuralgia of other organs. Individual authors, Daude and Chéron, have recently endeavored to establish a connection between vaginismus, that is, spasm of the pelvic muscles, and disease of the spinal cord. In such cases as the one reported by Sims*—and two similar ones occurred in my own practice—in which the painful contraction in coition persisted after complete extirpation of the hymen and even after repeated labors, and in which, as in his patient, cohabitation was possible only during ether narcosis, we may be compelled to consider the probability of such connection between these affections. Moreover, a case reported by Roth, proves that pregnancy may occur in spite of vaginismus and an intact hymen. But in my two cases there was no other symptoms which could indicate a spinal or cerebral affection, though the patients were under my observation for years after the operation, and one of them gave birth to three children. This question, therefore, calls for more complete investigation.

Treatment.—Radical cure in a short time can only be expected by a total extirpation of the hymen. Incisions into the hymen are of no avail, and the same must be said of all narcotic agents internally or externally. I have seen no results from internal remedies alone lately recommended by Girerd, and I would advise Decraud, who administers gold internally and externally, to feed his patients with gold in the form of champagne and oysters, for in this way they at least escape the metallic taste. Most patients, especially those who suffer much, soon consent to

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* *Loc. cit.*, p. 259.

an operation, but in one case I was obliged to threaten the patient —in her husband's name—with a separation before she would consent to an examination and operation. In addition to emptying the bladder and rectum, no special preparation for the operation is necessary. The patient should be placed in the dorsal position, chloroformed, and the operation delayed until the hymen ceases to be sensitive. When the patient no longer shrinks on taking up the hymen with a tenaculum, its base should be transfixed just above the navicular fossa by a small bistoury, and the incision carried entirely around, thus removing the hymen with its border intact. If the upper portions are continuous with the urethra, they must also be excised, for, as Sims has shown, they are sufficient alone to cause a complete recurrence of the symptoms. Therefore, under some circumstances, it may be necessary to excise the entire urethral orifice, as I have done following the example of Sims, so that the portion of tissue removed will show two openings, one for the hymen, and the other the urethral orifice. As a rule, the hemorrhage is considerable, particularly from the depression between the urethra and the lateral wall of the vagina; but it is for the most part venous and can be controlled by pressure. If arteries have been cut and bleed much, they should be ligated. Marion Sims used after the operation, to check the venous hemorrhage, an instrument similar to a bath speculum, and which has, on the upper convexity, a gutter for the urethra. It is made of glass, and is introduced immediately after the wound has been washed with two to three per cent. carbolized solution and blood clots removed from the vagina. It may be prevented from slipping out by fastening it to the thigh by a strip of adhesive plaster. The instrument may remain in position six to eight days, until the patient has no more burning pain or until it falls out during defecation. Once in my experience an excessive arterial hemorrhage which forced me to tampon the vagina, occurred four to five days after the operation, while the instrument was still in position. Recently I have not used it so much because I found that the secretions that collected around it had an offensive odor; also, because pressure for the purpose of checking the hemorrhage can be just as well made by a tampon of salicylated cotton without exposing the wound to friction; but

particularly because I do not consider the pressure high up in the vagina necessary unless the affection be chronic. In the last three or four cases I have succeeded just as well by placing in the circular wound a tampon of cotton as large as a walnut. After the wound has been healed, if the patient still be anxious and sensitive, she should be given a Sims dilator and taught how to use it, that she may methodically dilate the orifice until she has the courage to submit to sexual intercourse which will usually soon result in pregnancy. Finally, I wish to state that I have had no success whatever from cauterization, sitz-baths, anodyne ointments, or with suppositories, which it is utterly impossible to introduce into the vagina; also that other mechanical contrivances or surgical means, *e. g.*, gradual or rapid dilatation, incision of the vaginal mucous membrane, of the hymen and of the constrictor cunni, are not to be compared in result with the radical effect of complete extirpation of the hymen. We can, therefore, easily dispense with a new *hymen dilator* such as Henry Cotagne had constructed by Matthieu fils in Paris and presented before the Society of Medical Sciences of Lyons.

But what a terrible disappointment it is for these poor patients when the husband is found to be impotent! The operation has been successful, the pain removed, and the finger or speculum may be introduced without anæsthesia, but the conviction that the fulfillment of the marriage relation and pregnancy are entirely out of the question is a severe blow to many a poor woman. It would, therefore, be well before this operation is undertaken, to examine into the sexual condition of the husband, that the prognosis in regard to cohabitation may be made.

If the margins of the hymen grow together, causing thereby complete occlusion of the vaginal orifice, the condition is known as

E. Imperforate Hymen, Atresia of the Hymen.

Atresia of the hymen, or, more correctly speaking, *conglutinatio hymenis*, may be congenital or acquired. I once operated on a virgin twenty years old whose menses had, according to her mother's account, been present, but then ceased. I found the edges of the hymen firmly united. In this affection there is no outlet for the secretions of the genital canal, and they are there-

fore retained. But the entrance of air, or any other external source of irritation, is also impossible, so that hypersecretion resulting in hydrocolpos or hydrometra during childhood is of rare occurrence. Heilbut saw atresia of the hymen in a child of three years, which a year later had spontaneously disappeared. Godefroy found in a child of two months a fluctuating tumor completely closing the vaginal orifice, which increased on urination and defecation, protruding from the external genitals; when incised, a thick, tenacious albuminous fluid was evacuated which proved to be mucus from the uterus. The hymen was very firm and vascular, was 2 mm. ($\frac{1}{13}$ in.) thick, and the incision bled slightly.*

Most of these congenital atresiæ cause no inconvenience before the time when menstruation should occur in consequence of beginning ovulation. Then in place of the menstrual flow, pain is manifested, and the patient becomes conscious of a tumor both externally and in her abdomen; the tumor increases in size from month to month, and compels her to seek professional advice. This tumor usually appears above the symphysis, and is caused by the menstrual fluid retained at the vulva.

Closure of the introitus may be recognized as atresia of the hymen by the fact that the ring or border of the hymen is wanting; the membrane is smooth like a mucous membrane, and is very elastic but shows no cicatrices; the vulva and perineal region are pressed outward so as to be convex, and look not unlike a dark amniotic sac, a condition which can scarcely occur in the deep, firmer vaginal atresiæ. Moreover, the membrane is continuous posteriorly with the labia and perineum, its upper border being formed by the urethra.

In such cases the hymen has been found unusually thick and flesh-like; in Schaible's description it was described as completely hardened or cartilaginous,† from which it will be seen that, notwithstanding the great degree of distention, bursting and spontaneous evacuation of the contained blood are exceptional. This may, however, be due to the fact that the pain caused by

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* *Gaz. des Hôp.*, 1856, No. 142.

† Beigel, II, 556.

tumors of this kind compels the patient to consult a physician as soon as the tumor is noticed.

The length of time which the hymen withstands the pressure it is subjected to is shown by the case cited above, in which the obstruction had existed eighteen months, and by Zancini's case in which, the hymen, in a young woman of twenty years ruptured after seven years of menstrual retention. Dohrn believes that atresia of the hymen occurs much less frequently than is generally supposed, as the membrane of the vestibule which helps to form the lower lamella of the hymen is but little disposed to anomalies of this kind. This would be the conclusion drawn from the infrequency of closure of the rima of the vulva. The decision of the question depends largely upon the condition of the membrane some time after the rupture. If the edges are thickened to any great degree after the discharge of the menstrual fluid, hymeneal atresia may be excluded. But Reimann's case, in which he diagnosticated hymeneal atresia from the fact that the edges of the membrane were directly continuous with the nymphæ, shows that there may be exceptions; this case was also remarkable in that the edges of the incision had adhered after three days, and the uterus was again distended to the size of one at the eighth month of gestation. The excised piece of membrane, which was removed at a subsequent operation, consisted of a firm, fibrous internal membrane, and a reticulated layer of connective tissue externally. It was much firmer and thicker than the ordinary hymen. Breisky found, after an incision for atresia of the hymen, the edges of the incision more than five millim. ($\frac{5}{26}$ in.) thick, and the walls of the vagina eccentrically hypertrophied. He also emphasizes the fact that the atresiæ seated higher up in the vagina, from their firm connective tissue texture, exert such a pressure and offer such a resistance that the lower uterine segment is not distended but rather narrowed.

The consequence of this collection of menstrual fluid is, depending upon the quantity of blood, distention of the vagina, which invariably causes hypertrophy of the vaginal walls, so that they may measure six to ten millim. ($\frac{3}{13}$ to $\frac{5}{13}$ in.) in thickness. This hypertrophy usually results from an increase in the volume of the muscular layers, which is also associated with an

increase in the contractility of the vaginal walls, *i. e.*, an eccentric hypertrophy. Further up, the cervix and cavity of the uterus, and finally one or both of the tubes, will be dilated, all these organs appearing to be lengthened, and their walls thickened.

In *hematocolpos* the blood is always mixed with vaginal epithelium, usually thickened to a tarry consistence so that in Reimann's case it passed out of the incision in a cylindrical or spiral form. The consequences to the uterus and tubes will be considered hereafter.

The symptoms caused by the growing tumor are known as *menstrual molimina.* They are pain, tension, feeling of weight in the genitals, abdomen and sacrum; the greater the distention the more intense the bearing-down and labor-like pains; these are associated with headache, sleeplessness, fever, emaciation, dysuria, constipation, and sometimes retention of urine, until the source of trouble is recognized and treated, or the spontaneous rupture of the hymen furnishes an outlet for the menstrual fluid. Ten litres (10.5 quarts) of blood have been evacuated either by incision or spontaneous rupture.* It is obvious that from the pressure of such great accumulation pain and swelling of the lower extremities, cramps in the calves of the legs, œdema, inability to move, may be caused. After the evacuation the danger is not absolutely averted, for a fatal issue may result from septicæmia, rupture of the tube, or from peritonitis.

Diagnosis.—Delayed menstruation, the presence of a tumor in the genital organs having a covering like mucous membrane which is directly continuous with the nymphæ, ought to make this condition easily recognized and error impossible. But unfortunately girls are treated for amenorrhœa with preparations of iron instead of the real cause being determined by an examination. In the first place, atresia of the hymen is confounded with vaginal adhesions, etc.; the differential diagnosis of these affections has already been mentioned. That a tumor of this kind should have been mistaken for the pregnant uterus (Heister, Parsons, Denman, McCauley), or by a medical consultation for

* Roze, p. 44, Naegele.

an extra-uterine pregnancy (Naegele), can be understood only on the supposition that an internal examination was neglected. It has also been taken for a prolapsed uterus, polypi of the uterus and a neoplasm of the vagina. It is quite evident that if this tumor be mistaken for a prolapsed uterus and attempts made at reposition, the consequences may be very serious.*

In relation to pregnancy it is certainly worthy of mention that this affection has repeatedly been discovered in married women who considered themselves pregnant, and in whom years of cohabitation had so distended the meatus urinarius that the finger could easily be introduced into it (Reimann, Bruzelius).

A cure is nearly always certain if the diagnosis be made at the right time and prudent operative measures employed. If the tumor be not too large and no distended tube can be felt at the side of the uterus, the method proposed by Celsus may be adopted, viz., a crucial incision at the thinnest part of the hymen, cutting off the ends of the flaps in order that the contents may have free exit, and adhesions be prevented. The patient should be placed in such a posture at the evacuation, that air will not enter the vagina and cause decomposition of the blood coagula remaining in the uterus. For the same reason it is not advisable to make digital examinations, or to introduce the sound or speculum after the incision has been made. Breisky has shown how very dangerous this may be. Emmet advises a thorough irrigation after the evacuation, and repeating it every day.

If a dilated tube can be palpated by the side of the uterus, there is great danger of its rupture, and in all such cases it becomes necessary to very gradually evacuate by the trocar, or by small incisions with the bistoury, all pressure upon the abdomen being carefully avoided. In former times important organs were injured in the operation for atresia of the hymen, and it is necessary to mention this fact in order that proper precautions may always be taken, *e. g.*, the bladder must be emptied with the catheter and its position clearly made out. Roonhuysen, it appears, injured the urethra in one of the operations described

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* *Siebold's Journal*, IV, p. 400 and 474.

by him. Lesions of the bladder or rectum are more frequent in extensive vaginal atresiæ.

In children it may be possible to rupture the hymen with the finger, as Baker Brown recommended, otherwise it must be incised and the ends of the flaps cut off. It is never necessary to entirely remove the hymen, either in children or in adults.

Compression of the abdomen by bandages, etc., has been suggested as subsequent treatment, but when the distention has been slight they can do no good, if great, they may do harm. It is well, however, to immobilize the abdomen, and this can be accomplished by passing a simple bandage over a layer of cotton. Regular evacuation of the bladder and rectum should be had, and ice bags may be applied in case of pain. Internally, quinine and mineral acids; ergot is to be avoided.

CHAPTER II.

MALFORMATIONS OF THE VAGINA.

Anatomy.—The lower extremities of the two ducts of Müller unite to form the vagina. According to Dohrn, this union first begins a little above their lower orifices between the lower and middle third of the genital tract; from this starting point the process extends upward and downward, and hence, more slowly above than below, a single vagina with double uterus is a more common anomaly than a double vagina and single uterus. In the human embryo the ducts unite during the last half of the second month of embryonic life. As a rule, Müller's ducts do not lie exactly by the side of each other, but the left is pushed somewhat further forward than the right, probably owing to the presence of the rectum. Dohrn found them almost completely united in an embryo three centim. (a little more than an inch) in length, from which it seems probable that the vagina is fully formed by the nineteenth week of gestation. Geigl found, in a four and in a six months' fœtus the vagina closed by round pavement cells to within one millim. ($\frac{1}{26}$ in.) of the hymen, its entire length 4.5 millim. (about $\frac{1}{6}$ in.), and without a trace of a lumen.

In the fœtus and the newly born the vagina occupies a higher position and is nearer to the anterior pelvic wall than in adults. In the former, according to Frankenhäuser, when the bladder and rectum are empty, the vagina does not lie in the pelvic axis, but in the soft parts of the pelvic outlet. Its direction is, therefore, not vertical, but corresponds with the antero-posterior diameter of the pelvic outlet.

The two vaginal walls are of unequal length, the average of the anterior wall being 5.0 to 5.7 centimeters (2 to 2.25 in.), while that of the posterior wall is 7 centimeters (2.7 in.). The mucous membrane of the vaginal walls consists of several layers of epithelium, the most superficial of which contain large, polygonal, flattened cells with a central nucleus, the deepest stratum, however, being formed of cylindrical cells with elongated nuclei.* In the anterior and posterior walls are two ridges which pass longitudinally, and are called the anterior and posterior vaginal columns, and also numerous transverse ridges and projections, and microscopic papillæ. The first form tubercles of 1–3 millimeters in diameter, which are partly flattened and partly by being united irregular in form. The transverse ridges are quite prominent and their free edges are notched, or warty prolongations may be seen which become less as the lateral walls are approached. Simple and compound vascular papillæ abound under the epithelial layer, both upon the ridges and in the depressions between them. They are from 0.1 to 0.3 of a millimeter in height. Those found on the vault of the vagina for the most part contain simple capillary loops, while lower down near the orifice the compound papillæ contain anastomosing capillary loops derived from the larger branches of the submucous tissue. The veins originate in the capillary network of the centre of the papillæ, pass into the submucous tissue, and developing into a plexus in the columns give their lower portions the appearance of a cavernous tissue. The veins form meshes in the longitudinal axis of the submucous tissue, their larger branches penetrating the muscular layers, and forming about them the vaginal venous plexus. Into this plexus numerous large veins from the bulbs

* Von Preuschen, *Virchow's Archiv*, Bd. 70.

of the vestibule and of the labia empty, and the whole converging to form two trunks which pass in the posterior wall by the side of the vaginal arteries.

But little is known of the lymphatics of the vagina. Loewenstein has described dilatation of the lymphatic vessels, and Chénevière, when referring to my report of cystic colpohyperplasia, expressed the opinion that there were lymph spaces in the vaginal mucous membrane concerning which very little was known.* Again, Spiegelberg asserts that the cysts alluded to are really dilated lymphatics, and Klebs comes to the same conclusion after an examination of their endothelial lining.

Still more controversy has arisen concerning the existence of glands in the vaginal mucous membrane. A number of investigators, *e. g.*, Robin, Tyler Smith, Mandl, Rokitansky, Langer,† Klebs, and others, could find no trace of glands. On the other hand, Preuschen has described vaginal glands containing ciliated epithelium in their cavities, and numerous layers of pavement epithelium in their excretory ducts. Lebedeff also concludes that there must be glands in the vagina, even though their number be small, from the occurrence of vaginal cysts lined with cylindrical epithelium.‡ But Eppinger believes that the depressions in the vaginal mucous membrane may have their orifices occluded, and thus be mistaken for glands, and are merely stages of development of epithelial masses. Loewenstein, Litzmann, Henle, and Birch-Hirschfeld saw glands with a circular base and a central depression, sometimes alone, and sometimes arranged in transverse rows; they were particularly numerous in the vaginal vault. Hennig found mucous follicles in the upper part of the vagina in an adult and in an infant.§ Ruge denies the existence of either glands or follicles under normal conditions. The most recent writer on this subject, Heitzmann,‖ considers the unusual occurrence of glands in that part of the vaginal portion covered with pavement epithelium, and of simple glands in the

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* *Archiv*, IX, 356.

† Handbuch, 1873.

‡ *Zeitschrift für Gynäcol.*, Bd. VII, 1881.

§ *Archiv*, XII, p. 488.

‖ "Spiegelbilder der gesunden und kranken Vaginal-portion und Vagina," part I, Vienna, 1883.

vagina in a normal condition, to be evidences of defective retrogressive metamorphosis. Originally the epithelial lining of the whole genital tract was a single layer of cylindrical cells, throughout the entire extent of which there were rudimentary glands in the form of simple inversions decreasing in number from above downward. Heitzmann also thinks the observations of all the authors quoted above to be correct, for all these gland-like bodies, closed follicles, depressions, and real glands actually occur. The latter are most frequently seen in the vaginal vault in young subjects, where they have the form of simple club-shaped inversions. They are lined with a single layer of cuboid epithelium, which sometimes may approach the cylindrical form, but which never become ciliated. Moreover, at an early stage in the development of the vagina gland-like inversions may be seen upon its surface; later on these enlarge and, at the age of puberty, perhaps some five or ten per cent. of them have become perfect glands of the simple or compound variety, which are lined with a single layer of cylindrical epithelium.

As the superficial epithelial layer of the vagina is similar to that of the lips, of the mouth and of the œsophagus, it becomes useless and desquamates, and the normal vaginal secretion is composed of epithelial cells, mucous corpuscles, débris and rod-shaped bacteria; in catarrhal conditions, the above components with the addition of the *bacterium trichomonas vaginalis.* Heitzmann could never find the parasite, it is true, but different authors, among others Scanzoni, Kölliker, and myself, have been convinced of its presence in this secretion. It may be long, round, or biscuit-shaped, has from one to three delicate processes or prolongations, and is provided with a rigid, thick, tail-like appendix. Its movements are at times very active. Scanzoni first found it in pregnant women; afterward in more than one-half of all those who had either a simple or a virulent discharge, but never in the perfectly normal vaginal secretion. The normal secretion is very slight, serves to keep the surface smooth, and is either quite clear or somewhat milky in appearance. The reaction is always more or less acid.

The vaginal nerves are derived from the sympathetic and from the pudendal plexus. Connected with them are isolated

ganglion cells which in the rabbit and dog pass directly over into a sub-epithelial network, the fibres of which then form a mesh about the epithelial cells (Breisky).

While there exists much difference of opinion among authors regarding the character of the vaginal mucous membrane, there is even greater concerning its muscular coats. Henle, Klein and Frey maintain that the internal layers are longitudinal, the external being transverse and circular; Luschka, Eppinger, Toldt, and Breisky found the internal layer to be transverse, the external longitudinal, and *vice versa*, if one of the columns be cut across, particularly the anterior column. The muscular layers are intimately connected with the mucous coat.

External to these is a loose, fatty and vascular connective tissue.

The connections between the vagina and adjacent organs are most intimate in its inferior portions, with the urethra anteriorly and with the perineum posteriorly. The union is less firm higher up, as it approaches the bladder, and for some three or four centimeters (1.2 to 1.6 in.) above the navicular fossa in the direction of the rectum, a loose connective tissue being interposed between the uterus, bladder, and vagina, while the peritoneum passes down the posterior wall to the level of the external os uteri. Laterally, at the base of the broad ligaments, the vaginal tissues are also partly covered by a reflection of the peritoneum. Close beneath the margin of the latter, the ureter descends by the side of the middle third of the vagina, and, still lower, the vascular cellular tissue of the pelvic diaphragm also furnishes some support to the vagina. If we except the soft parts of the pelvic floor upon which the vagina lies, and the ligaments which sustain the uterus, we have this organ held in position by its connection with the urethra, the bladder, the rectum, the pelvic connective tissue, and the peritoneum. Its connection with any of these structures is so limited in extent, that we have an explanation of its remarkable mobility and distensibility.

Still another structure remains to be mentioned in connection with the vaginal walls, one which has claimed the attention of gynecologists only recently, viz., the Wolffian ducts, also known as Gartner's canals from a Danish author who described them.

These remnants of the bi-sexual structure were first pointed out, in the year 1681, by Malpighi in the uterus of the cow.* Gartner, knowing Malpighi's discovery, in 1822 gave illustrations and wrote an exact description of the canals which have since borne his name. Kobelt stated in his well-known work that the excretory ducts of the Wolffian bodies in the female underwent a retrograde metamorphosis throughout their entire length, and that their lower extremities completely disappeared. Beigel, however, found that a part of the Wolffian bodies and what appeared to be the well-preserved duct invariably remained.† G. Veit discovered a connection between such ducts and some vaginal cysts. Kölliker confirmed Beigel's observations, and Freund stated that there could be found upon the urethral ridge, about three-quarters of a centimeter ($\frac{3}{10}$ in.) above the urethral orifice, a shield-like spot resembling a cicatrix and entirely without folds; this was the orifice of the Wolffian ducts. This view was substantiated by Freund's case of vaginal cyst in which a tube lined with cylindrical cells and passing upward at the side of the vagina was found to open at this point. J. Veit and M. Graefe also had cases of vaginal cyst—the latter, one with dermoidal contents and lined with pavement cells—which they regarded as originating in Gartner's canals.‡

This was the view generally held by the profession when Kocks made the announcement that in eighty per cent. of all adult females he had found two little canals, one-half to two centimeters ($\frac{1}{5}$–$\frac{4}{5}$ in.) long, opening from two small papillæ situated before the hymen and just behind the border of the urethral orifice, or even in the border itself; and these he held to be the ducts of Gartner, the analogues of the caput gallinaginis of the male.§ In infants he found them small and narrow, and believed that they widened at puberty. In a case of defective vagina he found the right canal, which has usually closed, opening into the vagina. This was first confirmed by Boehm, who at the same

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* Dohrn, *Archiv f. Gynäcol.*, XXI, p. 328.

† *Med. Centralblatt*, 1878, No. 27.

‡ *Zeitschrift f. Gynäcol.*, 1882, vol. VIII.

§ *Archiv f. Gynäcol.*, vol. XX, p. 487.

time called attention to the common blennorrheic affections of these canals, which appeared in virgins and the deflorated as a peculiar form of urethritis.* Kleinwächter also supported this view.† But the more recent observations of Dohrn, who is especially qualified to decide the matter, have led to a different conclusion.‡ He found in the human embryo, at the middle of pregnancy, that the duct of Gartner terminated in the substance of the uterus at that point where the internal os would later appear. From this point the duct passed downward into the concentric muscular layers of the uterus, remaining, however, on the outer edge of these layers, and passing below internally and anteriorly to the vault of the vagina. The lumen was of variable size, its course very irregular, spiral, or in loops, but always inside the uterine tissue and toward the vagina. The wall consisted of firm fibrous connective tissue lined with an epithelial layer which was often separated from the membrane beneath it. It passed thence into the concentric layer which surrounds the roof of the vagina, being embedded in the anterior wall, more externally above, more toward the median line below. The lower the canal passed, the more its walls united and disappeared, so that Dohrn was unable to follow it to the urethral orifice in a single embryo. He also made numerous transverse sections of the urethra at the spot designated by Freund and Kocks, but was unable to find the ducts of Gartner. Isolated lumina were to be found in all sections, but when they were compared with the next section they proved to be simple inversions of the vagina or urethra. These are the lacunæ recently described by Robert, Cadiat and Oberdieck. This disappearance of Gartner's canals toward the urethral orifice resulted from distention with stretching and thinning of the urethro-vaginal septum, which occurred during the growth of the embryo.

The most recent investigations of Geigel § agree with the above

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* Wien, *Archiv f. Gynäcol.*, XXI, 176.

† *Prager med. Wochenschrift*, VIII, 9, 1883.

‡ *Archiv*, XXI, pp. 328–345.

§ "Ueber Variabilität in der Entwickelung der Geschlechtsorgane beim Menschen," Würzburg, 1883.

to the extent that he was unable to trace the Wolffian ducts to their lower extremities, and that he found the left tube obliterated to a much greater extent than the right. Geigel found not a single trace of the Wolffian ducts either in the uterus or its appendages; moreover, he represents in Fig. 4, plate i, the sections of the two divided Wolffian canals in the region of the urethra, not anterior to, but laterally and behind the section of the vagina. In short, it appears from the above that these structures must be still more thoroughly studied, and that their location is probably more variable than Dohrn seems to believe.

1. Simple Atresia of the Vagina.

Atresia, the complete closure of the vagina, may be congenital or acquired, simple or complicated. In 300 cases of atresia of the female genital organs, Puech found this defect to exist in the vagina 99 times.

Congenital atresia may be complete, so that in place of the vagina there will be found only a band of connective tissue formed by the union of the ducts of Müller. One such case, associated with malformation of the labia, has been described by Otto; others by Maisonneuve and Lachowicz. One portion of the vagina may be an open canal, and the other a firm band. This narrowed portion may be directly below the uterus, as in Otto's and Kussmaul's cases, or directly behind the introitus, or at both vaginal orifice and os uteri, as in cases reported by Fuerst and the writer. The intermediate impervious portion is firm, thick and membranous, or thin and membranous similar to the hymen—membranous atresia of the vagina. If the septum be incomplete, we may find perforations in it; these may be cribriform openings, or the membrane may have the form of a ring, a crescent, or a simple band. I once found a remnant of a septum in the form of a firm band as thick as the finger, passing diagonally from the vaginal vault to the introitus, in a woman who had been repeatedly confined.

As the consequences and symptoms of congenital and acquired atresia are similar, we will describe them together. Acquired vaginal atresia may exist in any portion of the vagina, at times in

the form of membranous adhesions, again, as a firm, broad union.* It is not always complete; there may be small orifices in the membrane through which a sound can be passed. These openings may be covered by some part of the cicatricial tissue so that they are very difficult to find.† If the atresia be high up in the vagina it may distort the vaginal portion and os uteri in such a way that these cannot be recognized. As the smallest openings suffice for conception, this condition is even found during gestation.

Symptoms.—Congenital atresia extending the entire length of the vagina is generally associated with an undeveloped uterus, so that there is no accumulation of obstructed secretions in these cases.

In partial atresiæ which are usually situated in the lower third of the vagina, such an accumulation is probable. Breisky reports two cases, in which, in new-born children, a very thin membranous septum extended across the vagina just behind a well-formed hymen; this membrane was colorless and transparent, and was arched forward and distended whenever the child cried. In one case the tumor was as large as a cherry, and on the third day a quantity of thick mucus clouded with large masses of vaginal epithelium was evacuated from it. The character of the membrane, its ephemeral existence, and complete disappearance after rupture from the abdominal pressure, indicate that such cases are examples of a simple adhesion of folds of the mucous membrane behind the hymen. Breisky observed a firm septum posterior to the hymen in a virgin fifty-four years old, under treatment for sarcoma of the uterus, and expresses the opinion that some cases of so-called double hymen are of this character.

Fischel has very recently described an extensive vaginal atresia in a married lady, twenty-seven years old, associated with good development of the genital canal, but with no hematometra. Both she and her husband had noticed an obstruction to cohabitation; they had been married more than five years. The urethral orifice was distended and funnel-shaped, the posterior por-

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* Atlas, plates xxix and xxx, Figs. 1 and 2.

† Marion Sims, "Clinic. Uterine Surgery," etc., p. 263.

tion of the hymen was wanting, and for some time she had been subject to nervous headache, formication in the hands, and an annoying sense of weakness.*

The symptoms of vaginal atresia are usually manifested about the time of puberty, their intensity depending upon the general condition of the individual. If the patient be weak and chlorotic there will be simply an accumulation of mucus, for, on account of the amenorrhœa, no blood is thrown out from the uterine mucous membrane; if, however, the person be strong and vigorous, so much blood accumulates in a few months that the vagina will become distended and lengthened, lifting the bladder and rectum either out of position or compressing them. In a case reported by Ponfick in which the vagina was closed near the vulva, and contained over a quart of blood, only the upper part and the cervix were distended.† The occurrence of an eccentric hypertrophy of the vaginal walls under such circumstances has already been mentioned. Internally, the surface is not always smooth, but may continue to show folds in spite of the very considerable distention. If the accumulation does not cease, the atresia being thin and membranous, a spontaneous rupture may occur, not invariably externally through the obstruction but also through the rectum, thus leaving the atresia intact.‡

The changes produced in the uterus and tubes, the character of the blood, its source and quantity, will be considered in connection with atresia of the uterus.

There is, finally, a class of cases in which there is only a shallow depression or pocket under the urethral orifice and within the vulva; this is usually associated with a solid uterus, and consequently there is neither hematocolpos nor hematometra. I have seen five cases of this kind. The symptoms here depend upon the relative growth of the ovaries and Fallopian tubes, and may be very severe if these are well developed, causing the patients to seek relief in an operation; or, if poorly developed or wanting, the individual is annoyed simply by the absence of

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* *Prager med. Wochenschrift*, 1883, No. 12.

† "Beiträge der Ges. f. Gebh., Berlin, 1873, II, p. 97.

‡ Schaible.

menstruation, or if married, by sterility. Occasionally patients suffer from dysuria caused by the dilatation of the urethra in coitus. This dilatation, the urethra taking a function of the vagina, may be so great that, though not associated with incontinence of urine, two fingers may be readily introduced, as in Säxinger's case. I have repeatedly examined two such patients.

Diagnosis.—As soon as dysuria appears in children, whenever they cry during and after urination, or press violently in order to evacuate the bladder, the external genitals should be examined, the nymphæ drawn apart, and the stream of urine and its direction observed, the orifice of the urethra being separated from the border of the hymen by introducing the point of a sound. The hymen is then examined with the sound, the latter being introduced into the vagina to detect any obstruction. In atresia of the lower portions, the seat of the obstruction and its bulging forward from retained secretion, may be found without difficulty. If the sound detect an obstruction higher up in the vagina, the finger must be introduced into the rectum to determine whether there be any tumor in the pelvis. In examining adults, attention should be paid to the characteristic symptoms; as to whether they appear every four weeks with increasing severity, and as to whether menstruation has ever occurred. The detection of a tumor, the presence of which is recognized by the patient herself, is very easy, and if the finger be introduced into the vagina, the septum may also be felt. The questions to be decided are, as to the situation of the septum, and its dimensions. For this purpose a catheter should be introduced into the bladder, its contents evacuated, and the instrument left in position; the index finger of the right hand is then passed into the rectum, and, the catheter being held with the left hand, the whole septum between the bladder and rectum is carefully examined. If the atresia be far up in the vagina, one finger should be placed in the latter and against the membrane, the other in the rectum, when, by exerting moderate pressure upon the tumor, the thickness of the septum may be known. But there are cases of several atresiæ, one above the other, in which, above the lower septum, there will be an accumulation of mucus, and above the upper one, of blood, *i. e.*, hematocolpos and hematometra. Such

cases have been described by Steiner, Charrier, and Thompson. In acquired atresia, the history of the case will reveal a trauma or inflammatory process occurring during the puerperal state, or at some other time, and cicatrices resulting therefrom will usually be found. In rare cases ulcerative or inflammatory processes may occur in these parts even in fœtal life.

Atresia will be differentiated from stenosis of a serious nature by the passage of mucus or blood through the latter from time to time, but the openings may nevertheless be very difficult to find.

2. Lateral Atresia of the Vagina.

When the original septum of the vagina, which disappears from above downward, remains, and is associated with a complete septum in the uterus, we not infrequently find one or the other half of the uterus and vagina closed, thus furnishing the conditions necessary for the formation of a retention tumor, hydro- or hematocolpos, and hydro- or hematometra. This tumor is lateral. The condition was first described by Holst,* later by Veit, Simon, Schroeder, and many others. The occlusion is usually of one half of the vagina. In 46 cases noted in recent literature, 35 were of this character, the half of the uterus being occluded in 11 cases only.

Atresia of both sides is very rare. Breisky gives Neudörfer's case as an example in which an original bilateral atresia was relieved by spontaneous rupture, first of the left side, and then of the right into the left through the uterine septum. According to Puech's observations unilateral atresia is much more frequent upon the right side (20 to 8); this was the fact in a case of mine. In the majority of cases the physician is consulted by young women on account of suffering which increases with each menstrual period; upon examination an elastic tumor is found upon one side of the vagina. These tumors vary in size and form (see *Hematometra*), and have opening into them the os uteri, which is high up in the vaginal vault and distorted. If the menses occur unusually late, and are scanty, the symptoms may be very slowly developed, so that years may elapse (in Holt's

* "Beiträge z. Gyn. u. Gebh.," 1, Tübingen, 1865, p. 63.

case, 10 years) before a physician is consulted. The prominent symptoms are catarrh of the unobstructed half of the uterus and vagina, dysuria, increasing feeling of weight in the pelvis, and at times during the menstrual period the most violent pain. Schroeder has shown that this condition is most likely to be confounded with periuterine hematocele; but these affections may be easily differentiated by remembering that the retention tumor is not situated directly before or behind the uterus, but at its side, and that it is not of sudden origin, and hard and uneven, but of gradual growth, and cylindrical and elastic. Moreover, anteuterine hematocele is extremely rare.

Spontaneous rupture of simple vaginal atresia occurs in about 1 per cent. of cases, but in about 10 per cent. of cases of unilateral atresia; the uterine septum is ruptured quite as often as the vaginal. The first variety of rupture, as Breisky has shown, does not usually result in immediate cure, but is followed by a lateral pyocolpos and pyometra caused by retention of the fluids in the vaginal cul-de-sac, and purulent catarrh of the dilated portions of the vagina and uterus, which in turn leads to increased dilatation. This process finally causes a new rupture through a thinned portion of the uterine wall, and the same changes are repeated. The pus becomes putrid, ulceration of the inner surfaces of the uterus and Fallopian tubes follows, and death resulting from pelvic peritonitis and exhaustion.*

Lateral pyocolpos may also follow incision of the vaginal sac, provided the opening be too small, *e. g.*, Braus's case.† In one case reported by Breisky himself, the left-sided lateral pyocolpos, from a congenital rudimentary vagina, had not been preceded by a hematometra.‡

According to Veit, the unobstructed portion of the vagina in unilateral atresia may be recognized by its position with regard to the tumor, and by a crescent-shaped orifice, with its concavity toward the closed side. In my cases, this was not particularly characteristic. The walls of the sac are subject to variations in

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* See cases by Wrany, Rokitansky, and Breisky, *loc. cit.*, p. 32.

† *Berliner kl. Wochenschrift*, Nos. 10 and 11.

‡ *Archiv f. Gynäcol.*, Bd. VI, pp. 89–102.

tension, partly from a decrease of the contained fluid by absorption during the intermenstrual intervals, and partly resulting from contractions of the walls.

If any doubt exist as to the dimensions or origin of the tumor after it has been incised or punctured, these questions may be decided by a microscopical examination of the material obtained by scraping out the sac with a curette, and the discovery of vaginal epithelium. In lateral pyocolpos pressure upon the tumor will evacuate more or less putrid pus through the os uteri and vagina.

Finally, other tumors originating in the uterus or ovaries, *e.g.*, myomata (Breisky's case), or a cystoma or sarcoma may be mistaken for lateral vaginal atresia and hemato- or hydrocolpos. An exploratory puncture or incision will determine the diagnosis in such cases.

The prognosis is good, as long as the accumulation of the secretion is confined to the uterus and vagina. Unfortunately, such cases are rare, for usually the distention extends to the tubes, and then there is danger, for rupture of the tubes is very liable to follow the most careful evacuation of the hematometra (*e. g.*, cases of Ponfick and others).

Rupture is most frequent in unilateral hematocolpos, as has been proven by Puech. My own case unfortunately resulted fatally from this accident.

It is, in a great measure, due to the fact that in such cases the affection is far advanced before a physician is consulted.

Treatment.—After a vaginal atresia has been recognized, the first question in regard to the treatment is, as to whether there is a retention of secretion or not. If there is not, but if the atresia is associated with a normal uterus as ascertained by examination per rectum, its incision is indicated when the symptoms render the patient uncomfortable, even though no retention tumor be yet developed. Fischel has considered this condition in detail. Acting in harmony with this view, I once incised an acquired atresia of the middle portion of the vagina, originating after the puerperal period. Upon puncture of the septum, at first only a tablespoonful of thick mucus was evacuated. The incision was followed by dilatation of the constricted canal with

gentian root, and the result was favorable. In 1882, I performed a similar operation, with good results, upon a woman who had had one child, had previously menstruated normally, but later, probably in consequence of an infectious colpitis, suffered from an extensive atresia of the upper part of the vagina, not attended, however, by any considerable hematocolpos, though the atresia had existed for several months.

But if neither the uterus nor ovaries can be reached through the vagina or rectum, the formation of an artificial canal will be of no benefit, for it cannot be kept open, and will not lead to any evacuation.

Two patients of this kind whom I treated in Rostock, had Basedow's disease, in addition to the atresia; in these cases, as the patients suffered much, I took great pains to establish and keep open an artificial canal to the uterus, thinking that perhaps there might be a cavity and some retained blood in this organ, which was very small and hard, but the attempt failed. If there be an atresia, with accumulation of secretion, it must be completely evacuated, and the canal kept open, so that not only the menstrual fluid may be discharged, but that conception and labor may occur.

The operative measures necessary to accomplish this are, in many respects, dangerous, directly from the possibility of injuring adjacent organs, indirectly from the probability of causing rupture of the tubes and septic infection.

Even experienced operators have injured the bladder, rectum, or peritoneum in cases in which the atresia was extensive, and the septum between the bladder and rectum very thin; he who has operated upon such cases knows how thin this septum, through which a canal must be formed, may be.

In such a case, I adopted the following method: I introduced a catheter, and evacuated the bladder; then passed the right index finger into the rectum, and around the tumor; a trocar, held in the left hand, was forced through the septum lying between the catheter and the finger. After some blood had flowed through the canula, a bistoury was passed by its side, the opening enlarged to the right and left, and the cavity evacuated as completely as possible. In this case, hematocolpos and hema-

tometra alone existed, and the large opening and rapid evacuation were attended with no danger.

If in addition to the uterus the tube be distended, the blood must be slowly evacuated, lest a too rapid discharge cause dragging upon and rupture of the tube, which is usually adherent to the adjacent tissues.

All pressure upon the abdominal walls is to be avoided, and the anæsthetic administered when the stomach and rectum are empty, to guard against vomiting and straining. The entrance of air into the genital tract and septic infection are to be prevented by attention to the position of the patient, avoiding the high dorso-coccygeal, knee-elbow, and lateral posture, and making the incision under spray with thoroughly disinfected instruments. The parts should not be examined with the finger or sound for several days after the operation.

Scanzoni and Baker Brown advised puncture of the hematocolpos through the rectum to avoid the above-mentioned source of infection, but in addition to the tendency of such a small opening to unite and the former condition result, there is always danger that gases will find entrance from the rectum into the retention sac and cause decomposition of its contents.

G. Simon, therefore, recommended incision of the tumor through the bladder, thus producing a condition similar to that in the transverse obliteration of the vagina, or where the posterior lip of the os uteri is used to close a large opening in the wall of the bladder; but it is known that stone, cystitis, and pyelitis, usually supervene, and the operation, therefore, cannot be recommended.

Moreover, the bladder has been injured with the trocar as in the case cited by Breisky, in which septic phlegmon of the pelvic connective tissue followed, and, as the new canal is kept open with great difficulty after the puncture, Breisky has recently proposed this method: Following Emmet's suggestion, he first makes a passage through the atresia by cutting into the skin with the scissors; the assistant's finger is passed into the rectum, a catheter into the bladder, and the operator's finger pressed into the wound tears apart the tissue of the atresia, only firm resisting bands being divided with the scissors. As soon as the

vicinity of the os uteri is recognized as a circular, yielding point, a long-handled lance-shaped knife, having the canula of a trocar fitted to the base of the blade by a spring, is forced through the external os, pushed forward, and an incision 1 centim. ($\frac{2}{5}$ in.) long is made on each side, thus making a wound two centim. ($\frac{4}{5}$ in.) in width; the blade is then drawn back, the canula pushed forward into the wound, and over it a branched canula introduced. Now the trocar is withdrawn, the branches of the last canula spread apart, and a fenestrated double tube of silver 6 or 7 centim. (2.3 to 2.7 in.) long, as thick as a No. 12 catheter, and perforated at its lower end, is introduced into the newly-made canal. Breisky uses a silver tube 15 centim. (nearly 6 in.) long, and which fits into one of the perforations in the head of the double tube, for the purpose of introducing the latter and for irrigating through it.

After a few days, when the uterus has retracted, the double tube is changed for one 6 centim. long and not so thick, which may be worn until after the next menstrual period.

After the first introduction of the canula, Breisky uses injections of carbolized water, places a compress wet with chlorine water upon the external genitals, gives 10 drops of wine of opium internally, applies cold compresses to the abdomen, and insists upon strict rest, and injections of a tepid carbolic solution through the canula for the first five days, twice a day, then once a day. If there be fever, give quinine internally.

If one should find a second septum above the first, as in cases described by Steiner and others, this must be incised and treated in the manner just described. The earliest reported case of this kind is probably that of Delpech.*

By this method of treatment dilatation is not made at once, but the canal is kept open simply by the canula which remains in it; later, when all danger from the hematometra has passed by, the canal may be dilated by laminaria, tupelo, etc., from time to time, a form of dilatation which will be assisted by cohabitation.

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* "Mémorial des Hôpitaux du Midi et de la Clinique de Montpellier," Août, 1830, ref. in Froriep's Notizen, Bd. 28, p. 240, October, 1830.

Other Malformations of the Vagina.

(A) *Absence of the Vagina.*

Complete absence of the vagina includes those cases in which no band-like atresiæ can be found, and in which the septum between the bladder and rectum is so thin that scarcely a layer of connective tissue can be recognized, still less the muscular rudiments of a vagina. This occurs only in connection with a defect of the vulva or uterus. Such cases have been reported by Dupuytren, Samter, Ramsbotham, Rossignol, Ebert, and others. Recent authors have observed the above definition, but since all cases have not been anatomically examined, the diagnosis of some remains in doubt. Rossignol found the breasts rudimentary, form slight, the face infantile, and venereal desire absent. Cunningham confirmed the diagnosis of absence of the vagina by an autopsy.

(B) *Abnormal Narrowness and Shortness of the Vagina.*

Women or girls who have reached the age of puberty may have an infantile vagina associated either with a fœtal or infantile uterus. Scanzoni measured some vaginæ with a diameter of 4 and 4½ lines; in the last case the vagina was so narrow that only an ordinary hollow sound could be introduced; the first admitted a metal catheter. G. Veit reports similar cases. These stenoses may be partial either in a single part, or more rarely in several, and of slight extent; they then appear as crescent-shaped, diagonal, or spiral ridges. Most of them probably originate, as do congenital atresiæ, in a fœtal inflammatory process. They may also resemble a second hymen, when in the form of a transverse membrane having several openings and situated just above the hymen. Murphy saw such an one in a bride. The inflammatory origin is probable in such cases as Beigel's, in which, in a married woman of 23 years, with a normal uterus, the vagina would admit nothing larger than a uterine sound, and its walls were unusually firm and thick. The patient was sterile; there was congenital malformation of the pubes, and the vulva was remarkably small, though the mammary glands were well developed.

Slight stenoses are no impediment to coitus and labor, as a rule not even requiring incisions; but coition is impossible in well-marked cases, or if the individual has conceived, the progress of labor is so interfered with that rupture of the vagina may occur.

(C) *Double Vagina.*

Previous to 1830, Ph. Liepmann found in thirty-two cases of double uterus and vagina only two cases, reported by Callisen and Morgagni, in which the vagina alone was double. In such cases there is persistence of the septum between Müller's ducts, the disappearance of which from above downward is generally complete in the twelfth week of embryonic life. This septum may be median or lateral, the halves of the vagina being of equal size, or one narrower than the other.* The cause is to be found in the abnormal congenital stenosis and small size of one half, and, according to G. Veit, in cases of single uterus only that portion of the vagina is suited for coition which is not connected with the vaginal portion. The hymen is also usually double, and the columnæ rugarum poorly developed.†

If the septum be complete above or below, we have a *vagina septa supra* or *infra simplex.* The incomplete forms show the septum in the form of a low ridge. A vaginal portion may exist on each side. In one case of double vagina and single uterus, reported by Dunglas, the upper end of the septum was attached to the side of the cervix. In another case the hymen was single, the septum beginning one millimeter ($\frac{1}{26}$ in.) behind it and extending the entire length of the vagina. Here the uterine orifice was double, the uterus single, and the halves of the vagina unequal.‡

The septum often is so thin and distensible that one-half of the vagina is dilated at the expense of the other.

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* See plate XXV, in the Atlas.

† Foerster, Missbildungen, plate XX, Fig. 11.

‡ Corazza, *Schmidt's Jahrbücher*, CXLVIII, 148.

(D)

Finally, it is worthy of remark that there may be inversions or prolongations of the vaginal mucous membrane which extend into the muscular layers, or even into the paravaginal connective tissues. These are partly congenital inversions of one vaginal wall, or they are cases of unusual widening and lengthening of the mucous lacunæ situated at the sides of the columns of the vagina. One must be careful not to mistake them for a double vagina, or for the walls of a rudimentary vagina. They have thin, smooth walls, and may be several centimeters long, *e. g.*, in Breisky's two cases, three to four centimeters. Breisky found a narrow passage of this sort in an elderly maiden lady, which he was obliged to open on account of symptoms caused by retention of mucus; and a second similar case in a woman in the last half of pregnancy. I have repeatedly seen such pockets, but always in women with relaxed vulvæ, and who had given birth to several children; and here it seemed to me there must be some connection between the development of the lacunæ, the increased mobility of the vaginal tissue during pregnancy, its distensibility during labor and subsequent involution.

Ætiology.—*Acquired stenoses* generally result from puerperal processes, and in particular from ulceration consequent upon injury received from instruments used during labor. Infectious colpitis and gangrenous or diphtheritic ulceration may be causes; also, trauma, *e. g.*, a fall upon the corner of a chair or table, etc.; cicatricial strictures resulting from wearing a pessary too long, the mucous membrane growing around and over it, as I have seen in five or six cases; severe cauterization with the actual cautery, galvano-cautery, or strong acids may likewise originate stenoses. Finally, not infrequent causes are cholera,* typhus, variola, erysipelas, acute exanthemata and particularly syphilitic ulceration, puerperal phlegmon, paracolpitis, and adhesive colpitis in children and adults. Stenoses from partial or total destruction of the external genitals have been observed by Müller, Sims, v. Franque, and Holst; usually the upper part of the middle

* Ebell, "Beiträge z. Gebh. und Gynäcol.," 1, 2, pp. 51 and 62, 1871–72, with the literature of the subject added.

portion is affected, as in the patients of de la Garde and Schoen. When occurring high up in the canal the stenosis is liable to be utero-vaginal. The bands of adhesion which fix the vagina are the result of ulcerative processes.* Very extensive alterations of this character may recur during gestation. The vagina may be occluded by a membrane having in it several perforations,† or the stenosis may be either single or multiple.‡

Congenital stenosis results either from arrested development of Müller's ducts, from intra-uterine inflammatory processes, or from the adhesive colpitis of young children, as the latter may run its course without the appearance of grave symptoms.

The *prognosis* of congenital and acquired stenoses is better than that of atresia, for they cause no accumulation of the secretions, and many of them give way during labor. Van Swieten reports the case of a girl sixteen years old, with such stenosis of the vagina that the handle of a pen could scarcely be introduced, who nevertheless married and gave birth to four children.§ Breisky saw a stenosis which was an obstruction to labor, but which was overcome by natural forces, and recurred after labor.‖ Evory Kennedy in one case dilated a stenosed vagina with sponge tents to permit coitus, which was followed by normal pregnancy and labor; in another case, however, a crescentic membranous stenosis led to fatal rupture of the uterus.¶

Treatment.—A short and narrow vagina should be dilated with tents of gentian, laminaria or tupelo. Bands of adhesion are to be incised if they interfere with labor, or, if necessary, pieces of them may be excised with antiseptic precautions. Septa must be doubly ligated and divided. Dieffenbach reports the case of a woman with acquired stenosis of the vagina, resulting from labor, whose bladder was incised by one physician, the rectum by the second, and whose vagina he reopened, without, however, curing the vesico-vaginal fistula. The vagina must be

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* Fig. 2, plate 8.

† Jarjavay and Trelat.

‡ Netzel's case, *Hygeia*, April, 1868.

§ Breisky, *loc. cit.*, p. 54.

‖ *Loc. cit.*, p. 61. E. Martin, "Beiträge d. Berliner Gebh. Gesell.," 1, 3, 62.

¶ Breisky, *loc. cit.*, pp. 54, 55.

thoroughly disinfected after any incision, and tampons of antiseptic material introduced, to be followed by dilating agents also saturated with such a solution, to prevent reunion of the parts. R. de Latour cured two cases of vaginal stenoses within eight days by progressive dilatation of the genital canal, beginning with bougies 2 millimeters ($\frac{1}{13}$ in.) in diameter.* Sitz-baths, injections, cocoa-butter suppositories, subsequent incision of bands, and the use of sutures are often just as necessary to prevent reunion as is the removal of the cause of the original stenosis.

Still another malformation of the vagina remains to be noticed in this connection, viz.: abnormal congenital union between the vagina and a neighboring organ so that the contents of the latter are evacuated into the vagina.

(E) *Congenital Cloaca of the Vagina.*

We have already alluded to the fact that many malformations of this nature have been incorrectly regarded as anomalies of the vagina, while really the condition was that of persistence of the uro-genital sinus. There is, however, a congenital *atresia ani vaginalis, i. e.*, an occlusion or absence of the external anus, and an opening above the hymen into the vagina through which the contents of the rectum are evacuated. This condition or anomaly was first described, in 1719, by Jussieu; then observed by van Swieten, Mercurialis, Boerhaave, and Morgagni.† The causes may be classified as fœtal inflammatory conditions, abnormal pressure, and hereditary predisposition, as this anomaly has been known to occur repeatedly in the same family. It is a rare affection, for Bednar saw only one case among 7154 girls in his foundling asylum, Collins one among 16,654 children in the Dublin lying-in-hospital, Moreau saw it but four times during 40 years' experience at the Maternité, and I do not recall a single case among 12,000 children during my service as director of the Dresden hospital. If the anus open underneath the hymen, the condition is known as *atresia ani hymenalis vestibularis*

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* *Presse Médicale*, XXIII, 40, Sept., 1871. *Schmidt's Jahrbücher*, 155, 170. See author's publication in the *Deutsche Klinik*, 1867, No. 29.

† Krieger, *Monatsschrift*, XII, p. 184.

or otherwise *superior* and *inferior vaginal atresia.** There may also be both an opening into the vagina and into the perineum, *e. g.*, cases by Kiwisch and Veit, *loc. cit.*, p. 534.

The opening into the vagina may be large or small, round, oval, or irregular; if it be large, an inversion or prolapse of the rectum into the vagina may occur, as Ammon observed in a girl seven years old. If it be not too large, it may be provided with a sphincter and evacuation occur periodically, *i. e.*, true *continentia alvi.* Such cases have been reported by Blot, Roux de Brignoles and Jobert. Ricord knew a woman of 22 years, married three years, whose rectum opened into the vagina, but evacuation occurred at such regular intervals that her husband had no idea of her condition. Under such circumstances, where the patient can retain the fecal masses and flatus, she suffers but little inconvenience and may live to old age. Not so, however, when the opening is large, for the involuntary discharge of feces renders the condition miserable in the extreme, even though by great attention to cleanliness the patient may escape serious consequences. But, as these openings above the hymen and in the vagina are smaller than normal, and in addition the rectum is drawn forward or even bent at a right angle, it not infrequently happens that very considerable fecal retention results, proceeding even to the symptoms of obstruction, stercoraceous vomiting, peritonitis and death. Guillon had a patient aged fifteen years under his charge who habitually facilitated defecation by pressing upon the perineum.†

The *Prognosis* in *atresia ani vaginalis* is, on the whole, good if the opening be not too high up in the vagina. By an operation which is attended with comparatively little risk, the condition may be permanently removed, the evacuations made to occur in the normal way, and complete continence secured, provided the anomaly has not existed too long, has caused no disease of the rectum, and is not associated with other malformations which, in any case, are dangerous to life.

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* Lotze's case: D, i, "sistens casum singularem ani praeter naturam collocati et atresiæ vaginæ." Jena, 1827, 4. c. tab. ænea.

† Thomas. "De l'imperforation congénitale de l'anus." *Thèse de Strasbourg*, 1864, p. 6.

In the surgical treatment of this affection, it should be the aim of the operator to restore the organ as nearly as possible to its normal position. Therefore, it would be highly improper to push the posterior wall of the rectum downward from the vagina toward the normal location of the anus and make an incision into it, as this would leave the vaginal fistula to be closed subsequently; the latter would heal with difficulty, the external opening be apt to remain too small, and the rectum be subjected to too much tension.

The perineum must be divided by an incision from before backward and sufficiently long to expose the lower portion of the rectum, which must then with a blunt instrument be loosened from its connections, particularly at the vaginal insertion. The vaginal connection will then be divided and the end of the intestine sutured into the middle of the perineal wound, thus providing against a narrowing of the opening; the vaginal opening is finally closed by sutures passed from the vagina.

The stitches should remain till they cut through. Easy stools are secured by administering cathartics or, if need be, by injections with the irrigator. In eleven cases of *atresia ani vaginalis* which were operated upon, according to Curling there was but one fatal result.*

After the rectum has been separated from the vagina, the opening in the latter soon becomes so reduced in size that it may be closed by cauterization. When there are narrow, fistulous canals in the perineum, they should be opened into the rectum, separated from the intestine, and the sutures passed backward to the coccyx.

Rhea Barton divided the tissues between the anal orifice and the perineum, beginning the incision at the former, and then preserved the opening in the perineum. In this method other subsequent operations become necessary and the patient is in a miserable condition until they are performed. It therefore seems better to finish all at once by an operation which really is not so complicated as may appear at first glance.

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* Esmarch, Billroth, III, vol. II, "Abth. Fünfte Lieferung," p. 40.

CHAPTER III.

DISPLACEMENTS OF THE VAGINA.

Owing to the great mobility and distensibility of the vagina, temporary displacement does not disturb its circulation or secretion, nor destroy any of its connections. When, however, a dislocation of a permanent character is produced, disturbances in these soon become manifest.

One or both walls may be displaced. As a rule, it is the anterior wall which is dislocated and, if we examine carefully into the relations of the parts, it is observed that a portion of the wall has descended into the widened lumen—that is to say, it has not only descended but is also inverted. If the inverted portion pass through the vulva, the condition is known as "inversion of the vagina, with prolapse." In order to understand the method of its production, the prolapsed portion should be returned and the patient then told to bear down. It will now be seen that the rima of the vulva is opened by the descent and advance of the vaginal tubercle, and that it is gradually followed by more or less of the anterior vaginal wall. The uterus may remain anteverted but it usually sinks somewhat lower, and finally in great inversions it is retroverted and partially prolapsed.

In displacement of the posterior wall, generally the lower or middle portion, rarely the upper, descends. In inversion of one wall the corresponding vaginal vault is obliterated.

Total circular inversion of the vagina usually begins in the vaginal vault associated with and caused by prolapse of the uterus. More rarely it results from the gradual inversion of one vaginal wall.

When a portion of the vagina has passed through the introitus and remains exposed to the air and other irritants for any time, the mucous membrane becomes paler, firmer, and its folds are effaced; it appears like cuticle from the transformation of its epithelium, and both mucous membrane and the tissue beneath become infiltrated, œdematous and passively congested. Associated with the above changes are found hyperplasia and hypertrophy of the muscular layers. Varicosities are often produced

by stasis in the vessels. In elderly patients the walls of the inverted part are very much thinned by the disappearance of the paravaginal adipose tissue, and look smooth and glossy. There may also be loss of substance in the more dependent parts near the perineum, associated with slight swelling of the adjacent parts, the wound having a secreting surface with reddened edges.

Such spots are to be regarded as *decubitus* since they are subjected to pressure and irritation in walking, sitting, and lying; subsequently they become enlarged and unhealthy looking, from dribbling of urine and difficulty in maintaining cleanliness.

Ætiology.—These dislocations result from the united effect of diminished resistance on the part of the vaginal walls and increased weight and pressure. Diminished resistance follows upon the repeated extension, relaxation and mechanical injuries associated with gestation, particularly when the pregnancies occur in rapid succession. The processes of labor permanently enlarge the lacunæ in the pelvic tissue in which the vagina lies, and its perineal supports are relaxed, thereby lessening its fixation and power of resistance. A certain predisposition is caused by injuries to the perineum which lessen the support of the vaginal walls, cause expansion of the vulva, and which, by cicatricial contraction, may even directly draw on some part of the wall. This is, however, not the only cause, nor is it so common as has hitherto been supposed.

It is obvious that anything which throws a weight upon the vaginal walls or draws down the uterus is a predisposing cause. Tumors in the vaginal wall, cysts, fibro-myomata, may exert such an influence; also anything which causes a descent or prolapse of the uterus. Under the circumstances last mentioned the dislocation of the vagina is secondary. In this way it may be inverted by pressure from any of the other pelvic organs, *e. g.*, the bladder, the rectum, the ovaries, and also by tumors in Douglas's cul-de-sac; but even here the vaginal walls do not usually give way unless their connections have been weakened.

In the great majority of cases the vaginal displacement is the primary affection, and the dislocation of adjacent organs secondary. It has been asserted that anterior vaginal hernia might

become so great that the vaginal wall would be loosened from the bladder and urethra, but this can occur only under such circumstances as exist in prolapse of the uterus; such a primary separation of the entire wall cannot be brought into harmony with known facts (Breisky).

A. Inversion of the Anterior Vaginal Wall, with Vaginal Cystocele.

Vaginal cystocele is an inversion of the anterior vaginal wall in connection with the pulling down or descent of the posterior wall of the bladder, usually at its lower portion. This portion is pushed forward under the urethra which finally becomes S-shaped. It is generally situated in the median line, but may appear on either side. The wall of the bladder is subject to the changes peculiar to the vaginal wall, the inverted portion becoming œdematous, hypertrophic, etc. The tumor thus formed may reach the size of a child's head, when the greater part of the bladder has escaped from the pelvic cavity, but usually the greater part of the organ remains behind the pubic symphysis.

Cystocele is easily recognized as a yielding, elastic tumor which is readily reduced but instantly reappears from pressure. The catheter cannot be introduced in the usual manner, but its concavity must often be directed downward and posteriorly until the point enters the tumor between the labia majora. Then the handle of the instrument may be turned around, and it is often possible, without reposition of the cystocele, to demonstrate a cavity behind the symphysis.

Women with cystocele generally suffer with dysuria, though not invariably; in addition to this there are the symptoms peculiar to inversion of the vagina. Some cannot pass their urine until they have reduced the cystocele with the finger; others incompletely evacuate the bladder, retaining the urine in the portion which has descended into the vagina, and hence a cystic catarrh may result, though this is uncommon. If the muscular coat of the bladder becomes affected, retention of urine will result, the patient complaining of pain in the region of the kidneys, and in the epigastrium, of nausea, anorexia, etc. Concretions may follow or be associated with the catarrh. In a cystocele of this

kind in a patient eighty years of age, F. Tolet found five stones; Ruysch found forty-two stones in the bladder of a patient eighty years of age. The alkaline fermentation which accompanies catarrh of the bladder promotes the formation of phosphatic concretions; numerous such concretions were found by Eyster and Galabin in cases of cystocele, and in that alluded to above, one of these seems to have perforated the wall of the bladder, passing toward the vagina. It is also obvious that the cystocele will increase in size from accumulation of urine. Scanzoni believes that cystocele in young girls may be caused simply by the protracted retention of urine; this I doubt, however, for I have never met with such a case. Cystocele may appear during the puerperium, especially in poor women who are obliged to work hard soon after delivery. Such cases are represented in the author's Atlas, Plate xvii, Fig. 1, p. 118, and Plate xix, Fig. 2, p. 224; the thickening of the walls of the vagina and bladder could be seen with the naked eye, also the numerous vessels upon section.

In one hundred and eight cases of prolapsus of the uterus met with in the polyclinic, I found cystocele fifty-four times, and rectocele only thirty-three times.

The prognosis of vaginal cystocele is not unfavorable; it may be cured by an operation with comparatively little risk. Palliative treatment by means of a pessary is sometimes advisable, though the instrument is liable to cause disagreeable results. But if a cystocele be neglected it may gradually produce disease of the kidneys or wasting of the ureters, thus placing the life in jeopardy. I had such a case under my care in Rostock, in April, 1871; the patient, with irreducible incomplete prolapse of the uterus, died on the day after her admission, from nephritis, hydronephrosis, uræmia, and proctitis. Similar cases have been cited by Froriep, Virchow, C. Braun, Phillips and Barker.

Treatment.—*Prophylaxis.*—The avoidance of great exertion of any sort during the puerperium, confinement in bed after delivery, if necessary even for weeks, the treatment of perineal lacerations and constipation. Predisposing catarrh and relaxation of the vagina should be treated with astringent injections,

cold-water injections, or tampons and suppositories prepared of cotton and of cocoa butter, and saturated with some astringent solution. Remedies useful for this purpose are, lead water, decoction of oak bark (10 to 250), tannin, alum, aluminate of copper, sulphate of copper, sulphate of zinc, extract of rhatany and kino. These may be pulverized and applied upon cotton, but then they act powerfully upon the tissues and cause much pain; they are, therefore, best used in the form of ointment, 1 to 25, or 1 to 15 of vaseline, which may be spread upon cotton; or 15 to 38 grains of the remedy may be dissolved in about a quart of warm water, and used once a day as a vaginal injection.

B. Vaginal Injections and Tampons.

The instruments used for vaginal injections are syringes of tin, glass, or india-rubber, siphons and funnels, the bulb syringe, and simple irrigating cans.

The use of syringes of tin, glass, and rubber is becoming less and less common, even in midwifery practice, because air is liable to enter the syringe and be forced in with the fluid, the apparatus is hard to manage and to clean, and because only small quantities of the fluid can be injected at a time, making frequent changes necessary and the entrance of air almost unavoidable. If a rubber bulb attached to a tube be used instead of a metal syringe it requires a long time to complete the injection, tiring the patient, the balloon is liable to become hard or damaged, and the fluid mixed with air.

The bulb syringe is still less worthy of recommendation. Air may easily be forced into the genital organs with this instrument, or even into the veins and heart, thus producing instant death. Hegar has recently reported such a case from the practice of a medical friend which should serve as a warning.* Moreover, the instrument is difficult to work, tiresome for the patient, and the pressure is irregular and hard to equalize. This instrument is to be rejected.

The simplest apparatus for vaginal injections are the siphon, funnel, and the so-called irrigating can. The siphon consists of

* "Operative Gynäcologie," Stuttgart, 1881.

a long tube, having on one end a hollow lead hemisphere, on the other a vaginal nozzle. The end to which the lead is attached is put at the bottom of a vessel filled with water. Before the vaginal nozzle is connected the rubber tube is filled with water, the end closed, and when it is now placed below the level of the fluid in the vessel, the flow will be continuous till the latter is emptied.

Hegar's funnel is still more simple. It consists of an ordinary glass funnel, which is inserted into a rubber tube having a uterine nozzle at the other end. The funnel when filled is either held by the patient, or placed upon a stand in such a way that the flow of the fluid can be watched.

The ordinary surgical irrigator is just as suitable. It is a cylindrical vessel, holding 3 to 4 pints; it has a bale, and an orifice below, to which a rubber tube about 3 feet long is attached. At the other end of the tube is the uterine nozzle, which is closed with a stop-cock. The nozzle is inserted into the uterus or vagina after the water has run till the air has been expelled.

Graduated vessels of glass or porcelain have been used instead of zinc, or they have been provided with a graduated tube at the side, which serves to indicate to the patient the quantity of fluid used, and to prevent the entrance of air into the tube, but such apparatus is expensive and fragile, and is practically no better than Hegar's funnel.

Injections and douches are by no means so innocent as is generally supposed, not only because inflammatory and neuralgic conditions have resulted when they were administered too forcibly, or infection has been caused by the use of apparatus which was not thoroughly cleansed, but because instant death has resulted from the introduction of air. Care and prudence are, therefore, essential in every case. It is also obvious that a very important portion of the apparatus is that which is to be introduced into the vagina. This should be 6 to 8 inches long, have an olive-shaped head in which are a number of openings not too small to be cleansed with ease, and there should be no opening directly at the end. If it is made of some substance which is covered with varnish, it must be smooth, hard, and not affected by acids. The very best are of glass, which is cheap, easy to

clean, and can be made so thick that there is no danger of their breaking.

That the injection of air into the genital organs is not the only thing to be feared has been proved by Chrobak's case, in which the patient injected an entire match into her uterus.* He had advised her to close the central opening in the uterine tube, so that the stream would not be thrown directly against the uterus, and she had done so without his knowledge in the manner indicated. Several weeks later she was attacked with violent parenchymatous metritis and perimetritis, from which she did not recover for many months. A few days after the onset of the disease Chrobak found a foreign body in the uterus, which proved to be a match. This had been forced out of the head of the tube into the uterus by the stream of fluid, and had produced inflammation. But it seems to me that Chrobak has attached entirely too much importance to the entrance of the match in this manner. It is conceivable that the head of the tube was pushed into the distended os uteri, and the match thrown forward, but that it could be forced through the cervical canal simply by the stream of fluid is hardly probable.

The object of vaginal injections is, in part, to cleanse the internal surface, wash away the secretions, and to remove exfoliated tissue; and in part to cause contraction of the vaginal walls through the influence of temperature, *i. e.*, by either very hot or very cold injections; to cause changes in the circulation and position of the vagina, or to cause contraction by the influence of a certain pressure; or, to introduce medicinal agents calculated to remove certain pathological conditions of the organ. The indications for these especial purposes will be given hereafter. We will simply mention, in this connection, that the vaginal mucous membrane has the power of absorbing medicinal agents in a comparatively short time. According to Hamburger's experiments,† the following agents could be demonstrated in the urine, in from 2 to 5 hours after injection into the vagina, viz., 15 per cent. solution of potassic iodide, 9 per cent. solution of

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* "Untersuchungen der weibl. Genitalien," p. 145.

† *Prager Vierteljahrsschrift*, vol. 150.

potassic ferrocyanide, 2 per cent. solution of salicylic acid, 6 per cent. potassic bromide, and 10 per cent. solution of lithia.

We were, however, aware of the absorbent power of the vagina before these experiments were made, for patients frequently have the taste of tannin in the mouth, following injections of this substance; salivation has resulted from injections of corrosive sublimate, and, as I have myself seen, iodism may follow the prolonged use of solutions of potassic iodide.

Such results seldom ensue from simple injections with these agents, but more frequently from intimate and protracted contact by means of tampons, etc.

Tampons, which are useful in the treatment of inversion and cystocele of the vagina, are made of fine, soft cotton, the best being Bruns', which has been deprived of its oil. They act mechanically in causing retention, and also as vehicles for medicinal agents; they should, therefore, be made of a size corresponding to the lumen of the vagina, tied round the middle with a string, one end of which should be left three or four inches long, and have a loop at its end. These tampons are then to be dipped into an astringent fluid until thoroughly saturated; as of alum, 15 to 30 grains, lead, copper, or zinc, 7.5 to 15 grains, or tannin, 30 to 60 grains to the 3 fluidounces; or, decoction of quassia, willow, leaves of butternut, kino, or of rhatany, 15 to 100. The tampons may be also dusted with the above-named agents in powder, but the action is then often too energetic. They may also be covered with ointments of vaseline or glycerine, 2, 3, or 5 parts to 75 of vaseline; made in this way, they are readily introduced.

Special instruments for introducing tampons have been devised. It affords me much amusement to recall the time when a very popular gynecologist, in a German watering-place, was accustomed to send each of his patients to her home with a porte-tampon, purchase from him, in her possession—an original and ingenious method for adding just a little profit to the customary fees of physicians at such resorts. Whether his action had a tendency to elevate the standing of the profession, the friendly reader may judge for himself. One should instruct the patient when she is in the gynecological chair how the tampon is intro-

duced, in a half-reclining position, and if she is intelligent she will soon learn it, but if stupid only involves herself in more difficulty by having one of these beautiful instruments. The instrument has also the disadvantage that it is suitable only for a small, narrow vagina, so that really each patient should have a porte-tampon made especially for herself.

A borated lint roller may also be used for this purpose, by introducing one end, and gradually following it with the rest of the bandage.

This tampon is indicated chiefly in sudden hemorrhages, but is also of much service in cystocele.

Tampons are best introduced in the evening after the patient has retired, and left in place during the night. In the morning the tampon may be removed, either before the patient rises, or while in a stooping posture, by pulling on the free end of the cord attached to it in the manner described. Injections of tepid water should be used immediately after its removal.

A tampon may also be introduced by the physician or midwife through a speculum only when it is necessary, a certain portion of the vaginal wall being diseased, to place the tampon directly upon it.

Too much should not be expected from this method of treating cystocele; very few cases can be cured by it, and these only when the affection is treated at its very beginning.

Nevertheless, it will often be necessary to resort to this means, for example, in patients who will not submit to an operation and who have vaginal catarrh from wearing a pessary, rendering the removal of the instrument necessary.

As a rule, we will be forced to resort to mechanical means for retaining large inversions of the vaginal walls, since very few patients are willing to submit at once to an operation. There is a great number of such appliances, which will be considered in detail when we come to speak of prolapse of the uterus; in this connection those only will be mentioned which are of special service in the treatment of cystocele. These are pessaries with and without stems, simple or wing-shaped, and those resting in the vagina, with or without external support. In slight cases, Meyer's rubber ring pessaries may be of good service, but if the

cystocele be large they will be at once expelled because of their pliability, and then round pessaries of oakum covered with a firm, thick, smooth coat of varnish should be used. These rings, when placed above the levator ani and pelvic fascia, assist in retaining the prolapsed wall by causing a circular distention of the vaginal vault. If the largest pessaries of this sort are expelled on account of the great pressure and the stretching of the vulva, they may in many cases be replaced with advantage by Martin's stem pessary. If this should give way before the strong pressure to such an extent that an edge comes to lie between the levators, the club-shaped extremity of the stem will be forced against the thigh, and further expulsion prevented. There is still another instrument to be mentioned, which may be of signal service in special cases, viz., the Zwanck-Schilling hysterophore. I have seen this remain in position when all the previously mentioned pessaries were at once expelled. However, its somewhat thin edges may exert an injurious pressure upon the soft parts, resulting in vesico-vaginal fistula.

Other patients are benefited by the apparatuses of Roser and Scanzoni—a stem pessary held in place by a girdle and a bandage over the external genitals. I formerly used these, but have abandoned them. Poor patients who cannot themselves properly place them in position, soon complain of pain and burning from ulcerations near the urethra caused by the pressure of the bow. If the pressure upon the instrument be great, the pessary is expelled, or the vaginal wall passes down behind or by its side.

The Scotch hysterophore, which is especially recommended by Breslau, is better, but is suitable for slight cases only.* It causes simultaneous longitudinal and transverse distention of the vagina, but is very irritating, and unless the patient is careful to cleanse the parts, will produce catarrh.

Many patients are rendered very comfortable by a firmly applied T-bandage; in slight cases this may be tried alone or in conjunction with the tampon.

But a radical cure can be only obtained by an operation, and this is so simple and so satisfactory in its results, that it should

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* "Scanzoni's Beiträge," IV, 275.

be strongly recommended to every patient who is not soon relieved by one of the above methods of treatment.

The operation consists in the excision of an oval piece of the anterior vaginal wall, and is known as anterior colporrhaphy. He who would become thoroughly acquainted with this operation, its origin and gradual development, should read its history by Marion Sims. It was Sims' belief that previous to his time, nothing had been accomplished by operating for cystocele, and he attributed all his success to the metallic sutures which he employed—a view which has not been confirmed by experience. The length and breadth of the excised portion depend upon the degree of inversion and cystocele. The more extensive these are, the longer and broader must be the portion excised, *e. g.*, in very bad cases it may reach from the vaginal tubercle to the anterior lip, and be two to three inches broad.

The patient should be anæsthetized, after the rectum and bladder have been evacuated, and placed upon the table in the dorso-coccygeal position; the anterior lip is then drawn down with a tenaculum-forceps or by a loop of silk until it appears at the posterior commissure. The two assistants who hold the patient's thighs should now draw the nymphæ apart with tenacula, until the field of operation is exposed. The anterior vaginal wall should be washed with a 2–5 per cent. carbolized solution, which should also be dropped over the wound from an irrigator during the operation.

The incision begins below. The contour of the portion to be excised is now marked out with the scalpel, the incision then made through the entire thickness of the vaginal wall, first upon the left side, and the lower end loosened with the knife. The handle of the scalpel is used to separate cellular tissue between the bladder and vagina—the knife being employed only when the connections are very firm. It will be necessary to divide one or two large vaginal arteries, branches of the uterine artery, and a number of large veins; the arteries are at once taken up with the forceps. Scarcely five minutes will be required to excise the oval portion necessary to be removed. The surface of the wound is then made uniform, all islands of vaginal tissue removed, the irrigation with the carbolized solution repeated, and the sutures

introduced. The needle should be entered and brought out about $\frac{2}{5}$ of an inch from the edge of the wound. In the middle of the wound it must be passed beneath the surface so that this will not be thrown into folds when the sutures are tightened, *i. e.*, only about two-thirds of the wounded surface is to be entirely embraced by the sutures. In small wounds this precaution is unnecessary, and the suture may pass behind the wound throughout its whole length.

The individual arteries need not be ligated, but the sutures can be passed in such a way as to include them. The sutures are to be tied alternately above and below so as to gradually overcome the tension, which is greatest in the middle of the wound. I do not now pass superficial sutures, but deep ones only, while K. Schroeder adopts the opposite plan, *i. e.*, passes many superficial sutures and but few deep ones. This latter method has been characterized by Werth as not proper. Immediately after all the sutures are tightened the wound and its vicinity are carefully washed and dried. When not a single drop of blood is to be seen escaping from any portion of the wound, the vagina may be replaced. It is not necessary to apply any protective substance, or to insert a tampon of cotton.

The variety of suture proposed by Dr. Werth, of Kiel, is as a rule also unnecessary.* Under certain circumstances, these interfere with the union. I particularly recommend the silkworm gut for sutures. The whole operation may be completed, on the average, in from 20 to 25 minutes, *i. e.*, from the time the incision is made.

If the patient can urinate after the operation, there is, of course, no reason why the catheter should be used. Ischuria may supervene, however, for the sutures have been passed through the wall of the bladder. If pain in the bladder or catarrh follows catheterization, the bladder should be washed out with a solution of salicylic acid, 1 to 1000, or with a solution of boric acid, 3½ per cent.

The sutures may remain *in situ* at least eight days, but if fil de Florence (silkworm-gut) be used, they need not be

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* *Centralblatt für Gynäc.*, 1879, No. 23, p. 561.

removed for weeks. Silk sutures must be removed in six or seven days.

The bowels may be evacuated on and after the fourth day; the patient should be confined to bed until the twelfth or fourteenth day, as before this time the cicatrix is not firm enough to be exposed to strong pressure without risk. If the patient be a poor woman, she ought for a time to avoid, as far as possible, hard work, frequent stooping and the carrying of heavy articles.

Descent and prolapse of the uterus are usually associated when inversion and cystocele are extensive; here the operation just described will not suffice, and posterior colporrhaphy must be subsequently performed.

It remains to be mentioned that strong caustics, such as fuming nitric acid, chloride of zinc and the actual cautery, were formerly applied in different ways to the vaginal walls, but that, at the present time, they are no longer used for this purpose, partly because their action is uncertain, and also because adjacent organs are unfavorably affected by them.

C. Inversion of the Posterior Wall and Rectocele.

Associated with inversion of the posterior vaginal wall there is often a dislocation of the anterior wall of the rectum, a condition analogous to cystocele—the so-called rectocele. The condition was well known to Gunz, 1744, Sabatier, 1757, van Swieten, 1765, Monteggia and Clarke, 1814. In 1835 Bellini performed colpodesmorrhaphia for this affection, but in 1836 Malgaigne announced in a communication to the Paris Academy that he had discovered rectocele, a condition which had previously never been described.

By rectocele or protocele we understand a projection or distention of the anterior rectal wall into an inversion of the posterior vaginal wall. The tumor thus formed may be as large as the fist or larger. The dislocation of the rectum does not, however, invariably follow inversion of the posterior vaginal wall; it is by no means as common as cystocele in anterior inversion because the connection between rectum and vagina is much looser. As a rule, the tumor is flaccid and easily reduced; it rarely becomes hard or firm by being filled with scybala; but it

may be so enlarged in labor by strong pressure that an obstacle to the expulsion of the child is presented.

The usual symptoms are obstinate constipation and occasionally tenesmus; sometimes there are disordered digestion, anorexia, nausea, and abdominal pain. The other symptoms are caused by the prolapse of the uterus which usually accompanies it.

Rectocele may be differentiated from a simple inversion by introducing the index finger through the rectum into the tumor which appears between the labia majora, though, since the rectal wall is so easily displaced, a mistake might possibly occur. From an abscess or cyst it may be differentiated by careful inclusion of the wall between two fingers. The presence of fecal matter in the tumor will, of course, render the diagnosis very easy.

Ætiology.—The causes of proctocele are indeed many, but it does not frequently result from ruptured perineum; on the other hand, the relaxation and stretching of the posterior vaginal wall in pregnancy may produce it, assisted by protracted constipation; possibly sudden concussion, as in Malgaigne's case. Secondarily, the dislocation may result from prolapse of the uterus, neoplasms of the posterior vaginal wall, etc.

Treatment.—All the means and methods which are used in treating cystocele are also suitable for rectocele; likewise injections, tampons, and pessaries.

The integrity of the perineum is to be restored provided there be a laceration or cicatrix, and a permanent pressure brought to bear upon the posterior vaginal wall and the anterior rectal wall by narrowing the vagina. The methods of accomplishing this end, which have found favor during the last twenty years, are as follows:—

G. Simon excised a pentagonal portion of mucous membrane from the posterior vaginal wall, having its base at the dividing line between the skin and vulvar mucous membrane. This excised piece measured 5 to 6 centimeters (2 to 2.3 in.) in breadth, being 1 centimeter ($\frac{2}{5}$ in.) narrower at the upper portion, and extended up the vaginal wall for 5 to 6 centimeters. The operation was performed with the aid of the fenestrated

speculum invented by him, and the wound united by alternate deep and superficial silk sutures. The vaginal sutures numbered about ten, and the perineal from four to six, the former being removed on the ninth or tenth day, the latter on the fourth.

Hegar and Kaltenbach's method, *perineauxesis*, is to excise a triangle, the sides extending above the rectocele, and the convex base crossing the posterior commissure. The wound is closed by deep wire sutures, the deepest of which do not pass around its entire breadth, but leave a small portion exposed in the middle. After the operation the wound is cleansed with chlorine water; injections of this fluid are subsequently employed, if there be an offensive discharge. The bowels should be evacuated on the third or fourth day, the perineal sutures removed from the third to the fifth day, and the vaginal not before the fourteenth to the twenty-first day.

Bischoff's method of colpoperineoplasty, while principally used for prolapsus uteri, is also of service in rectocele, but it is much more complicated than the operations previously described. The field is exposed by raising the anterior vaginal wall with a suitable instrument while the assistant stretches the vaginal orifice with his fingers. A tongue-shaped flap is now marked out in the middle of the posterior vaginal wall, beginning 2 centimeters ($\frac{4}{5}$ in.) in front of the navicular fossa; the flap is from 4 to 6 centimeters (1.6 to 2.4 in.) long, 2.5 to 3 centimeters (1 to 1.2 in.) broad, the base above and the slightly rounded apex below. It is now dissected up from the point to the base, the latter remaining in connection with the vagina. When this is done, incisions are made either in a straight line or slightly convex, from the base of the flap through the lateral vaginal walls to the level of the middle of the labia minora, and these two lateral triangles then denuded by dissecting them first right and then left from the base of the flap and below the lateral incisions, to the vaginal orifice. The flaps may be separated by using the handle of the scalpel and the finger-nails, unless there be cicatrices. Finally, the vaginal wound is extended to the posterior commissure and borders of the labia majora and minora.

The flap obtained from the middle of the posterior wall is now united by sutures passing deeply into the vaginal tissue to the

wound in the vagina, the left edge of the flap to the left edge of the vaginal wound, and *vice versa*. Next the perineal sutures are introduced, and in such a way that the upper 1 or 2 will include the points of the vaginal flap. The wound and parts adjacent must be carefully disinfected before the introduction of the sutures; 4, 6, or 8 sutures are used in each side of the vagina, and the perineum united with from 3 to 6 deep silver sutures; if preferred, all may be of silk or silkworm-gut. Some operators place a carbolized tampon in the vagina after the operation is completed.

D. Ovariocele. Vaginal Enterocele. Hydro- and Pyocolpocele.

The posterior vaginal wall may likewise be inverted into the lumen of the vagina by organs situated above it.

The anomaly known as *vaginal ovariocele* results from the following conditions: An ovary not larger than a hen's egg, with a long pedicle, and some obstacle to the growth of the ovary upward; for if the ovary be larger, it may indeed dislocate the vagina forward, but it cannot invert it. But when the vagina is once inverted and prolapsed, the tumor may continue to grow, for the vagina is capable of being very much distended. Very often, in retroflexion, one or both ovaries may be felt in Douglas's cul-de-sac, but this will not warrant us in assuming an oophorocele, for in the latter the ovary must have entered into a pocket in the vaginal wall, a condition which is extremely rare.

Secondarily, however, and associated with vaginal enterocele, this is more liable to occur. Plate xix, *a*, of the author's Atlas represents a preparation in which Douglas's cul-de-sac has been forced forward through the vulva, and is so distended, that beyond doubt during the patient's life loops of intestine must occasionally have been in it. The patient was 74 years old; the uterus was elongated, and retroverted, and an ovariocele may easily have resulted from an enlarged ovary descending into the pocket.

Landau and Breisky have each recently reported cases of vaginal enterocele. A permanent primary vaginal enterocele can occur only when the loops of intestine, having once descended,

cannot afterward escape from Douglas's cul-de-sac. This may be the result either of the entrance to this space being too narrow from congenital enlargement of the ridge-like folds of the *plicæ semilunares Douglasii*, or from its having been narrowed by adhesive inflammation. From this the proof of the difficulty in the reduction of the tumor in the two cases referred to is apparent; in Landau's case the tumor interfered with labor, and it was reduced only after passing the whole hand into the rectum while the patient was deeply narcotized. In Breisky's case the knee-elbow posture was repeatedly tried without success, but the tumor was finally reduced by the protracted use of mild cathartics. A remarkable feature of the latter case was that the uterus was in its normal position. If the entrance to Douglas's cul-de-sac be narrow, strangulation of the intestine is possible.

Secondarily, and associated with incomplete prolapse of the uterus, vaginal enterocele is not so rare; in these cases the neck of the sac is formed by the fundus of the uterus and the anterior wall of the rectum. While the intestine does not, as a rule, descend far into the sac, still, Rokitansky and Fehling have reported cases of rupture of the posterior vaginal wall followed by the protrusion of large masses of intestine. Fehling's patient, 63 years old, had been afflicted for years with a prolapse as large as a child's head, which had been distended when the accident occurred by carrying a pail of water up four flights of stairs; the patient, while making vigorous efforts to reduce the tumor, felt something give way. Fehling found a convolution of intestine larger than a man's head, protruding from the vagina, and ascertained that it had escaped through an opening in the posterior vaginal vault: he was not able to reduce it. The rectocele, a large inversion of the vaginal mucous membrane into which the rectum protruded, was not ascertained until the autopsy was made. The vagina was 12 to 14 centim. (4.7 in. to 5.5 in.) wide, and on the posterior wall was a laceration 6½ centim. (2.5 in.) long and 4 centim. (1.5 in.) wide, involving the vaginal vault and peritoneum. The vaginal walls were very much thinned at this point. A large number of bridge-like bands and fibres were stretched across from the posterior surface of the uterus to the rectum.

In the same way a metrocolpocele may originate. The pregnant uterus may invert the posterior vaginal wall more and more and its rapid growth finally cause rupture of the vagina; the prolapsed retroflected uterus will then be found in the rupture.*

Further, there is one case noted by Petrunti in which the omentum alone became strangulated in such an inversion of the posterior vaginal tissues,† *i. e.*, a recto-vaginal epiploic hernia.

Finally, an exudation from the abdominal cavity of simple ascitic fluid or pus may descend into Douglas's cul-de-sac, invert the posterior vaginal wall and pass through the vaginal orifice. Kiwisch saw an unusually large prolapse of the posterior vaginal wall disappear after puncture for ascites; this was evidently a hydrocolpocele. The author found an inversion of the posterior wall as large as the fist, containing the cul-de-sac of Douglas which was filled with pus, at the autopsy of a patient who died of diffuse purulent peritonitis with extraordinary adhesions. During life this had been diagnosticated by a colleague as prolapse of the uterus. Hydrocolpocele presupposes the existence of a more or less vertical pelvis, and a vertical or retroverted uterus, and as these conditions do not often exist, we rarely meet with it even in very great ascites.

If the upper part of the vagina descends in the form of a ring into the lumen, we have complete circular inversion, which may also be primary or secondary; the latter, as a rule, in prolapse of the uterus. Ordinarily, anterior inversion with incomplete prolapse of the uterus is the original condition, and out of this a total circular inversion is developed. According to C. Meyer's description this condition may exist simultaneously with anterior and posterior vaginal enterocele.‡ The anterior enterocele was as large as a man's fist, the posterior as large as a pigeon's egg, and between the two was the cervix 2¾ inches long and 1 inch thick, while the fundus was in its normal position. The uterus was 4½

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* *Caspar's Wochenschrift*, 1838, and E. Martin, "Neigungen u. Beugungen," 1865; Martin, *Monatsschrift*, XXVI, 4, Grenser, and Mayer-Dubois, Fehling, *loc. cit.*, p. 107. † *Froriep's Notizen*, 49, p. 295.

‡ "Verhandlungen der Ges. für Geburtsh.," vol. III, pp. 131–133.

inches long, and the vaginal walls were enormously thickened, from ¾ to 1.25 inch thick.

Diagnosis.—It will not usually be difficult to recognize a secondary ovariocele, because the ovary, which will be about the normal size and in a large enterocele-sac, may be readily known by its form, surface, sensitiveness, by its pedicle, and by its being easily reduced. But when the ovariocele is primary, and the enlarged ovary, which is less movable, has caused the inversion of the posterior wall, the diagnosis is much more difficult. In this case, all the points in differential diagnosis, which will be considered under ovarian tumors, must be carefully weighed.

The tumor in vaginal enterocele is soft and elastic, may be flattened and lessened in size, the gases in it may be recognized by the tympanitic sound, and often the contents may be moved about. Enterocele may be difficult to reduce. In the posture *à la vache* the tumor may become smaller, but upon coughing or bearing down it will again descend. In hydro- and pyocolpocele the tumor is irreducible, gives a dull percussion note, and is associated with other affections, particularly with ascitic distention, or an inflammatory condition of the abdomen. In hydro- and pyocolpocele the inverted vaginal wall will be reddened, swollen, and œdematous, and the general symptoms will be grave. In the first place the physician must convince himself that the os uteri is not a part of the inverted portion.

Prognosis.—In pyo- and hydrocolpocele this is almost entirely dependent upon the chief affection; in ovariocele upon the ovarian tumor, its size, mobility, sensitiveness, etc. The prognosis of enterocele, with regard to life, is good; the accompanying symptoms are not usually grave. As it generally occurs in patients who have repeatedly been delivered, the parts are relaxed and stretched, and symptoms of strangulation are very rare. On the other hand, a radical cure is almost out of the question; the treatment will be palliative, instruments being used to retain in position the parts which were prolapsed. Of 15 cases collected by Hoin, 13 were women who had recently been delivered, and in whom the position of the uterus directly behind the abdominal walls favored the descent into Douglas's cul-de-sac. But it also occurs in nulliparæ.

Treatment.—An ovariocele may be reduced, when the ovary is wedged into the sac, either in the lateral posture or *à la vache*, the operation being facilitated by narcosis: this is a necessity in the reduction of the ovary from beneath the pregnant uterus. If reduction be impossible, an attempt to lessen the size of the tumor by removing a part of its contents must be made, and this is best accomplished by puncturing the fluctuating portion with a long, curved trocar passed up the vagina. The precaution required in this operation will be considered in detail under ovarian affections. Should reduction be impossible after lessening the size of the tumor, or should the latter be also impossible, then ovariotomy or, during labor, the Cæsarean section should be considered.

In enterocele the reduction is usually easy, the two cases reported by Landau and Breisky excepted. It is performed with two or four fingers, or the whole hand, in the position *à la vache*. Retention is secured by a round pessary of suitable size, in a manner similar to that required in vaginal inversion. Petrunti in one case diagnosticated an abscess which threatened to open into the vagina; he therefore made an incision, and, after evacuating a quantity of bloody serum and putrid matter, a large portion of the gangrenous omentum appeared, which he excised.

In hydrocolpocele which is in free communication with the abdominal cavity, puncture will also evacuate the sac. Puncture through the vagina would be necessary only when the sac is completely closed, when the symptoms demand an operation, or when the other measures adopted fail to reduce the size of the tumor. The operation is to be repeated if the sac refill. But it matters not in what way suspicions of hydrocolpocele arise, no excision of part of the wall, or injection of tincture of iodine should be made, as the possibility of some slight communication with the peritoneum always exists. The treatment of the original affection causing the hydrocolpocele does not come within the limits of this treatise.

In pyocolpocele the question of incision or puncture may also arise. As a rule, the treatment of the diffuse peritonitis will first claim attention, and any therapeutic measures be of avail only when it has subsided.

CHAPTER IV.

NEOPLASMS OF THE VAGINA.

Gurlt observed the following tumors of the vagina in 11,140 patients with tumors of all kinds :—

Of	647	women	with	fibroma,	1 was	situated on ant. vaginal wall.
"	53	"	"	papilloma,	2 were	" in the vaginal wall.
"	937	"	"	cysts,	3 "	" in the vagina.
"	268	"	"	polypus,	1 was	" in the vagina.
"	483	"	"	sarcoma,	1 "	" in the vagina.
"	4107	"	"	carcinoma of the genitals, 114 occurred in the vagina alone ; in the vagina with uterus, 3449.		

In all, 122 in 5029 tumors of the external and internal sexual organs, excepting tumors of the mammary glands, there were 2 to 2.3 per cent. of vulvar tumors.

When we study Gurlt's statistics of tumors, we will at once notice the remarkable infrequency of neoplasms of the vagina. On the other hand, compared with the rare appearance of neoplasms, we find congenital tumors and those occurring in early childhood quite common. I wish to call attention to the fact that neoplasms of the vagina must really be much more frequent than these statistics would lead one to believe, for individual authors have observed so many cases. Critical examination of the vagina is often neglected ; that is to say, the affections of the uterus receive more attention and are of comparatively greater importance, and hence many affections of the vagina are simply overlooked.

Beginning with tumors of the vaginal mucous membrane, the first which will claim our attention are :—

1. Cysts of the Vagina.

In my article on vaginal cysts,* in the year 1871, I began with the words : " Cystic formations in the vaginal walls are calculated to awaken a certain interest, not only because they are on the whole very rare, but because their location and their origin are

* *Archiv für Gynäcol.*, vol. II, p. 283.

by no means well understood." Twelve years have passed since then, and considerable literature upon this subject may now be obtained; but still the sentence just quoted has its full force. The article referred to had certainly the merit of proving that vaginal cysts are far more common than had hitherto been believed, and that they were the most frequent vaginal neoplasms.

Cysts of the vagina will be divided into the simple, compound, single or isolated, and those occurring in masses or groups.

As a rule they occur singly (82 per cent.), more rarely two or three at once, or even five (Kiwisch); air cysts, however, always occur by the hundred. The location of cysts is on the anterior or posterior wall, more rarely on the lateral walls, the proportion being 29 : 21 : 11 (Graefe). In the anterior wall they are most frequently found in the lower third, or between the lower and middle thirds, and in the posterior wall with like frequency in the lower, and in the middle third. By far the greater number of cysts are therefore situated in that part of the vagina between the middle and the vicinity of the vaginal orifice, 66 per cent. About one-fourth of vaginal cysts are as large as a pea or hazelnut, one-half as large as a walnut, and about one-third as large as a pear or the fist; the larger cysts are therefore three times as common as the smaller ones, which is a proof that the latter are often overlooked or not considered worthy of notice. Peters' account of a cyst of the posterior wall as large as a child's head, and which interfered with labor, and from which he evacuated a pound of clear yellowish fluid, at once arouses a suspicion of the tumor having been an ovarian cyst.*

The contents of the cysts resemble the fluid from hydrocele—bright and clear with a tinge of yellow; but they may be reddish, brownish, chocolate-colored, or greenish, also similar to synovial fluid, thick and albuminous: those of firm consistence are about as common as the serous. In Nélaton's case, the tumor was cystic and as large as the fist; it occupied the entire posterior wall; the chemical analysis of its contents was as follows: water 18; albumen 1½, and salts ½ part. Microscopical investigation reveals in different cysts, epithelium, granular and pus cells.

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* *Monatsschrift*, xxxiv, 2, 1869.

Graefe found many crystals of cholesterine, débris, nucleated cells, globules of granular matter and lymphoid cells.

The character of the cyst wall is very variable. In some cases it is so slight as to rupture from the use of the speculum. It has frequently been noticed that the wall was harder and firmer than would have been expected from the transparency of the cyst. Lisfranc found the walls 7 mm. ($\frac{1}{4}$ in.) thick. The wall was hard, fibrous and firm in several cases reported by West, Säxinger, Lisfranc and others. From the above there can be no doubt that cysts must also be divided into superficial and deep.

Careful microscopical examination* of the cyst wall gives the following results: The external surface is covered with the ordinary pavement epithelium of the vagina; the thickness of the wall varies between 1 mm. and 1 centim. ($\frac{1}{26}$ in. and $\frac{2}{5}$ in.), the thinnest portion being formed of connective tissue alone, the thicker with the addition of smooth muscular fibres. The internal surface is usually perfectly smooth, but may show papillæ covered with epithelium which in the majority of cases is cylindrical, more rarely simple or stratified pavement epithelium, or still more rarely stratified pavement and cylindrical epithelium in the same cyst.† The original simple cylindrical epithelium may become flattened into pavement epithelium, and this in turn be transformed into stratified pavement epithelium.

The original location of these cysts, according to our present information, it will be seen, may vary.

In the first place, it cannot be doubted that many vaginal cysts arise in the form of retention cysts of the vaginal glands. The most interesting account of this variety is furnished by von Preuschen.‡ Heitzmann and Hückel have confirmed the obser-

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* Graefe says that my article above referred to has one great defect, namely, that the microscopical examination is given in a few cases only, and then in a very incomplete manner; this charge is preferred against the wrong person, however, for the blame should not be attached to me, but to the authors who cited and published my cases. My own descriptions in this article are very precise, and have since been confirmed by various authors, *e. g.*, Schroeder, Klebs, Hückel, and Lebedeff.

† Three cases by Graefe, one by Kaltenbach and Lebedeff.

‡ *Virchow's Archiv*, LXX, S. A., plate ii, Figs. 4 and 6.

vation of von Preuschen as regards the existence of vaginal glands. The coalescing of several cysts which were originally single would explain the occurrence of cylindrical and stratified pavement epithelium in the same cyst. All such cysts would obviously occur in the superficial portions of the vaginal mucous membrane.

Secondly, there are cysts whose interior is lined with endothelium, as I have demonstrated and Klebs has confirmed.* Such cysts would seem to originate in dilated lymph vessels; they do not appear to be common.

Four cases, found in the literature of this subject, tend to show that cysts may also originate in œdema, contusion, or in transudation of blood into the submucous tissues. These will have neither epi- nor endothelial lining.

Deep-seated cysts having a muscular wall may arise in one of two ways: From the remains of Wolff's or Gartner's canals, and hence they must be situated in the middle and upper third of the vagina or in the wall of the uterus, particularly at its sides. I excised such a cyst six months ago from the right side near the urethra; it was almost as large as a hen's egg. I have also repeatedly punctured one as large as a pigeon's egg, situated on the left side in the vaginal vault. Secondly, as Freund believes, some such cysts may be considered as rudiments of Müller's ducts, in that some portion of them has not united with the corresponding part, while the spiral course of the double vaginæ about each other will explain why the cyst is situated sometimes in front, and at other times posteriorly or laterally. Finally, Graefe is of opinion that, when several large cysts with thick walls are present,† the hypotheses of Freund and Veit might be combined, viz., that two of the cysts proceeded from Gartner's canals, the third from a rudiment of Müller's ducts.

The following is the result of the examination of a cyst the size of a walnut, which I extirpated from the posterior vaginal wall: It contained a sticky, thick, brown fluid, in which shriveled blood corpuscles, corneous cells, and fat corpuscles, with large masses of cylindrical epithelium, floated. Transverse sections of

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* "Handbuch," 1, 2, A. 965. † Graefe's case, No. ix.

the wall of the cyst next the vaginal canal showed, first, pavement epithelium, under which was a layer of numerous fine capillaries, then a firm stratum of longitudinal and transverse muscular fasciculi, and internally a thin interrupted border of low cylindrical epithelium, the cells being almost cubical. Remains of glands could not be recognized in any part of the walls.

In another smaller cyst of the middle portion of the vagina we found the following appearance upon microscopic examination: A wavy, loose connective tissue with few cells, which passed without any definite boundary into the connective tissue of the vaginal mucous membrane, where the cells became more numerous. The internal lining was of pavement epithelium, with small cells and but slightly stratified. In the vicinity of the cyst were many convoluted arteries and large venous lacunæ in part filled with blood, the white blood corpuscles being so aggregated that some points resembled little abscesses. The superficial portion of the vaginal mucous membrane, with its numerous isolated papillæ and pavement epithelium, was continuous over the covering or roof of the cyst. No communication between the cyst and the surface of the mucous membrane could be detected.

Finally, cysts are found still more externally in the peri-vaginal connective tissue whose origin may have some relation to the vaginal wall. For example, hygromata of the recto-vaginal wall are described by Verneuil and by Mannel;* one was a follicular tumor with atheromatous contents, the other the size of a hen's egg, with dermoidal contents, both being situated in the loose connective tissue between the peritoneum and the levator ani, both to the left of the median line. As a rule such tumors are surrounded by a tolerably firm membrane, and have a separate sac, and may be turned out of the tissue without being ruptured.† Their point of origin is not clear, though von Preuschen succeeded in demonstrating a connection between such a tumor of the anterior vaginal wall and the urethra; the origin of this cystic growth was in a racemose gland of the urethra, and a delicate opening into the canal was demonstrated. According

* "Tumoren des hinteren Beckenraumes," Marburg, 1864, p. 63.

† As in Lebert's case.

to location, vaginal cysts may therefore be divided into mucous, interstitial, and paravaginal.

Symptoms.—As a rule vaginal cysts grow very slowly, many requiring years to become as large as a hen's egg. The small and medium cysts generally cause no inconvenience. They attract the attention of the patient only when they are situated so low in the vagina that they lie between the labia minora, or protrude when in the erect posture. Still, in infants, cysts as large as a walnut may cause dysuria.* They may also cause the urine to flow into the vagina, thereby producing colpitis. Large tumors may make coitus impossible, as was the case in one patient with a cyst the size of a pigeon's egg at the introitus. When the tumor enlarges it may displace the uterus anteriorly or posteriorly, or a pedicle may be formed, the tumor descend through the vulva and pull the uterus down by its weight.† They then cause shooting pains and interfere with the evacuation of the bladder and rectum, as, for example, in the case described by M. Brednow, a cyst as large as an orange being situated in the lower portion of the anterior wall, in a woman of nineteen years and in her first pregnancy; attention was directed to the tumor by a protrusion of the vaginal wall. J. Veit's case does not belong to this variety, and was probably a cyst of the broad ligament. Vaginal cysts are frequently associated with a profuse or putrid discharge; they may also add to the discomforts of menstruation.

Small cysts may rupture spontaneously, and subsequently refill just as they do after incision. Huguier has reported a case of gangrene of the cyst wall which was probably caused by labor, and which was associated with metroperitonitis.

Diagnosis.—These tumors should be recognized without difficulty, but still they have been mistaken for cystocele, rectocele, hydrocolpocele, prolapse of the uterus, and ovarian cysts.

If that portion of the vaginal wall where the tumor in question is located be grasped through the vagina and moved about, the connection between the tumor and the wall will often become

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* See author's case of congenital cyst, *loc. cit.*, pp. 395, 396.

† Nélaton's case.

evident. If this plan does not succeed, and the tumor is on the posterior wall, the finger is to be introduced into the rectum and the vaginal wall carefully examined; if on the anterior wall explorations may be made with the catheter introduced into the bladder. Again, there will be a difference in color between the vaginal wall and the tumor, the latter being usually bluish or reddish brown. The larger tumors also show a tense, elastic fluctuation, and will not disappear when the vaginal inversion is reduced, but are of the same size and consistence as before. In all cases in which, in spite of the above modes of examination, a doubt exists as to the real nature of the tumor, the question may soon be decided by puncture and examination of the fluid.

Ætiology.—The author reported the first case of congenital vaginal cyst. During extra-uterine life anything injurious which comes in contact with the vagina would favor the formation of cysts; mucous cysts which originate in the vaginal glands may be produced by catarrh or inflammation of the mucous membrane, particularly during gestation. Labor is probably the chief cause of interstitial and submucous cysts, in as far as it produces compression, displacement and contusion of the vaginal walls with transudation of blood into the tissues, and as the vaginal tubercle and the anterior wall are most exposed to the above-mentioned lesions, it is not remarkable that cysts are most frequently found in these localities. In a case described by Sanson, the origin of the tumor was very probably in some way connected with a fall received by the patient while she was carrying a heavy load, for immediately after the accident occurred the tumor was first noticed. Trauma may also explain the origin of cysts of the Wolffian bodies or of the rudiment of Müller's ducts. Verneuil believes that serous sacs may easily be formed in the loose space between the vagina and rectum, and that these subsequently develop into cysts from an increase in their contained serous fluid. He found a lacuna three centimetres (1.2 in.) in diameter between the vagina and rectum and five or six centimeters (2 to 2.4 in.) above the anus, which he concludes was caused by the pressure of the uterus against the rectum.

Treatment.—As a rule, a simple incision into the cyst wall and evacuation of the contents suffice to cause the disappearance

of the growth. In addition to this, most operators excise a portion of the cyst wall and cauterize the base of the tumor with nitrate of silver, a practice which is attended with some danger if the cyst be in the posterior wall, on account of its proximity to the peritoneum; a patient treated in this way by Ladreit* had subsequently very severe pain in the iliac fossa. Jobert recommended puncture and iodine injection, because he had observed considerable hemorrhage result from the incision. Some remove such tumors with the écraseur; others pass a loop of wire through the cyst. I have recently several times excised cysts larger than a walnut, chiefly because I wished to examine all portions of their walls; the hemorrhage was soon controlled by acupressure and uniting the edges of the wound with sutures, and a rapid recovery followed. To accomplish this, the wall over the cyst is to be divided through a portion which is not too thin, and the whole sac dissected out with the finger or the handle of the scalpel, if possible, without opening it; if need be, a piece of the vaginal wall may be resected. The wound should then be closed by a sufficient number of deep sutures passing entirely around it.

Historical.—I once made the statement that, according to Safford Lee, vaginal cysts were first mentioned by Sir Astley Cooper, but Dr. Haussmann† has shown this to be incorrect. Haller mentions "*hydatides in vagina vidi*," in his treatise *Elementa Physiologiæ Corporis Humani*.‡ The word hydatids was used to designate a more or less thin-walled sac containing a fluid, and, as he uses this expression without further remark, it is probable that vaginal cysts were quite well known in his time.

2. Cystic Colpohyperplasia.

In my previously mentioned article I described a condition which I designated *colpohpyerplasia cystica*. I met with this in three cases during gestation, the condition being characterized by the enormous numbers of cysts present, for example, fifteen or twenty upon a spot the size of a dollar; also, by being exclusively superficial, with a transparent wall, developing upon a moist

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* No. 10, Author's Table. † *Archiv f. Gyn.*, VIII, 533.

‡ T. VII, Bernæ.

hyperemic substratum, and usually being associated with hypersecretion. The greater number of these cysts were filled with gas, and, when punctured, collapsed with a distinct sound. K. Schroeder has shown that C. Braun had demonstrated the same condition in a case in his clinic in 1861.* Braun found in a pregnant patient with *hypertrophia corporis papillaris vaginæ*, "the whole vaginal portion and the posterior roof thickly studded with elastic vesicles as large as a pea, which, through the speculum, appeared smooth and of a pale yellow color, and, when punctured, audibly collapsed, exuding a few drops of a limpid, pale yellowish fluid. The vesicles did not refill after being evacuated. The patient did not consider herself sick, except that she had a rather profuse blennorrhœa." Thus far Braun's observations fully coincide with my own; but they received no further notice at that time, my attention first being directed to them by Schroeder. In the description just quoted, Braun calls the affection hypertrophia corporis papillaris vaginæ, and in the second edition of his text-book, 1881, p. 368, retains this designation, though the affection has not the slightest connection with a papillary hypertrophy. He did not endeavor to investigate the origin of the contained gas, thus ignoring the obscure feature of the affection. Chénevière states that Ritgen was also acquainted with this condition and had described it, but I can assure the reader that the *puerperal aphthous disease* which he described has not the slightest similarity to the affection under discussion, and I therefore consider any comparison of the two as inappropriate.

At all events, my article first drew the attention of the profession to this peculiar disease which is analogous to no other affection of the mucous membranes, and since that time a large number of papers have appeared upon the origin, character and location of this air or gas.

I had emphasized the fact that some of the cysts were lined with endothelium and were to be regarded as follicular cysts, but that others, having no epithelial envelope, seemed to have originated in hemorrhagic exudation; the air contained in them may

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* *Archiv für Kl. Medicin*, XII, 538; *Zeitschr. d. Ges. der Wiener Aertze*, 1861, vol. II, p. 182.

have developed from a vaginal catarrh, and may have been confined by the coalescing of some of the adjacent vaginal prominences. Soon after this, Eppinger reported a case from which it would be concluded that the air had collected in spaces in the most superficial connective-tissue layer of the vagina; that these air-spaces had no characteristic lining membrane, and that, as Professor Lerch had determined, the air in the cysts was similar in chemical composition to the external air.*

Kaltenbach, after describing an excised cyst, briefly states that he saw a striking example of colpohyperplasia in a pregnant woman in Hegar's clinic.†

Then K. Schroeder described a case as *emphysema of the vaginal mucous membrane*, where the cysts were most actively developed in the second week of the puerperium, rapidly disappearing after this. He thought the gas originated in the serum of the mucous follicles. Klebs said that it was possible the gas was diffused into the dilatation of the lymphatic vessels, or that, formed in these dilatations, it was altered by diffusion.‡

Breisky's communication followed, describing a number of cases of conglomerate air-cysts in the vaginal wall which occurred not only during pregnancy but in the non-pregnant.§

Schmollig published a case from the Berlin clinic (J. D., Berlin, 1875).

Naecke then published three cases from my Dresden clinic, which proved that such emphysema could not be artificially produced by injecting air into the mucous membrane with a Pravaz's syringe, because the injected air escaped immediately after the withdrawal of the canula.‖

Then Zweifel studied the subject, and, accepting the hypothesis of the secreting gland tubules which von Preuschen had in the meantime demonstrated, concluded that the air collected in the glands; into these, as long as they remained open, air or germs might enter, and thus would generate gas in the ordinary way,

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* *Vierteljahrssch. f. Prakt. Heilkunde*, Prag, vol. 120.

† *Archiv*, v, 1873, p. 144. ‡ 1873, "Lehrbuch" 1, 2, A, 966.

§ *Correspondenzblatt f. Schweizer Aerzte*, 1875.

‖ 1876, *Archiv f. Gynäcol.*, ix, 461.

if the glands became closed. At the same time he proved that the cysts did not contain air, but trimethylamin; they had the odor of herring-brine, and an alkaline reaction. He showed, too, that trimethylamin was common in nature, occurring not only in herring-brine, but also in the blood of calves, ergot, cod-liver oil, urine, and chenopodium vulvaria; it boils at 48.7° F. The character of these vesicles and their great tension were suggestive of a low boiling point, for it was entirely inexplicable that atmospheric air could be under such high tension.

Indeed, Zweifel did not succeed in demonstrating directly the existence of trimethylamin in the vesicles, but Professor Hilger, of Erlangen, conclusively proved its existence in the healthy vaginal secretion of pregnant women, thus removing the objections which Breisky formerly held in regard to this explanation.*

The next communication came from Chénevière, who reported some cases from Professor Breisky's clinic in Prague, several of which were non-gravidæ, and one was a young girl of 17 years, giving, in addition to this, two illustrations which were very accurate.†

In a note appended to this article, Breisky remarked that he had under observation at that time a pregnant woman, in whom the unusual symptoms of emphysematous crackling or crepitation was had when the examining finger was pressed upon the posterior vaginal vault. Spiegelberg based on this article the statement given in his text-book, that the cysts are really ectasiæ of the lymphatics; Klebs also makes the same assertion.

Eppinger's view as to the location of the gas was next confirmed by Carl Ruge.‡

In 1876 he excised a portion of the vagina with air cysts upon it, and found that the cavities were interstitial in the stroma, that they had no separate wall, and that small projections of connective tissue extended into their interior, and from these projections of free elastic or connective tissue fibres either floated in the cavity or extended across it in the form of trabeculæ. He named the condition *colpitis vesiculo-emphysematosa*. Klaus

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* *Loc. cit.*, p. 128. † *Archiv f. Gynäcol.*, XI, pp. 351–357; plate viii.

‡ *Zeitschr. f. Geb. u. Gynäcol.*, II, p. 29, 1878.

and Welponer objected to Zweifel's theory, first on account of the ease with which trimethylamin is absorbed, while the gas from the cysts will rise through water; again, because if the boiling-point be so low as stated, the high tension would certainly rupture the thin cyst wall. They also examined the gas and found its composition almost the same as atmospheric air—with but 4 per cent. less oxygen—which might, however, have been absorbed by the tissues.*

In Eppinger's second and more complete article, he arrived at the following conclusions: That the appearance of gas cysts filled with atmospheric air in the wall of either a part or the whole of the vagina was due to a purely mechanical change; that it might occur in any vagina, or, probably, more readily in one prepared or predisposed by some disturbance of the venous circulation; that it was analogous to interstitial pulmonary emphysema and to the subcutaneous variety, and was, therefore, in any case, simply an emphysema having no connection whatever with an inflammation of the vagina.†

The endogenous development of the gases contained in the cysts, was sustained in 1881 by Lebedeff, in opposition to Eppinger's conclusions.‡

He found that cysts have a connection with the venous hyperemia, that blood exudes from the capillaries, its fibrin becoming granulated, while the formed elements are decomposed, and he supposed that these changes, transpiring in the blood, might account for the formation of the gas. Lebedeff confirmed my own observations, viz., that in two days a gas cyst was developed at those points where an exudation of blood could be seen with the naked eye. The frothy character of the discharge he attributed to the gas escaping from the cysts.

The most recent literature upon the subject is by Hückel.§ The views therein expressed are based upon the study of two preparations, both from women above 50 years of age, the examination being under the direction of Professor Zahn, of Geneva.

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* *Centralblatt f. Gynäcol.*, 1879, p. 337.

† *Zeitschrift f. Heilkunde*, vol. I, Prag, 1881, S. A., p. 48.

‡ *Archiv f. Gynäcol.*, 18, p. 132. § *Virchow's Archiv*, 1882.

They confirm, in every particular, the result obtained from my original investigations. In both cases, Hückel found a violent and protracted vaginal catarrh. He further saw gland-like formations in the vaginal mucous membrane in the form of simple or divided tubes with cubical epithelium and a membrana propria which descended into them from the surface. These had, apparently, undergone no change, thus confirming the observations of Preuschen. Hückel, however, considered the cysts to originate in these glands, since they also possessed a membrana propria and a cubical epithelium; he explained their formation by assuming that a catarrh of the mucous membrane extends to the glands, and retention cysts result. He did not find ciliated epithelium in them. He further adopts the name applied to the condition by me. Since Hückel's article appeared, Heitzmann has written upon colpohyperplasia, and given some good illustrations, but, in addition to this, nothing new has appeared.*

From the above it seems that the simple name emphysema of the vagina will not apply to all phases of this affection; the designation given by me has been adopted by many writers, some others preferred Ruge's—*colpitis vesiculosa emphysematosa.* This will suffice for a disease which, as Lebedeff has said, "has almost no practical importance for the gynecologist, but is all the more interesting from a pathological standpoint, since it is not analogous to any of the known processes."

3. Neoplasms of the Vaginal Connective and Muscular Tissues.

These tumors of the submucous, muscular, and paravaginal tissues are grouped according to their composition—*fibromata,* when of connective tissue and vessels only; *fibromyomata,* when they contain muscular fibre in addition to the above, and *myomata,* when mainly composed of non-striated muscular fibres.

Ætiology.—There are many examples of each of these three groups, but such neoplasms of the vagina are in fact rare, and particularly so when compared with analogous diseases of the uterus. This fact seems rather remarkable, for the vagina is

* "Spiegelbilder der normalen und kranken Vaginal-Portion," Wien, 1883, pp. 91, 92.

exposed to manifold irritations, disturbances of circulation, displacements, etc., and at the same time has a thick layer of non-striated muscular fibres, similar to those of the uterus. The differences in the character of the mucous membrane, especially the smaller number of glands and their slight sensitiveness, and in the number and arrangement of the vessels may in some degree account for this, but will not altogether explain it. In contradistinction to those of the uterus the tumors referred to may be congenital or developed in infancy.* Still, they usually occur during the third and fourth decade, in the child-bearing period. They are also found in children, in girls about the age of puberty, and in parous women. But the number of these cases is too small to determine with accuracy the causative influences of the puerperal processes. Indeed the ætiology of all these formations is very obscure, for if they originated in the uterus, as Kiwisch held, they are really not vaginal tumors. The existence of the latter, however, is beyond all question. It is obvious that they cannot be produced by masturbation, as Faye claims, for the vaginæ of non-masturbating married women are exposed to much greater irritations than those of the masturbating, and they occur without causing neoplasms. On the other hand, we must bear in mind the possibility of a connection between these tumors and a partial hyperplasia of the walls of Gartner's canals, or of an obliterated Müller's duct.

Anatomy.—The tumors occur in all parts of the vagina, and their size varies from that of a pea to that of a child's head.† The larger they are the higher they grow, so that finally only the wall which is affected, but not the point of origin, can be determined. It is a remarkable fact that the disease generally attacks the anterior wall, scarcely half so often the posterior, and apparently still more rarely the lateral walls. Leteneur confirmed the observations of Rokitansky and Klob, but this view was opposed by Kleinwächter. Another remarkable difference between vaginal and uterine tumors is that the connective tissue and muscular vaginal tumors are invariably single, while the opposite is the fact in tumors of the uterus. They are pedunculated or

* Cases by Traetzel and Wilson.

† Greene.

sessile with about equal frequency. The pedicle may be thin, or as thick as the finger; it is generally short and thick, and may contain quite large vessels. Pedunculated tumors usually become cylindrical from the pressure of the vaginal walls and, if they partially protrude through the vulva, may show a constriction caused by the introitus of the vagina.*

Numerous changes may occur in the tissues composing the tumor. Serous infiltration, the tissue becoming very relaxed because of blood stasis, will soften the tumor or even make it fluctuate. In consequence of this, it has been mistaken for an abscess or a vaginal cyst. In Neugebauer's case the lymph vessels surrounding the tumor could be anatomically demonstrated. The œdema is sometimes so great that fluid exudes from the incised surface. It is obvious that the latter condition would cause a more or less rapid increase in the size and weight of the tumor.

In one case Kleinwächter saw a partial myxomatous degeneration of the tumor. We cannot doubt the possibility of fatty degeneration in some cases, though, according to Kleinwächter, it has never been observed. Calcification has been observed but once, in Taubert's case as reported by Meckel, in which an excrescence of the vagina three drachms in weight was found near the labia; this was associated with a calcareous tumor of the uterus.

Because these tumors are sometimes very vascular, arteries as well as veins being present, the growth will vary, within certain limits, in size, according to the fullness of the vessels; there may also be points of hemorrhagic exudation. True cavernous tumors do not seem to have been found in the vagina; Dupuytren had a case which may have been of this character, but it is so incompletely described that one can only say that it was very vascular.† Flunderberg refers to a case which will serve to illustrate hemorrhage into the tissues of such a tumor; four weeks after the delivery of a patient having a vaginal tumor the size of a cocoanut, an exploratory puncture was made which evacuated a dark-brown, syrupy, odorless fluid containing shriveled blood corpuscles. These tumors are seldom complicated with other

* Hildebrandt.

† Kleinwächter, *loc. cit.*, p. 367.

tumors of the genital organs. Only three cases of this kind are noted by Schroeder, Virchow and Pillore, in which a fibromyoma of the uterus or an ovarian tumor existed simultaneously. Neither do they degenerate into sarcoma or carcinoma, or occur with them; this is probably due to the small number of vaginal glands, and also because these tumors soon form a pedicle from the yielding wall, are then seen and removed before being much affected by injurious influences.

Symptoms.—Neoplasms of the vagina grow slowly, they may remain small for years, and therefore cause no inconvenience. They are not infrequently accidentally discovered by the examining physician. Some patients know of their existence for years, but, from the fact that they produce but little annoyance, pay no further attention to them. When they begin to grow they interfere with the mobility and distensibility of the vagina, or cause affections of adjacent organs, even those lying high up in the pelvis. Those developed in the anterior wall may cause dysuria, œdema, ischuria, and inversion of the wall with all their *sequelæ*. Those in the retrovaginal septum may interfere with or render defecation impossible. Tumors of large size prevent cohabitation. Such tumors also displace the vaginal wall and pull the uterus down, push it up, or displace it laterally, according to their situation. They may also interfere with menstruation, but this is rather unusual. As long as they remain small they do not prevent conception, normal pregnancy and labor. McClintock found a partially gangrenous, pedunculated myoma, about the size of a hen's egg, in a woman who was in the last month of gestation. The vessels from which the œdema results may also cause a more rapid growth during pregnancy, and the tumor may be an obstacle to delivery, and even cause such a narrowing of the pelvic canal that the Cæsarean section will become necessary. Smaller tumors delay labor or render it more difficult, or if the tumor be low down in the vagina the presenting part may drive it through the vulva. Porro's case demonstrates the possibility of mortification and gangrene resulting from contusion of the tumor. It is not definitely known whether the tumors diminish during the puerperium, though this is probable; it would depend in great measure upon their size

and vascularity. If the tumor has a long pedicle, it may protrude through the vulva without being forced down by the contents of the uterus. This occurs spontaneously, but slowly in small tumors situated low down, and large ones may by the tension on the vagina cause reflex contraction of the abdominal walls, thus driving the tumor down as if it were the child's head, even, as in Greene's case, causing rupture of the perineum. This having occurred, the pain is usually lessened. The delivery of the tumor generally takes place very slowly and is associated with violent pressure upon the bladder, retention of urine in the urethra and urethral catarrh.* The tumor may then make walking, standing, sitting and cohabitation impossible; or it may become strangulated, causing erosions, ulcerations, hemorrhage and decomposition, finally leading to the expulsion of the tumor or to septicemia.

Diagnosis.—Small neoplasms of the vaginal wall may at once be recognized as fibromata by their hardness, their shape and mobility. If situated high up or in the anterior or posterior vaginal septum, exploration by the rectum or urethra is often useful in determining their precise origin. In large solid tumors such examination is indispensable, combined with palpation of the abdominal walls, to determine the upper boundary of the tumor and its connection with the uterus. At the same time the mobility of the tumor and the displacements of adjacent organs must be regarded, since neglect might lead to injury of those organs in the extirpation of the tumor. I think it probable that many polypi which have been driven down from the uterus during labor have been mistaken for vaginal polypi, for labor so obliterates the boundary between the uterus and vagina that it would greatly increase the difficulty of following the pedicle and determining whether it was located in the vaginal vault or above it. The cases collected by Kleinwächter are by no means all vaginal tumors, neither are those of Jacob Denys, 1733, Simon, 1743, in which the presence of such a tumor is briefly asserted but not proved. So also are the cases of Baudier, No. 10, and Pillore, No. 13, at least doubtful; for

* Kleinwächter.

example, in the account of the latter case, we read that "the tumor was situated on the anterior uterine and vaginal wall." Van Doeveren's and Gensoul's cases may be considered with probable certainty to have been fibrous uterine polypi, as the pedicle was inserted very high up and the tumor had delayed the delivery; in one case the extraction of the fœtus with the forceps tore the tumor from its insertion, so that it is questionable whether the latter could have been determined.

An exploratory puncture would in some conditions prevent confounding these tumors with cysts or abscesses. In case this does not make the diagnosis clear the tumor may be harpooned or a small piece of the wall excised. Sarcomata may be differentiated from fibromata of the vagina by their softness and sensitiveness, and especially by their rapid growth.

Again, solid vaginal tumors have repeatedly been mistaken for prolapse or even inversion of the uterus, an error which is impossible, if the os uteri, and location of the uterus, are ascertained, and this should be done under all circumstances.

Prognosis.—This depends upon the size, mobility, vascularity, location and complications of the tumor. Small tumors should not be interfered with; the larger can only be removed by bloody operations, which may be attended with considerable danger if the tumor has a broad base. The complications arising during labor will be determined by the narrowing of the birth canal which the tumor produces, and the readiness with which it may be pushed downward. The Cæsarean section has repeatedly been necessary, one-third of the mothers and as many of the children perishing under the operation.

Treatment.—The tumor should be removed as soon as it becomes as large as a walnut, for having once attained this size it will soon form a pedicle and produce displacement, etc. If it be pedunculated the operator must be convinced that the pedicle is not in connection with adjacent organs, and that no diverticulum of the bladder, urethra, or rectum extends into it. If the pedicle is only as thick as a pen-holder it may be ligated with catgut, silkworm-gut, or silk, and cut off just below the ligature; if the pedicle be much thicker, a double ligature is passed through it and each half tied. If the insertion is broad or the pedicle very

thick, an elastic ligature may be applied about the base, and the tumor then removed; the ligature may be passed through some of the tissue to prevent it from slipping. It is unjustifiable to leave the tumor to be thrown off by natural processes after ligation, for putrefaction of the ligated portion is liable to produce general infection through the pedicle.

If there be arterial or parenchymatous hemorrhage after the removal of the tumor, the arteries may be ligated, or the wound treated as has been recommended in vaginal cysts.

A broad, thick pedicle may also be divided by the galvano-cautery, a method which has much to recommend it. But one should accurately mark out the points through which the loop is to pass before beginning the section, or the parts will recede; the loop should be allowed to pass through slowly, that is, the heat should be intense, and a Paquelin's thermo-cautery kept in readiness that bleeding arteries may be at once cauterized. It will be understood that tumors which cannot be lifted up from the surface are not to be operated upon in this way, and that care should always be taken not to exert traction upon adjacent organs with the loop of the cautery.

Broad-based sessile tumors can only be removed by turning them out of their bed with the knife or scissors. The bladder and rectum are first evacuated, the finger then introduced into the rectum or the catheter into the bladder as the case may be, and the introitus of the vagina drawn apart with blunt hooks; when the size of the tumor will permit it, the vagina may be drawn down with a loop of cord so that the portion of the wall which is to be operated upon can be brought into full view. The surface is now thoroughly disinfected, the capsule divided in the longitudinal direction of the tumor, and the latter dislodged from its bed with the handle of the scalpel; small bleeding vessels are closed by torsion, and the larger ligated. The cavity must be carefully disinfected, and if the walls toward the vagina are very much relaxed, a piece may be excised from each side, and the wound then closed in its entire length and breadth by passing the needle completely around it; hemorrhage, which is the principal source of danger, will thus be prevented. The

tumors must not be drawn down with too much force, or the vagina or perineum may be ruptured.

In addition to myomata with non-striated fibres, there are also neoplasms of the vagina containing striated muscular tissue. Hitherto but a single well-authenticated case of this sort is known, the one described by Breisky and Kaschewarowa Rudewna; a growth upon the anterior wall of the vagina, resembling a polypus, was extirpated, but recurred in six weeks in the form of an irregular tumor the size of a hen's egg. The patient was 15 years of age. This tumor had a reddish color like mucous membrane, and the tissue forming it was so loose that pieces could easily be broken off with the finger; in color and consistence the tissue resembled smoked salmon. It grew rapidly, soon became necrotic, and caused a fatal issue in three months after the patient's second admission. The autopsy showed a nodulated tumor extending into the perivaginal tissues to the right and posteriorly, where one portion the size of a goose-egg lay loosely attached. Klebs examined it microscopically, and determined it to be a hyperplasia of normal muscular tissue, for he was able to follow out some of the muscular fasciculi into those belonging to the levator ani. From the hyperplasia there proceeded a proliferation of the connective tissue and muscular portions, the former as a myxoma, the latter as fasciculi of striated fibres, which in the older parts near the point of origin were band-like, striated and without sarcolemma; the tissue more recently developed was composed of spindle-shaped cells with transverse striæ.

These tumors are closely related to sarcoma and carcinoma; they soon recur, and are to be treated as such growths.

It appears as if there had been a metastasis of the tumor in the case just given, for a firm, whitish nodule the size of a lentil was found in one of the pyramids of the kidney, but its character was not definitely established.

4. Lipomata.

Pelletan claims to have extirpated two lipomata from the recto-vaginal septum; proof by microscopical examination is not furnished, however, and no cases of this kind have since been reported.

5. Sarcomata.

Sarcomata very rarely occur in the vagina. Kaschewarowa Rudewna has described cases of this character, and Prof. Kieter has extirpated such tumors. Two others were operated upon by Spiegelberg. Saengers' case was a girl three years old. A round-celled sarcoma originating in the anterior columna rugarum, associated with œdematous swelling of the tissues, perforated the bladder, causing death from perforating peritonitis. Ahlfeld had a similar case of congenital fibro-sarcoma. More recently Soltmann has published a case of primary sarcoma of the mucous membrane of the anterior vaginal wall with secondary sarcoma of the bladder. Kieter's cases were of rapidly recurring spindle-celled tissue; one case of Spiegelberg's, of a medullary small-celled, and the other of spindle-celled sarcomata. In Soltmann's case—a child two years old—the tumor proceeded from the anterior vaginal wall in the form of a convolution of reddish or yellow or dark-red proliferations, which were transparent, soft, and in part gelatinous.

Marchand asserted that the tumor primarily originated in the vagina, and that the grape-like form was characteristic of vaginal sarcoma. Further, a case has been observed by Bajardi and E. Bottini.

Sarcomata of the mucous membrane may, therefore, occur as a soft, circumscribed, circular node, or as a diffuse sarcomatous infiltration, the latter closely resembling carcinoma. As a rule they are found in young patients, but are also seen in the aged. Their symptoms vary with their position. When on the anterior wall they may cause dysuria, pressure on the bladder, inversion of the anterior vaginal wall and sensations of traction and tension. They may produce genital hemorrhage after the menopause. Occasionally metastasis to other organs occurs. Emaciation, anemia, œdema of the extremities, retention of urine, violent pains and uræmic symptoms may accompany them. If they extend through the vaginal wall and attack neighboring organs, their degeneration may cause abnormal communications with the bladder or rectum, *i. e.*, fistulæ. Inflammation of the pelvic peritoneum or pressure upon the sacro-ischiadic plexus will cause violent pain, inability to walk and constipation.

Treatment.—Early excision of a nodule if isolated may cure the patient. Spiegelberg's case is an example of this, no recurrence being noted after four years. In diffuse sarcoma the prognosis is bad; recurrence is to be expected even after complete extirpation, and the operations necessary for the removal are attended with hemorrhage and are dangerous.

6. Primary Cancer of the Vagina.

All the various forms of carcinoma—cancroid papillary tumors, fibro- and medullary carcinoma—are met with in the vagina, though they are alike rare. Papillary cancroid seems to be most common on the posterior wall. It sometimes extends in a longitudinal direction, and sometimes laterally or to the opposite wall. Ulceration soon occurs on the surface, and hence an uneven, eroded appearance. The pelvic and inguinal glands are soon implicated. The ureter is not usually attacked until during the last stages of the disease; in one case under my care it became affected two months before death. Proliferations then extend into it and hydronephrosis and uremic symptoms occur. Sloughing may take place, causing recto- and vesico-vaginal fistulæ.

Among the symptoms are irregular hemorrhages, particularly after coition, more or less violent itching of the external genitals, increased secretion of mucus and pus, gradually becoming offensive in odor, pains in the lower extremities, particularly in the course of the sciatic nerve, and difficulty in cohabitation. Dysuria or violent pain in defecation occurs. With the progress of the disease, fragments of tissue pass away when the finger or speculum is introduced. In a case of rhabdomyoma, in a woman 70 years of age, I removed large pieces of the vaginal tissue with the finger. Quite frequently there is little or no pain even in cases in which the disease has made great inroads into the tissues. In other cases uremic symptoms are developed, characterized by headache, nausea and vomiting. Occasionally the hemorrhages are repeated, the fistulæ increase the decomposition, and the patients finally succumb to the exhaustion or septicemic and uremic processes.

Ætiology.—T. Smith found cancer of the recto-vaginal wall

in a child of fourteen months. Guersant saw an excrescence 20 centim. (nearly 8 in.) long and 28 centim. (11 in.) in circumference growing from the introitus of the vagina in a child of three and a half years. In the Strasburg pathological collection, where there are four cases of primary vaginal cancer, Johannovsky discovered a sessile, nodulated, gland-like carcinomatous tumor the size of a hen's egg, situated in the posterior vaginal vault. The preparation was from a girl nine years old. Küstner was able to establish a marked predisposition in only one of twenty-four cases of primary vaginal cancer which he found reported. Hegar extirpated two ulcerating cancroid nodules from the vagina, which had developed exactly at the spot at which a Hodge's pessary had pressed against the ischium, and I believe I have seen a vaginal cancer result from wearing a Zwanck's pessary. Küstner's patients were, as a rule, above thirty years old. One-third of all cases occur in women between forty and sixty years old, but one-twelfth are between fifteen and twenty, and twenty and thirty years; there is, therefore, a comparatively large number of cases of primary vaginal carcinomata in which a protracted local irritation may be excluded, and which are accordingly in all probability cases of congenital neoplasm. This tends to substantiate Cohnheim's theory, which is, that these growths result from disease germs that are included in the embryonic development.

It is possible that gestation has something to do with the development of such germs, for Bailey, Küstner and Bruckner have seen cases in which the disease was first discovered during gestation, and my last case came under observation soon after the patient was confined. Such cases are, however, in the minority; nor is it positively known that the disease did not exist prior to pregnancy.

In 17 women with primary vaginal cancer, 6 were nulliparæ, one had aborted once, and another twice.

Carcinoma of the vagina has hitherto never been observed associated with prolapse of the uterus, though the vagina is here subjected to protracted irritation, and ulceration of the inverted wall is a common occurrence.

In more than 5000 women A. Martin found but 4 with primary

vaginal cancer, which very nearly corresponds with Gurlt's percentage from the Vienna clinics—not quite 1 per 1000.

Diagnosis.—Carcinomata may be mistaken for condylomata, sloughing fibro-myomata, and for sarcomata. The excision and microscopical examination of small pieces of the tissue are here eminently proper, for the operation is easily done and is painless, and the examination very soon confirms the diagnosis. Very careful examination of the os uteri will determine whether the disease be primary or not, for secondary carcinoma is frequent in inverse proportion to the rarity of primary vaginal cancer. It is interesting to observe that the disease more frequently extends to adjacent organs, as the bladder and rectum, than to the uterus, which is much more predisposed to cancer.

If the vaginal portion of the uterus be but slightly affected when compared with the extension of the disease in the vagina, as a rule, though not invariably, we may conclude the affection was primary in the vagina. Küstner also believes that many cases of vaginal cancer are reckoned with uterine cancer, because the vaginal portion had become implicated, and on examination or at the post-mortem both affections were found present. Nevertheless, he holds that heretofore in only three cases of primary vaginal cancer has it been proved that the uterus and vagina were simultaneously affected.

Prognosis.—Klob states that primary vaginal cancer may be spontaneously eliminated and a cure with the formation of cicatrices result, but these cases are extremely rare. As a rule, the prognosis is unfavorable; the average duration in cases observed by me was not longer than in cases of cancer of the uterus. The disease recurs just as rapidly after an operation.

Treatment.—Circumscribed cancerous nodules should be excised with the knife or scissors as soon as possible, and the wound united by sutures. This plan has recently been recommended and successfully carried out in diffuse vaginal carcinoma by K. Schroeder and A. Martin. The operation has even been performed in cases in which it could be seen in advance that the loss of time would be so great, a union of the wound would be out of the question. K. Schroeder has opened Douglas's cul-de-sac and removed the cancerous growth from the vaginal vault

and wall of the rectum, uniting the wound by deep transverse sutures; two of his patients recovered.

But ordinarily one will be restricted to palliative treatment, partly in the form of disinfecting injections of solutions of salicylic acid, thymol, carbolic acid, or corrosive sublimate; when hemorrhage and decomposition occur, the actual cautery should be applied to the entire carcinomatous surface. Von Gruenewaldt removed a recurrent vaginal cancer with the galvanocautery, but in so doing cut through a branch of the hypogastric artery, and the patient died from hemorrhage in a few minutes. In my last case I greatly lessened the hemorrhage and decomposition by the free application of the actual cautery; the diseased tissue was so extensive that any union of the wound made by an excision seemed impossible. After the operation, if the loss of tissue be too great to admit of union, the bleeding vessels should be separately ligated, the wound cauterized with the hot iron, and then tolerably firmly compressed with salicylated cotton. The tampon remains from 12 to 24 hours, and the wound is then treated as in case of cancer of the uterus.

In pregnancy and during labor the treatment will depend upon the size of the tumors; small ones may be left until two or three weeks after labor and then excised. Schroeder claims that the larger ones should be excised during labor, while Spiegelberg and Fritsch recommend Cæsarean section for the sake of the child.

CHAPTER V.

NUTRITIVE DISTURBANCES OF THE VAGINA.

We distinguish eight varieties of inflammation of the vagina, namely, catarrhal, gonorrhœal, mycotic, gummatous or syphilitic, croupous or diphtheritic, dysenteric, erysipelatous and vesiculo-herpetic.

1. Vaginal Catarrh and Gonorrhœa.

Vaginal catarrh may be acute or chronic. In the acute form the mucous membrane is red, swollen and relaxed, and the columns more marked. The secretion is profuse, at first trans-

parent, but soon becomes opaque, milky and purulent. The epithelium is exfoliated in large masses. The papillæ are swollen; they appear as nodules, the size of millet seeds, on the summits of the folds, and also over the whole extent of the vagina, giving it an irregular, uneven and rough surface like a file. The swelling of the papillæ in groups is caused by a small-celled infiltration, the superficial layers of their epithelium being exfoliated, so that the deep layers alone remain. At first they are rather pale in color, and situated upon a dark-red surface, but they soon become brown or cherry-red, then black from extravasation of blood, and may bleed somewhat when the tender epithelial covering is removed by the examining finger or speculum. Beside this papillary swelling, the muscular tissue or even the paravaginal connective tissue may be œdematous, and the inflammation extend to the walls of the bladder and rectum. The secretion has usually a strongly acid reaction, and often contains the previously described *trichomonas vaginalis*, in addition to pavement epithelium, mucus, pus corpuscles and rod-shaped bacteria. In gonorrhœal colpitis the diplococci or gonococci of Neisser are also found. The latter are remarkably large, round micrococci, 0.83 mm. in diam., deeply colored by methyl violet, lie by the side of each other, or in groups, several discs of which may be enveloped by mucus, thus forming a colony. This catarrh may affect the entire vaginal canal or only parts of it, in the latter case, generally the lower portions, or the part surrounding the vaginal portion. Catarrh of the uterus, of the vulva, and particularly of the glands of Bartholin, may be associated with vaginal catarrh.

When this affection has become chronic the swelling and the dark red velvet-like condition of the vagina are diminished, the mucous membrane becoming more livid in color; the dark-brown spots become slate-colored; the secretion is creamy or greenish and purulent, often containing the *trichomonas vaginalis;* the papillary swelling and the unevenness of the surface are less marked.

Symptoms.—A feeling of internal heat, pressure, chilliness and increased secretion are the first symptoms. These soon increase in severity and are followed by fever, pain in the uterus, desire to urinate, and difficult defecation and coition. The

discharge becomes more profuse, produces excoriation of the adjacent parts, and adheres to the hairy portion of the vulva, where its decomposition may cause a very disagreeable odor. Coition is impossible on account of the pain. The urine coming in contact with the inflamed and eroded parts of the introitus causes violent, burning pain. Retention of urine accompanies the severer forms of the affection. The patient is annoyed by desire to go to stool, or by pain during defecation. This condition may last two or three weeks, and she is debilitated by the profuse secretion, fever and pain, after which the disease may subside, or pass into the chronic state. In chronic catarrh attention need be called only to the profuse secretion and its consequences. The long-continued discharge gradually weakens the patient; she is pale, has rings about the eyes, anorexia, and is constipated; coition, while no longer so painful, causes some suffering. Conception is rendered more difficult, not only for the reason just given, but because the discharge destroys the spermatozoids.

A diffuse acute or chronic vaginal catarrh is rarely uncomplicated. In 30 cases in girls under eighteen years, Boys de Loury found 20 complicated with vulvitis. It is still more frequently associated with endometritis, or the latter supervenes when the catarrh has been protracted. Other complications will be named when we consider the ætiology.

Diagnosis.—When the labia are separated so that the lower part of the vagina is exposed, catarrh of the mucous membrane may be recognized by the naked eye; and from the previous description, it can be known if the disease is acute or chronic. To determine whether the whole vaginal canal or only a part of it is affected, the vagina must be examined by means of specula, or of various retractors.

Appendix.

Vaginal and Uterine Specula.

Historical.—Galen * is apparently the first writer who mentions the vaginal speculum. It has been asserted that Aretæus †

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* A. D. 131–200.

† A. D. 100.

was acquainted with it, because he described ulcerations of the uterus and their treatment; but this conclusion is not justifiable, for what was then called the osculum uteri was really the introitus of the vagina. Aetius knew of the speculum, and often used it;* but the instrument was known long before his time, because two and three-bladed specula have been found in Pompeii and Herculaneum.

Jacob Rueff, in his treatise,† gives an illustration of a three-bladed speculum, which he called a speculum matris, and which he used to dilate the os uteri during labor. The speculum was then forgotten until it was discovered or rather reinvented by Récamier,‡ when it rapidly passed into general use. Carl Mayer introduced the milk-glass speculum into Germany, and Fergusson, the silvered-glass speculum into England. Further, Simon, Metzler, and Sims§ began to use the duck-bill speculum, which led to the many varieties and improvements of the present day.

Varieties.—The forms in general use are the simple and double tubular, one, two, three and four-bladed, and single and double duck-bill speculum.

Any one of these may be with or without a handle, and may be provided with an obturator, or lever and screw, to separate the blades. In order that as much as possible of the vaginal walls may be seen after the speculum is introduced, it is composed of several parts, or made of glass, or fenestrated.

The cheapest and simplest variety for many cases, particularly if the vagina is large and not sensitive, or for the long vagina of pregnancy, is the tubular speculum of milk-glass or of hard rubber. Fergusson's is more expensive, and illuminates poorly when there is a bloody discharge. The tubular speculum is not a suitable form when the vaginal portion is drawn backward and fixed, in retroflexion or in any other condition in which it is hard to engage, since one must have a certain size for each case, and then it is sometimes impossible to bring the portion in view even with the largest instruments. Moreover, it

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* A. D. 502–575.

† "De Conceptu et Generatione Hominis."

‡ 1818.

§ 1845–1846.

must be kept by the patient in case remedies are to be applied through it.

Those patients who have noticed what a difference there is in regard to the introduction of the instrument between this and the two-bladed Cusco speculum, invariably prefer the latter. Its most important advantages, however, are the ease and certainty with which the vaginal portion may be engaged, after one has ascertained its direction by touch, and, secondly, when the portion is once engaged, the speculum is self-retaining. Two or three, differing in length and width, will suffice for almost all cases.

The blades of Cusco's speculum are placed on the anterior and posterior walls of the vagina.

The duck-bill specula introduced by Sims and Simon, which have contributed so much to progress in the diagnosis and treatment of vaginal and uterine affections, were not devised by them, but, as Schuppert (of New Orleans) has shown, by Metzler in 1846. The latter described his instrument as follows: A silver or plated vaginal speculum which consists of a gutter-shaped conical blade measuring five inches and a half, the lower half of which had a sharp outward curve.

In order that the blades might be separated as widely as possible without being hindered by the screw, Bozeman had a speculum made for his fistula operation, which was to be introduced in the knee-elbow position; the blades are to pass along the sides of the vagina, and have two arms attached to them perpendicular to their long axis, which can be separated by a screw. In Smith's and in Goodell's speculum the blades are separated in parallel lines by screws, or may be made to diverge by means of the lever, the screw fixing them in either position: this is an improvement.

The most recent instrument is that devised by Massari. It is to be introduced in the lateral posture, the shorter, more curved blade being for the anterior vaginal wall, the flatter, wider and longer blade, for the posterior one. The metal rods in connection with the blades have their lower extremities bent downward and a screw attached. The rods are attached to the blades by a movable joint, so that each blade may be placed in a variety of

positions, thus attaining the greatest possible number of modifications. I consider this a very complete instrument, and worthy of being recommended.

The Application.—The speculum is usually introduced after touch. The introitus is exposed by drawing the labia minora apart, the urethra is to be avoided, and the instrument carefully introduced without the use of force. The obturator is removed, or the blades opened by pressure, when the point is reached where the os uteri is believed to be, and, after it has been examined, the whole vagina may be seen, or medicines applied to it as the blades are being withdrawn.

The use of the speculum informs us of the area and intensity of vaginal disease, of the origin of discharge, of the complications, the condition of the lips of the uterus, and of the uterine secretions. As Beigel found an acid reaction at the introitus of the vagina in all cases of genital discharge, the reaction alone is not sufficient to warrant the exclusion of a uterine hypersecretion.

In addition to the above, a microscopical examination of the vaginal secretion is essential to a complete knowledge of the condition.

Ætiology.—Active and passive hyperemia of the pelvic organs predisposes to vaginal catarrh, and therefore, pregnancy and labor are causes, also all disorders of menstruation, micturition, and defecation. A still more common cause is obstinate and chronic constipation protracted through years. According to Matthews Duncan, alcoholism predisposes to vaginal catarrh. Under these circumstances, acute inflammation appears after taking violent cold, *e. g.*, wetting the feet, dancing during or immediately after menstruation; or from injuries received in violent coition, particularly when there is a disproportion in the male and female genitals; further, when vaginal pessaries, which are unsuitable or are too large, or of improper material, are worn. I have repeatedly seen acute vaginal catarrh result from wearing one of the recently introduced stem pessaries (Martin's), which are poorly varnished. Masturbation with foreign bodies of any sort, which are introduced into the vagina and sometimes left there, acts in the same way. Excessive uncleanliness among

the working classes may also be a cause.* The passage of feces and urine through the vagina is very liable to produce a catarrhal condition. It is questionable whether worms—the oxyuris vermicularis—will cause vaginal catarrh, since they never enter the vagina in great numbers, only a few at a time being present. But, beyond all question, the most frequent cause of acute primary vaginal catarrh is gonorrhœal infection.

Secondarily, we find vaginal catarrh associated with diabetes, general scrofulosis, neoplasms of the vagina, and uterine affections, particularly those characterized by profuse secretion and decomposition, and hence the puerperal state is an especially fruitful source of vaginal catarrh. Further, it may occur in various systemic affections, *e. g.*, exanthemata, dysentery and chlorosis.

About two-thirds of the cases of acute catarrh become chronic, all causes which were concerned in the production of the former being also in force in the latter. Neglect during menstruation is here of especial importance. Vaginal catarrh is certainly a frequent disease, but by no means as frequent as cervical catarrh.

Prognosis.—In regard to the duration, the prognosis must be guarded on account of the tendency to recurrence, the neglect of the first stages of the disease, and the frequent development of chronic catarrh. Acute primary cases, and those caused by taking cold, by foreign bodies, pessaries, etc., are most easily, certainly and rapidly cured. The chronic catarrh of constitutional ailments often disappears with the latter, as is the case in that of exanthemata, though this also occasionally becomes chronic. Sims found that the acid vaginal mucus generally killed the spermatozoids in five or six minutes, and therefore this secretion may be a cause of sterility in some women. It usually requires weeks and months to effect a cure in chronic catarrh, the time often being still more protracted because the patients, out of regard for their husbands, do not practice strict sexual continence, which must always be insisted upon.

Treatment.—Vaginal catarrh can only be entirely prevented by preventing its causes. The force of this precept is

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* The maggots of a marsh fly.—E. Martin.

seen in regard to dietetic regulations during menstruation. These must be observed not only when the menses are profuse or painful, but also when they are perfectly normal. Dancing during menstruation is especially injurious, but warning is generally useless. This disregard is not the result of simple desire for pleasure or the enjoyment of the dance, but more frequently of a certain shame or anxiety lest the reason may be surmised why the young girl does not dance, or remains away from the ball. Or, the menses may appear during the dance, and the fact be concealed for the reasons just given. To stop the flow by using sitz- and foot-baths, or to provoke it by the use of internal medicines or other means, as is the custom of so many young women, is, of course, extremely reprehensible. Many a mother has confessed to me neglect in this particular, stating that she has allowed her daughter to dance while menstruating, etc., and that sickness has been the immediate result. Many young girls injure their health by the excessive use of acid drinks for the purpose of getting a pale complexion, because they think this attractive, and their end is not seldom attained by taking vinegar; in these cases a muco-purulent discharge replaces the menstrual flow.

Long and fatiguing wedding-tours are especially harmful and injudicious; nights in frequent sexual indulgence; days in climbing mountains, riding or driving over rough roads, walking about or standing in galleries, all of which tend to produce active and passive hyperemia of the pelvic organs, so that frequently abortion and its consequences supervene, or swelling and hypersecretion of the vaginal mucous membrane occur before conception. It is for these reasons that so many young wives are forced to apply to a gynecologist, even before their wedding-tours are completed.

Another important point in prophylaxis is this: Correction of constipation in early childhood, and especially at the age of puberty. Young girls will not speak freely with the family physician on this subject, but at a later period of their lives often bitterly regret their sin of omission; obstinate constipation is most frequently associated with chronic female diseases.

The treatment of vaginal catarrh must be local, and in many

cases also internal. Tepid sitz-baths, warm baths, and a thorough washing the external genitals with a solution of carbolic acid will begin the local treatment. If the swelling is great, the pain severe, and the hyperemia considerable, local depletion by three to five leeches on the perineum has been advised, but I do not consider this essential and have never used it under such conditions.

In the early stages we may apply with great advantage emollient, antiphlogistic, then antiseptic, and finally astringent medicines directly to the mucous membrane. The method of application may be, and indeed, to produce the best results, should be varied. The medicines named may be injected in the form of solutions gradually going from the mild to the stronger, or poured in through the speculum, or they may be allowed to act through a bath-speculum in a sitz-bath; or, again, they may be applied as suppositories made with cocoa butter, gelatin, or tragacanth, or as ointments put upon cotton tampons, or, finally, pulverized and sprinkled upon the vaginal walls, or applied upon cotton.

The emollients of service in the early stages are tepid, mucilaginous injections with flaxseed, oatmeal, althea (prepared with milk), or poppy-head decoctions, to which a few spoonfuls of lead-water may be added. The pressure should not be too great, the tube should be pushed far up in the vagina, and about a quart of fluid used each time.

These should be followed by antiphlogistic and antiseptic injections, *e. g.*, borated water (3 per cent.), salicylated water (0.1 to 0.5 per cent.), solution of carbolic acid (0.5 to 2 per cent.), one, two, or three times daily, or a solution of corrosive sublimate (1–2 : 1000) once or twice daily at a temperature of from 22° to 25° R. (68° to 77° F.). Cool injections often feel better to the patient at first, but she soon learns that tepid or warm injections afford more permanent relief. Pouring the solution into the vagina through a wooden or glass speculum has not much to recommend it during this early stage, because the introduction of the instrument is very painful, and it should be employed as seldom as possible; the use of the bath-speculum is objectionable for the same reason.

When the congestion, swelling and pain have diminished, and the profuse secretion alone remains, astringents should be used in the following order: Injections of lead water, or of acetate of lead, decoction of oak bark (15 : 200), aluminate of copper, sulphate of copper, sulphate of iron, alum, infusion of matico, kino, catechu (decoct. 15 : 200), and sulphate of zinc. Of the salts one may take grs. 15 : 30 to the quart as a mild solution, gr. 70 : 80 as a stronger one, or several may be used at once, *e. g.*, alum and sulphate of iron in equal parts.

But as all injections flow out quickly, often over the folds in the mucous membrane, not penetrating into all the depressions, physicians have for fifty years been endeavoring to secure better action of the remedies in some other way. For example, Locock introduced pieces of linen covered with ext. of lead, laudanum, and mucilage into the vagina (1834). In 1835 Ricord advised packing the vagina with compresses wet with a solution of nitrate of silver; in fact this agent was strongly recommended for acute and chronic colpitis by most writers of that time. Others have used soft sponges saturated with the remedy, *e. g.*, red wine. In case the patient is scrupulously cleanly, these means may often be used with good effect, but in general they are not to be employed on account of the irritation and decomposition which ensue.

Black especially recommended suppositories, or better vaginal globules of cocoa butter, to which he added sulphate of morphia, half a grain, in each globule, and solution of sesquichloride of iron, twelve drops, to be applied every other day. He claims to have effected a cure with solution of iron in 9 days, with alum and tannin in 9½, balsam of copaiba in 12, with ointment of iodine in 13, with citrine ointment in 14, and with chloride of zinc ointment in 19 days. But when I hear the praises of remedies sung in this way I always think of Siebold's amusing account of the lectures of old Dr. Horn: If this does not help the patient, *recipe*—and if that be ineffectual, *recipe*—etc., etc. When these globules are made of gelatin they often pass away undissolved; on the other hand, rods or pencils of tragacanth mucilage, 6 centim. (2.3 in.) long, 1 centim. (⅖ in.) thick, mixed with a little sugar and placed in a narrow vagina, are often of good service.

But in obstinate catarrh this method of application is often insufficient, for the globules are too small, slip out, and do not contain enough of the medicine. Recourse must then be had to tampons, the size of a walnut or hen's egg, made of fine soft cotton or borated lint; these are to be covered with an astringent ointment. Here I can particularly recommend extract of rhatany, 4 to 50 of vaseline, as an active and painless remedy. Recently glycerole of tannic acid (Demarquay 1 or 2 to 10) has been very much used, but it is often followed for a few hours by a quite profuse, thin, watery discharge, which renders the parts very dry, and may alarm the patient unless she has been forewarned.

Further, painting the parts where the affection is most intense with solution of nitrate of silver, or with pyroligneous acid, and then immediately dusting over astringent and antiphlogistic powders, as alum, tannin, or iodoform, will be very useful in the chronic stage; this should be done two or three times a week. Recently hot water injections, at blood heat or several degrees higher, and under a very strong pressure, have been particularly recommended. Matthews Duncan reports a case in which these injections twice a day for five days completely cured the patient.* If the above named means do not cure, several may be combined; the injections may be used with the globules or tampons, and the parts regularly cauterized through the speculum.

Finally, the so-called bath-specula have been used; they are introduced into the vagina while the patient is in a sitz- or full-bath, and are retained during the bath so that the fluid may come in contact with the diseased membrane. The inner extremity must be rounded off, and the walls perforated, fenestrated, or made of spirals. But they have been superseded by the more efficient globules and tampons, and since gynecologists have called attention to the fact that they may be used for masturbation, they are not to be recommended.

Internal medication should not be neglected in acute or in chronic catarrh. In the former the diet should be carefully regulated, and mild cathartics occasionally used, *e. g.*, castor-oil, magnesia, various bitter waters and infusions. A few doses of

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* "Clinical Lectures, etc.," London, 1883, p. 165.

calomel, gr. 3 or 4 daily, until free evacuations are produced, will have an antiphlogistic effect.

In chronic catarrh with a scrofulous diathesis cod-liver oil is indicated; anemic patients will be treated with iron, especially the albuminous oxide; torpid individuals complaining of anorexia should be given cinchona or its alkaloids; these remedies improve the general nutrition and act upon the constitutional taint peculiar to each affection. The use of baths and waters is often necessary in scrofula, diabetes, and alcoholism, and for this purpose the waters of Carlsbad, Kreuznach, Ems, Neuenahr, Hall in upper Austria, and Tölz are often curative. At the three last named resorts the bath may also be used.

If the case be one of infectious colpitis the husband must be treated; he must be thoroughly cured before he again cohabits with his wife, and his attention called to the great danger the latter may incur from endometritis, salpingitis and pelvic peritonitis. I have seen a cancroid papillary tumor rapidly develop after repeated catarrh of the vagina associated with endo- and parametritis. Recurrent gonorrhœal colpitis has usually been treated with a strong solution of carbolic acid (5 per cent.) and nitrate of silver thrown into the vagina through a speculum; pyroligneous acid has also been used to check the discharge.

The leucorrhœa of young children may be successfully treated with bougies of gelatin or gum tragacanth about the thickness of a catheter, composed of 1 to 2 parts of iodoform to 10 or 15 of the vehicle. Constitutional conditions must also here be regarded, the scrofulous diathesis corrected, the activity of the skin promoted, and constipation relieved. Baths, cod-liver oil, iron, and cathartics or injections play as important a rôle in the treatment of this leucorrhœa as the local use of the remedies mentioned.

2. Colpitis Mycotica (Mycotic Colpitis).

If the spores or filaments of different fungi be placed in the vagina of a healthy woman they easily attach themselves, but the filaments and mycelia usually spontaneously disappear in two or three days. I have repeatedly performed this experiment by placing in the vagina of a non-gravida, fungi taken from a gravida, but I have never been able to verify the observation of

Haussmann, that the fungus not only attaches itself, but its growth is associated with a slight fever, moderate inflammation and increased secretion, that is to say, that the fungus is not the consequence, but the cause of the diseased condition.* But I do not wish to dispute his statement. Haussmann has also succeeded in transplanting the fungus of muguet to a pregnant woman, but never, however, to a healthy non-gravida. From these experiments it appears that a certain local predisposition is essential to the development of fungi in the vagina, which may be furnished simply by the changes peculiar to pregnancy or by the disorders incident to displacement or vascular disturbance. The varieties of fungi found in the female genital organs are:—

A. The leptothrix vaginalis, which, according to Haussmann, occurs in 14 per cent. of the pregnant, and in 10 per cent. of the non-pregnant; in the normal uterine secretion it is never found. It has the form of filaments whose length varies between 0.0055 mm. and 0.25 mm., their breadth being about $\frac{1}{7}$ of their length; they have rounded ends and are round upon transverse section. The spores belonging to them are oval, 0.0022–0.0033 mm. in length, and 0.0015–0.0022 mm. broad. Iodine colors the spores and filaments a greenish yellow. According to L. Mayer's observations and my own, they are sometimes branched; Haussmann and Hallier have never so found them. Transplantations from one woman to another have succeeded, but the fungus disappeared with an increased secretion from the last in 10 or 11 days.†

B. The branched fungus with broad filaments according to Hallier and Haussmann—oïdium albicans.‡ The breadth of these filaments varies between 0.0011 mm. and 0.0055 mm.; the proper mycelia filaments are not cleft, are seldom more than 0.0033 mm. broad, and between them are those which have a great number of members or branches. Haussmann says this fungus has no organs of reproduction; the pistils which spring from the mycelia are rounded or they have upon them a round, oval or pear-shaped body generally containing a nucleus, alone or in a vacuole.

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* Haussmann, "Die Parasiten der weibl. Geschlechtsorgane," Berlin, 1870.

† Haussmann's I. Versuch, p. 55. ‡ Robin.

The spores are round, oval, elliptic or pear-shaped, and often have a free nucleus or one inclosed in a vacuole. Haussmann claims to have found completely developed sporangia 0.0475 mm. long and 0.0342 broad only once, but I have very frequently found them in the mouth. I have never seen them in the vaginal fungus, and cannot accept Haussmann's explanation—that during each respiration the walls of the vagina move upon each other (?), thus limiting their development, and also causing the ripened sporangia to be loosened—as very fortunate, since if this were true we ought not to find sporangia in the mouths of infants, which, as already mentioned, is a frequent occurrence. Haussmann himself did not succeed in developing sporangia,* which, as he states, corresponds very well with Hallier's definition of oïdium, and with clinical experience, namely that the female genitals do not furnish a good soil for a luxuriant vegetation. He therefore believes that the muguet fungus of the cavity of the mouth, the oïdium lactis, and the ordinary vaginal fungus are identical, the existing difference being caused by the different fertility and temperature of the soils.

Haussmann had a negative result in transplanting penicillium glaucum, aspergillus glaucus, microsporon furfur, botrytis cinerea, mucor mucedo and mucor stolonifer to the female genitals.

Symptoms.—While the vaginal leptothrix causes little or no inconvenience, some patients who have the second form of mycosis complain of a severe itching and burning as soon as the affection has reached a certain intensity, also of heat and increased secretion; there is decided swelling of the internal parts which extends to the vulva so that the patients can hardly stand or walk. The pruritus is very violent at night, and the burning sensation becomes almost intolerable. The hypersecretion depends upon the exfoliation of the epithelium, and this upon the mass of the fungus, and its growth upon the mucous membrane. Some patients have comparatively few symptoms. As a rule mycosis begins with symptoms of a subacute inflammation, which abates and then increases in intensity, gradually extending to the whole vaginal canal.

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* *Loc. cit.*, p. 89.

As the growth usually descends to the introitus and inner surface of the nymphæ, and into the folds about the urethral orifice, the urine comes in contact with places where the epithelium has been exfoliated and causes pain. The pressure of a large growth of leptothrix filaments is said to hinder the development of the oïdium variety. Fungi have hitherto never been found in the os uteri.

The symptoms may be paroxysmal, and great irritation, rubbing and scratching, followed by exhaustion, and even profound weakness may occur.

The affection usually lasts from 5 to 10 days; it may become chronic or recurrent, when it may persist for 3 or 4 weeks, or even for months, as I have seen it during gestation.

Diagnosis.—A mycotic vagina and the mouth affected with muguet are in many respects similar in appearance. Upon the reddened sensitive mucous membrane, we see small whitish or whitish-yellow spots which cannot be scraped off, without, at the same time, removing the epithelium.

Under the microscope, the previously described filaments, spores and mycelia may be easily recognized. Sometimes they are confluent, but they never form large patches, as are seen in croup or diphtheria, and they are never larger than a pea. It is not definitely known how far the fungi penetrate the mucous membrane, but it is probable not deeply, for they may be removed from the surface with comparative ease. The slight fever and the scattered patches or spots, when examined with the microscope, suffice to differentiate mycosis from other forms of colpitis.

Ætiology.—All persons, who have catarrh of the genital tract, particularly if chronic, are predisposed to mycosis. Further, the gravid state furnishes the most fruitful soil for the development of these fungi. Küchenmeister, Wrede and L. Mayer regard moist and mouldy dwellings as a cause of mycosis, but the mould which is found upon the walls of buildings will not grow in the female genitals and, therefore, direct inoculation is improbable. Haussmann makes a similar statement as to microsporon furfur; but pityriasis versicolor during pregnancy does not predispose to vaginal mycosis. In 200 pregnant women, Haussmann found vaginal mycosis twenty-two times, *i. e.*, 11 per cent., but

only in 1 or 2 per cent. of the non-pregnant; and 33 per cent. of the pregnant had some venereal affection.

Friedreich found a fungus between the prepuce and glans penis of diabetic men, and the question has arisen whether this may not be transplanted, causing thereby vaginal mycosis.

This possibility is not to be doubted, and in a case of my own it seems very probable; a lady in the better class of society was affected with a very obstinate mycosis for several years, and which frequently recurred; her husband was a diabetic.

It is also possible that the fungi may be carried by the fingers of the gynecologist directly to the parts. I had not been able to trace any instance of mycosis to touching the genitals by the hands dusted with flour, but E. Martin gives this as the cause in one of his cases, in which a miller had been applying his hand to the genitals of his betrothed. Since then I had a case of severe mycosis in a baker's wife in which such an ætiological connection was very probable. Finally, A. Vogel has found vaginal fungi in children with muguet, a condition which may be owing to the evacuation of the fungus with the stools, or neglect of the nurse.

As a rule they disappear in the puerperium, either being mechanically removed by the parts of the fœtus, or by the strongly alkaline lochia. But as they are still in the vaginal walls when the head is born, Haussmann believes the child may be then inoculated with muguet.

The prognosis is good; the fungi usually disappear rapidly. At first, the symptoms may be quite severe, but they are easily removed, and usually in less than fourteen days.

Treatment.—Frequent injections of tepid or cool water will carry away the detached masses of fungi, and destroy the spores and filaments which still cling to the vaginal walls; one or two quarts must be thrown with some force through the vaginal tube at each injection. Various medicines have a tendency to destroy these fungi, viz., solutions of sulphate of copper, 1.5 or 2 to the 100, and of salicylic acid, 1 or 2 to 1000, carbolic acid, 2 per cent., or corrosive sublimate, 1 or 2 to 1000.

A glass tube should be used for the injections, because the

smallest particles may be easily seen in their interior, and the little orifices are more easily cleansed.

When severe burning pain persists in spite of frequent injections, relief may be obtained by tepid sitz-baths, or by anointing the parts at night with salicylated or carbolized vaseline. Moreover, mild cathartics and a light diet, with abstinence from alcoholic drinks, should be prescribed for 6 or 8 days. A particular form of colpitis mycotica is

Colpitis Tuberculosa (Tuberculous Colpitis).

Since we know that the changes peculiar to tuberculosis, *i. e.*, inflammation with the formation of inoculable, cellular, non-vascular nodules, are due to a species of fungus, tuberculous ulceration of the vagina must be considered as belonging to the category of mycotic diseases rather than to the neoplasms. Tuberculosis of the vagina is extremely rare. Virchow and Klob have proved its existence. Virchow, in a case of extensive tuberculosis of the urinary organs, found in the vagina groups of gray tubercles upon a reddish base. The isolated gray nodules were found in small numbers at the introitus of the vagina; they were more numerous in the vaginal vault, and most numerous at the os uteri.

Associated with tuberculosis of the lungs, liver and intestines, Klob saw the vagina covered with numberless confluent, circular ulcerations, the size of a lentil, with undermined edges, and in the tissues beneath them, yellow, caseous, broken-down, tuberculous nodules about the size of a pin's head. In 45 cases of genital tuberculosis, Geil found at the same time vaginal tuberculosis in only three. In addition to Virchow's cases mentioned above, Gusserow has published two cases of vaginal tuberculous ulcers.

But as the vaginal disease is secondary, only occurring when associated with tuberculosis of the uterus, or of other organs, it has no further clinical significance.

3. Colpitis Gummosa (Gummatous Colpitis).

In November, 1878, I described a disease of the vagina in a patient under my charge, being able to find in literature but one similar case. This was an observation which Birch-Hirschfeld

made at the autopsy of a woman 54 years of age, who, in addition to characteristic cicatrices on the gums, had old gummata in the liver.* In this case the vagina was constricted, had a smooth, pale surface, the submucous and perivaginal connective tissue indurated by gummata, so that the organ appeared like a thick-walled tube. The microscopical examination confirmed the opinion that it was a case of syphilitic perivaginitis.

But in my case, the mucous membrane and submucous tissue alone were affected, the vaginal canal seeming scarcely more rigid than usual; the inner surface was dry, rough from a grayish white membrane which covered it, and irregular, in short, it was a perfect endocolpitis. I have had the patient under observation for five years, and have treated her in all possible ways without the slightest benefit, syphilitic changes in the meantime having progressed in her eye. Hitherto the case is unique, and I shall, therefore, describe it in full:—

The patient, a brunette, 28 years of age, her parents alive and well, has seven healthy brothers and sisters, four having died in childhood; through her childhood she was healthy, but in her fifteenth year was attacked with swelling in both legs, which disappeared under treatment. In her sixteenth year she suffered with pain in the sacrum and abdomen, which returned every four weeks and lasted eight days. In her seventeenth year she first noticed a white discharge that did not completely disappear. In her nineteenth year she had an eruption on her face and arms, which was treated by inunctions. As soon as the eruption on the face disappeared, the left eye became affected, and remained in a very bad condition. At twenty years the patient had ulcer of the stomach, as stated by her physician; she vomited blood; this attack lasted nine months, and as soon as she recovered from it, an inflammation of the abdomen, *i. e.*, peritonitis, occurred and continued for six weeks; her hair fell out, but soon grew again. In her twenty-second year she had the first hemorrhage from the genital organs; this occurred at intervals of six months and was associated with the previous periodical pain in the sacral region. At twenty-five years she had an inflammation of the throat. Patient was never well, and had done no work, because she did not feel able. Since 1874 she says she has been under the care of a physician on account of the trouble with her eye, when similar pseudo-membranous layers were exfoliated from it as at present.

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* "Lehrbuch d. Patholog. Anatomie," Leipzig, 1877, p. 1161, Anmerkung.

Patient says she had sexual intercourse in 1870 for the first time; it was very painful and was followed by an increase in the then existing discharge, which became as clear as water and mucilaginous. The eruption had existed three months before cohabitation. She emphatically denies having had ulcers on the genitals at that time. One year ago she was treated by a gynecologist for the abdominal and sacral pain and white discharge; the discharge is then said to have ceased, and the present condition began August, 1877. She has never miscarried or been delivered of a child at term.

On the 14th–21st of October, 1878, I found her in the following condition: Brunette, head well covered with hair, and superficial, oval, pale cicatrices on the forehead and cheeks. The left eye is closed, the lids moderately reddened and swollen, the lower lid inverted so that the lashes touch the cornea, upon the internal surface of which there is an opaque membrane, that may be easily removed. The conjunctiva of the ball is swollen, and forms a prominent border about the cornea; internally and below it also is covered with the opaque membrane, its other portions being reddened up to the margin of the cornea, and its vessels dilated. The portion of the cornea corresponding to the part of the conjunctiva most affected, is infiltrated, gray and clouded. The pupil is dilated, irregular and deformed. When the membrane is removed, the conjunctiva pours out a secretion; this removal is painful. On parts where the pseudo-membrane grows, and which invariably is renewed in a few days when detached, it is corneous and dry. The right eye is unaffected.

On the right tonsil there is a circular, flat, grayish spot where the tissue seems to be changed. The uvula and gums are but little reddened.

The vulva is little reddened up to the mons veneris; there are no erosions in the left fold of the thigh. The labia are not swollen, but are dry. The rima is closed. When the nymphæ are drawn apart, there is found also a grayish-white pseudo-membrane which is in fact detached; this begins above the urethra, passes into it, and upon the anterior vaginal wall, also laterally from the inner surface of the nymphæ into the vagina, down to the posterior commissure, and thence through the entire vaginal canal as far as the vaginal portion. Externally, it ceases abruptly at the edges of the frenulum and nymphæ; above it extends to the vaginal vault, and at one time only, a small white spot as large as a pea was seen on the posterior uterine lip, but not at the border of the os. The external os is smooth, there is no cervical flow whatever, the sound is easily introduced and shows the uterus to be of normal length, and when removed there is no evidence of membranes. The membrane or deposit on the vagina is, in some places, several millimeters thick, may be easily pulled off with the forceps, and the parts under it are pale red.

The finger or speculum is introduced with great difficulty; even when

well oiled, the membranes which they remove are pushed before them and hinder their advance, and much pain is caused. There is no hemorrhage or other fluid secretion, and at first sight the affection seems to be a general croupous inflammation of the vagina. Upon touch, it resembles those changes which are produced in the vagina by strong applications of alum or solution of sesquichloride of iron.

The secretion has an intense acid reaction. The temperature is not increased,—vagina and rectum 98.5° F. The microscopical examination of the exfoliated masses revealed numerous cell-like fatty corpuscles, containing in part acicular crystals; when ether was added the fatty bodies broke up into drops and then completely dissolved; in addition there were thick layers of cornified epidermis-like pavement epithelium.

In order to examine the tissue of the mucous membrane itself I excised a piece just behind the carunculæ, posteriorly to the right side, where the deposit was especially great. Hon. Medical Counsellor Dr. Birch-Hirschfeld was so kind as to examine it, with the following result: *The epithelium was very much thickened, the epidermis-like upper layers were in many places loosened in masses or lamellæ like a membrane. The epithelial stratum corresponding to the rete Malpighii was also much thickened and had very large cells. The papillary bodies were hypertrophied, the submucous tissue was greatly increased, containing very many thick-walled vessels, between which the tissues were abundantly infiltrated with round and fusiform cells, so that it looked like a section of a fresh gummatous proliferation.*

On further observation of the patient we saw that new membranes were formed within two or three days upon the places from which we had removed them. Near the navicular fossa we could see this in progress; small gray nodules as large as a pin head at first appeared, and these later became confluent.

Another very interesting feature of the case was that October 16th, 1878, a discharge of blood, lasting two days—the blood escaping by drops,—occurred from the vulva.

When we now introduced the speculum, October 19th, we saw the whole vagina filled with a peat-like black mass resembling the blood-clots caused by solution of sesquichloride of iron, except that it was much dryer. This was removed by irrigation with a 2 per cent. solution of carbolized water, and from now on a greater or less mass of the same kind was thrown off by the vaginal walls. The membranes were not spontaneously expelled because they were too dry, but clung in thick layers to the vaginal canal.

The patient had no fever whatever during four-and-a-half weeks. Her principal complaint was of abdominal and sacral pain, and pain in the affected eye. The membrane on the conjunctiva and on the vagina were alike in every respect.

During this time I had several of my colleagues, Hecker, of Munich, and Mandelstamm, of Mohileff, to see the patient. Neither had ever met with a case at all resembling it.

The question now arises: Can it be proved that the patient is syphilitic, or even that this is probable, or that her condition is a symptom of syphilis?

While acknowledging the plausibility of syphilis, we still assert that the following points are against this view: The patient has had no characteristic symptoms of syphilis, neither on the vulva, gums, in the vagina, nor at the os uteri: she has had no enlargement of the inguinal nor other glands, or periostitis, is not anemic, nor can it be said that she is poorly nourished. The eruption on the skin appeared before she had had sexual intercourse, and the eye became affected in a manner identical with the vaginal affection, immediately upon the disappearance of this eruption. Finally, the patient used antisyphilitic medicines for a long time without affecting the local disease.

However, the falling out of the hair is suspicious, and the anatomical condition is such that the affection is best named colpitis gummosa, as it is neither a simple croup nor a diphtheria.

Having requested my colleagues who had seen or heard of such cases, to assist me in answering the question whether this disease was really specific or not, and no one having responded, I conclude that none of them have seen such a disease in the living subject.

During the five years which have elapsed since my first publication of this case, I have had the patient upon the following antisyphilitic treatment. Inunction with mercurial ointment almost to the point of salivation, iodide of potassium almost to iodism, subcutaneous injection of corrosive sublimate, and, finally, iodoform in substance and in vaseline ointment applied to the vaginal canal. Between these different courses I allowed the patient a respite of a month or so during which she used tonics, etc., taking up a new method only when she was suffering unusually, especially with pain in the left eye in which the clouding of the cornea has been steadily increasing. At one time it seemed as though the introduction of the speculum was easier and less painful, notably after the protracted use of iodoform, but the improvement was very transient. She was perceptibly better only when the menstrual intervals were unusually long; her general condition was indeed at all times comparatively fair, and she was often in very good flesh.

No traces of secondary or tertiary syphilis were seen by me during these five years, but this may be owing to the energetic antisyphilitic treatment to which she was subjected. The intervals of six months and nine months were certainly long enough to permit the eruptions of latent syphilis. Her local condition was not in the least changed. I am, therefore, more and more inclined to the opinion that her trouble is not an acquired syphilitic affection, but of a scrofulous nature, or, perhaps, hereditary syphilis, the latter being probable because she suffered as was stated, from childhood, and because the anatomical condition is more like a syphilitic disease than any other.

I will state, in conclusion, that I have repeatedly seen the new membrane developed at the introitus of the vagina and on the inner surface of the nymphæ in the following manner: At first circular, grayish-white spots the size of a pin's-head appeared, which soon became confluent, thus forming a connected epithelial stratum. While the process on the left lower eyelid was accompanied by shrinking and the development of entropion, not the slightest evidence of deeper tissue changes in the vaginal region could be found during the whole time she was under observation. This is also opposed to the assumption of a syphilitic gummatous affection, for when we consider the extent and intensity of the disease, it is hardly probable that adjacent parts would have remained normal. Fortunately the patient's right eye was not affected, at most, there was only occasional injection of the conjunctiva, or œdematous swelling of the lids.

We have thus far considered the primary inflammations of the vagina, and some less common secondary affections will now engage our attention. The first in this class is

4. Colpitis Dysenterica (Dysenteric Colpitis).

I have never seen this disease, and will therefore follow Eppinger's description, who examined the condition in twelve dead subjects, and gave us the first and only account of its anatomico-pathological characteristics. From the fact that in all cases the dysenteric changes were in an earlier stage of development than in the intestine, and were invariably found in the lower half of the vagina, and upon its more prominent portion,

he concluded that the dysenteric poison—certain microörganisms—had passed from the rectum into the vagina. He believed that a short perineum and a large introitus were favorable to this inoculation. The colonization occurred in fissures or in parts denuded of epithelium, which may originally have been caused by contact of the dysenteric dejections with the vaginal mucous membrane. The organisms first cause a stage of epithelial necrosis; they are at one time found under the epithelial layers, and at another between them; they cause a swelling of these layers and consequent compression; their protoplasm becomes granulated and they are transformed into amorphous plaques which are finally separated. This is followed by a deeper exudative necrosis of the tissues and obliteration of the papillæ, separation of the connective-tissue fasciculi by the deposition of molecular and cellular débris with the preservation of the nuclei, and thrombosis of the vessels. This dysenteric crust or membrane is said to be less liable to extend than septic and malignant formations; it is, moreover, scarcely possible to mistake it for others in this region, because the diphtheritic membrane of the vagina invariably proceeds from the nymphæ upon and below the surface, frequently becomes putrid, and when examined in a fresh condition—except firm fibrinous exudative infiltration—always shows sharply defined groups of micrococci and characteristic rod-shaped bacteria. Further, true vaginal diphtheria is never associated with dysentery, while typhus of the vagina has only been observed with typhus of the intestine.

The detachment of the crusts or scabs next causes the dysenteric ulcer, granulation tissue forming under the suppurating surface, which is followed by recovery with a cicatrix. With regard to the superficial area of the affection, spots of the croupous deposit alternate with erosions, and with the dysenteric crusts and ulcers.

Eppinger includes the microörganisms in that class which Klebs has named monads, because he saw in them the peculiarities belonging to the latter. Whenever observed, the masses of micrococci were irregular in form, the rounded outline was never distinct, the isolated cocci were pale and large, and when freshly

examined, the movements of an individual coccus were exceedingly active.

Eppinger found the frequency of intestinal and vaginal dysentery to be variable; he believed, however, the disease occurred oftener than he had observed it in the dead subject, and that it might cause adhesions, or even fistulæ.

Another secondary vaginal affection is described by the same author. This one is known as

5. Erysipelas of the Vagina.

Eppinger had a patient with non-puerperal facial erysipelas, which was cured, and erysipelas of the vagina and thigh, which was fatal. He found in this case the following very interesting facts. The patient was a laboring woman, aged thirty-five years; the vaginal mucous membrane as high as the fornix was much swollen, thrown here and there into large folds, and generally congested. A superficial band of erosion, as broad as the finger, having an intensely red surface, covered by a thin whitish deposit and with small epithelial vesicles at its border, was found upon the posterior wall, extending from two centimeters ($\frac{4}{5}$ in.) above the posterior commissure to about the middle of the vagina. The epithelium was thickened, œdematous and easily removed; the subepithelial and submucous connective tissues were swollen, œdematous and very red; both nymphæ were swollen and reddened, and there were a number of vesicles about the size of a bean upon the inner surface of the left labium majus. The microscopic examination showed swelling, enlargement and the formation of cavities in the epithelial covering and depressions on the surface; the papillæ were enlarged and distended with blood, in consequence of a cellular infiltration, which was continued irregularly to the boundary of the muscular coats. [The chain micrococcus of erysipelas was imperfectly understood at the time of this report.] The deeper vessels of the vagina were perceptibly dilated; the muscular layers, however, entirely unaffected, and the cervix and corpus covered with an intact mucous membrane. Matthews Duncan has also seen an erysipelatous colpitis of less frequent occurrence, which he thus describes:

"That in which diffuse inflammation of the external cellular coat causes swelling which almost occludes the whole length of the passage; and when this ends in suppuration, it sometimes so dissects out the tube of the vagina as to deserve the name of *paracolpitis dissecans*."

6. Ulcerative Adhesive Colpitis.

Hildebrandt found a nutritive disorder in old women, due to disturbances of the vagina, to which he gave the above name, but which Karl Ruge called *colpitis vetularum*. Different sized projections, not so intensely colored as the elevations in granular colpitis are, are found upon the surface. They are caused by a small-celled infiltration over which the epithelium is very thin or even sometimes entirely absent, so that adhesions take place between the adjacent walls. In this way bands and cicatrices occur as represented in my Atlas, plate vii, Fig. 3; these may be found both before and after the menopause. They may also cause adhesion between the vagina and the vaginal portion. The changes in the organ which result from adhesive colpitis differ from those due to simple senile atrophy. In the latter, the vagina is shrunken in all directions and drags the uterus below its normal level, is very mobile, shorter than before, and has very thin, relaxed walls. In adhesive colpitis the vagina, while unusually short, is as wide as in the normal condition, and the uterus remains at its proper height and is of normal length and thickness. An interesting case of this kind occurring in a woman only thirty-two years old is depicted on page 13 of my Atlas.

7. Miliary and Herpetic Colpitis.

These two forms, recently described by H. Eppinger, are closely related to the variety last considered, in that they also may occur in old age, but differ from colpitis vetularum in their tendency to the formation of pustules and abscesses. These small points of exudation project from the underlying connective tissue when the epithelium is removed, while the papillæ implicated in colpitis vetularum remain unaffected in miliary colpitis.

Miliary and herpetiform colpitis are especially common in vas-

cular disturbances, venous hyperemia or multiple thromboses. They have a peculiar tendency to recur. The disease is not dependent upon the age, for one of my patients was thirty-two years old, and one of Hildebrandt's, thirty-eight years.

Eppinger believes that the anatomical [post-mortem] changes peculiar to vesicular or herpetiform colpitis have not yet been observed, but that Kühn and Herrmann had seen them in the living, the patient of the former having simultaneous herpetic eruptions on the gums; he believed they might be much oftener found during life than in the cadaver. Matthews Duncan states that he has frequently treated pustulous colpitis.*

8. Croupous and Diphtheritic Colpitis.

Vaginal croup may exist as an isolated affection or be associated with croup of the vulva. The croupous membrane, particularly in the upper part of the vagina and on the anterior wall, is found in large and small patches, is homogeneous or reticulated, and gray, whitish or yellowish-white in color. The underlying mucous membrane is reddened, swollen and thrown into ridges. The exudation clings more or less closely to the epithelium, and there is bleeding from the exposed surface when it is removed. Klebs maintains, nevertheless, that it is not a genuine croup, even though the membrane be fibrinous, for it is formed without marked inflammatory symptoms.

Affections of the vagina resembling diphtheria, but which are not really diphtheritic, are found chiefly during the puerperal state and will not be described here. On the other hand, secondary diphtheria occurs in acute infectious diseases, notably, in Asiatic cholera, Willigk found five among 153 dead of cholera, and also in smallpox, measles and scarlet fever.

In persons dying from general diphtheritic infection, numbers of bacteria may be found, post-mortem, upon the surface of the diseased membrane, but not a single one in the vessels of the affected organ. The nature of diphtheritic poison, as Heubner has recently proved, is just as positively unknown as the poison of measles and scarlet fever. The poisonous principle isolated

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* *Loc. cit.*, p. 154.

in animals who were artificially infected, is not identical with that of diphtheria as it occurs in the human race.

K. Schroeder states that the vaginal portion is usually implicated in diphtheritic colpitis of the upper part of the vagina, and that he has seen the cervical mucous membrane so swelled that it resembled a mucous polyp the size of a walnut, apparently occluding the external os.

It is said that deep-seated phlegmonous abscesses occur in variola, with numerous ecchymoses in the hemorrhagic variety, in conjunction with superficial necroses, as in cholera.

9. Abscesses of the Vagina.

Of the various vaginal affections many may cause abscesses, which may be developed either in the vaginal walls or in the surrounding tissues. Pus may also burrow toward the vagina, when caused by caries of the spine or sacrum, or by disease of the iliac, psoas, or obturator internus muscles. This may result from parametritis, peritonitis, psoitis and caries, the description of which would here be out of place. We are concerned only with paracolpitis and with abscesses which result from hemorrhages into the vaginal walls.

Paracolpitis may be primary or secondary. The primary form occurs after labor, as a consequence of injuries from the forceps. Klob found it as a sclerema in firm syphilitic cicatrices. It may also be developed from a periphlebitis in the retro-vaginal septum. In *paracolpitis phlegmonosa dissecans*, which results from an inflammation surrounding the vaginal wall, the vagina is expelled in the form of a tube composed of muscular fibres and mucous membrane, along with the mucous membrane covering the vaginal portion. Only four cases have been reported, two by Marconnet, one by Minkiewitsch, and one by Bizzozero. Three of these recovered after suppuration, but the fourth ended fatally from gangrene of the soft tissues covering the posterior wall of the bladder and pelvis. In general, abscesses of the vaginal walls are uncommon. They have been known to occur after very protracted leucorrhœa, and produce fistulous openings into the vagina, rectum or perineum.

10. Gangrene of the Vagina.

Primary gangrene of the vagina may be either circumscribed or diffuse. Circumscribed not seldom accompanies associated noma of the cheek and of the vulva; Klebs found in several recent cases of this kind, in which the infiltration existed without breaking down of structure, that the tissues were thickly filled with micrococci.

To a case described by Obré, Klebs has applied the term "diffuse primary vaginal gangrene." The patient, a girl of fourteen years, died from vaginal hemorrhage; the mucous membrane was much softened, in some places separated from the muscular layer, the latter being pale, easily removed, and contained numerous ecchymotic patches. In syphilis Hamernik has found portions of the vagina gangrenous. It may be caused by the pressure of pessaries, or by decomposing foreign substances; especially it may occur during the puerperium, in association with gangrene of the vulva, in typhus and similar affections.

The **symptoms** of the severe vaginal affections just described are much graver than those of catarrh and mycosis; there are more or less fever, violent burning pain, and considerable swelling, which soon extends to the external genitals. The pain is of a throbbing, boring, or tearing character; there is dysuria; the patient is so weak that she cannot leave her bed, and occasionally rigors indicate the gravity of the disease. The discharge, at first scanty, soon becomes profuse, purulent, sanguinolent, putrid, sanious, and contains gangrenous tissue. The latter may now be thrown off, the line of demarcation formed, and recovery take place. The resulting cicatrices may cause stenosis of the vagina, particularly in the vault, and adhesion of the vaginal portion, or even complete occlusion with retention of the secretions, as described in a previous chapter. But if the process extends further, fistulæ may be formed, or the case terminate fatally from septicemia, even before communications occur with adjacent organs; or, as in Obré's case, death may result from hemorrhage.

The **diagnosis** of these various forms of severe vaginal inflammation will rest partly upon the type of the primary constitutional affection — variola, erysipelas, measles, scarlatina, typhus, or cholera, and partly upon an accurate microscopical

examination of the discharges and of portions of tissue, either exfoliated or excised from the inner surface of the vagina. The introduction of fenestrated specula is essential to determine the extent of the affected area, and for the application of remedies, though it may be very painful and not without risk to the remaining sound tissue. To differentiate between abscess and neoplasm, examination of the surrounding tissues must be made, their redness, swelling, and tenderness. Furthermore, the consistence of the tumor and its fluctuation, the clinical history and ætiology must be considered. The location and extent of the abscess can be ascertained by examination through the bladder and rectum.

Gangrene will be recognized by the slaty or dark color, the offensive odor and the rapid loss of substance.

Diphtheritic and croupous inflammations have already been considered under affections of the vulva.

Treatment.—Croupous and diphtheritic processes of the vagina may be treated with injections and through the speculum, as are the analogous affections of the vulva, *e. g.*, by potassium chlorate in substance, lime water, and solutions of corrosive sublimate. If fluctuation is recognized, a free incision should be made so as to thoroughly evacuate the pus and thus prevent burrowing and the formation of fistulæ, which are difficult to heal. Gangrenous portions should be isolated and the dead tissue removed; iodoform or chinoidin will be beneficial dusted upon the surface, or used as ointments. Furthermore, frequent irrigation with antiseptic solutions, and the internal administration of tonics and stimulants such as wine of cinchona, quinine, ether, and cognac, are indispensable. Unfortunately, the condition is, as a rule, so grave that recovery can scarcely be expected, but that a patient may recover even from very extensive puerperal gangrene is shown by Case No. 12, which I described in the *Pathology of Childbed.*

CHAPTER VI.

NEUROSES OF THE VAGINA.

Hyperæsthesia and spasmodic contractions of the levator ani and the muscles of the pelvic floor may be associated with inflammatory affections of the vagina and adjacent organs, just as we have seen them in connection with abnormalities of the hymen. For example, I once treated a very sensitive spot in the lower third of the vagina in a young girl, in which not the slightest tissue change could be recognized with the microscope. In another patient who was sterile and affected with a slight cervical catarrh, I found the vagina so sensitive that the finger had to be introduced with the greatest care to prevent spasmodic contractions of the entire canal, and the introduction of the speculum was almost impossible, though the hymen was not at all sensitive. In a case of stone in the bladder the parts contracted so firmly upon the finger that it was almost impossible to make out the location, surface and size of the stone, which was as large as a walnut.

These examples may suffice to show that there are primary and secondary hyperæsthesias and neuralgias of the vaginal walls, which have no relation whatever to the hymen. They are not necessarily accompanied with muscular spasm, though in any case very annoying, and especially so to married women.

Doubtless a certain proportion of these cases are symptomatic of uterine disease, and it seems to me that small myomata which cause tension of the uterine walls, as they increase in size, are especially liable to cause such neuroses, just as a wedge driven into a carious tooth may cause pain not only in the affected tooth, but also in the neck, shoulder, and even to the finger tips, and make every motion of these parts painful.

I, therefore, think the majority of these cases secondary, dependent upon uterine or other diseases, and not primary, and deem it to be the physician's duty to search the cause in each individual case and treat it. I have met with no case in which these symptoms appeared to be dependent upon anomalies of the brain and spinal cord, as has recently been urged by English

writers. Neither have I ever seen a case in which unilateral spastic disorder of the vagina occurred, as reported by Matthews Duncan.

But, as the physician is often appealed to for relief in such affections the real nature of which he does not understand, it is well to know that many of these vaginal neuroses may be greatly benefited by the various emollient injections already referred to. These injections should be warm, and followed by an infusion of hyoscyamus (ʒiij–iv to the quart); or suppositories of cacao-butter with extract of belladonna, placed in the vagina, will render good service; morphia, opium, and chloral hydrate may be used in the same way; or cocaine, which has recently become so popular, may be applied as a local anæsthetic to the vaginal mucous membrane.

Cohabitation should be interdicted; frequent introductions of the speculum are likewise harmful.

In case the entire vaginal walls are hyperæsthetic, cauterization with a five per cent. solution of nitrate of silver may be tried. Micturition and defecation should, of course, receive careful attention and such conditions as anemia, which predispose to these neuroses, should be promptly treated.

CHAPTER VII.

FOREIGN BODIES IN THE VAGINA.

Foreign bodies found in the vagina may be divided according to the purposes for which they are introduced into six groups. The first to be considered are those used in masturbation. Though friction and irritation of the clitoris may be caused by rubbing the thighs together, as mothers have observed in their children (a patient of mine frequently noticing it in her daughter of five years), still young girls are apt to make use of a variety of articles, which they push into the vagina, *e. g.*, hair- and crochet-pins, pencils, little boxes, or toilet articles, etc. Married women employ pine cones, an artificial penis of bacon-rind, or even pomade boxes or drinking glasses. Probably the most

ludicrous combination of this sort is noted by Schroeder, who found a pomade box and cockchafer in the vagina. Such articles are usually only partly introduced when they excite contractions of the muscles of the pelvic floor, slip from the hand and are then carried into the vaginal vault by the action of the levatores ani, as may often be observed in the introduction of a pessary. Once situated there, the tension, catarrh, ulceration, or even perforation produced depend upon the size, surface, etc., of the foreign body.

The second variety comprises those articles which are introduced for the purpose of preventing conception, tampons and sponges serving as examples. The removal of these may be neglected or forgotten; hypersecretion and putrid decomposition follow, arousing suspicion of some malignant neoplasm, and a superficial observer might conclude the patients were suffering from sloughing polyps or cancroid papillomatous tumors.*

Articles may be introduced for criminal purposes, *e. g.*, to produce abortion. For this purpose sharp instruments of numerous kinds are generally employed, and, becoming broken in the attempt, portions remain in the vagina.† Cases are on record in which female thieves have used the vagina for concealing pocketbooks or other stolen articles.

Objects may be retained in the vagina which are introduced during gynecological manipulations. For example, Kurz removed the upper part of a milk-glass speculum, which was entirely concealed by granulations, and Day the broken end of a glass syringe. Forgotten pessaries, sponge-tents, tampons, etc., all belong to this category. The match thrown into the uterus in Chrobak's case, previously mentioned, is an additional instance.

Furthermore, foreign bodies may gain access to the vagina independently of the individual, *e. g.*, ascarides or oxyures enter from the rectum, from the opening of dermoid cysts, hair or teeth may enter the vagina; in ectopic gestation the walls of the vagina may be perforated, and through the opening the bones or other portions of the fœtus may pass; or the daughter vesicles from a ruptured echinococcus cyst may likewise find their way into the

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* Breisky, p. 105.

† Ploss, "Die Fruchtabtreibung."

vagina; finally, in abnormal communication with the bladder, small intestine, or rectum, the contents of these organs may be evacuated through this canal.

Again, by a fall of the patient upon some iron or wooden object, portions may break off and being difficult of removal therefore remain in the vagina.

As already mentioned, these articles are not simply held fast by muscular action, but also lifted higher in the vagina and retained there, this action being probably assisted by the negative abdominal pressure and certain positions taken by the patient. If the foreign bodies have a smooth and unchangeable surface, as ivory, and do not exert too great a pressure, they may be retained for years by the patient, as pessaries often are, without occasioning any annoyance whatever. Finally, however, they undergo the same changes as a pessary, *i. e.*, mucus and menstrual blood stagnate around them, the salts of lime and the triple phosphates are deposited, and hence they become roughened and irritating. Ulceration is produced, associated with a putrid, sanguinolent discharge, and, if the offending body be not now removed, perforation into adjacent organs may occur. The ulcers furthermore cause adhesions between the vaginal walls, and the object becomes encapsulated; or, if the latter contains openings, the mucous membrane grows through them, thus rendering removal exceedingly difficult and even dangerous.

The sole indication is, of course the removal of such bodies from the vagina. If it be a sponge, a tampon or a small pessary, this is usually easily accomplished with the forceps or the finger; in objects with sharp points or corners it is more difficult, as the place where they lie must be exposed, the vaginal walls separated, or a speculum or other instrument introduced, so that they may be seen.

The removal of an incrusted or a large object which has remained a long time and become almost hidden from view, is one of the most difficult and tedious of operations.

The vaginal canal must first be thoroughly disinfected with a two to five per cent. carbolized solution, the hands washed in a similar solution, and careful examination made of the bands of adhesion. The surface of the object, *e. g.*, a pessary, should be

completely loosened or uncovered, and the finger then introduced into the opening and traction made. If the pessary has a stem it usually breaks off, thus roughening the pessary and causing vaginal wounds or abrasions, which become easily infected and, through contamination by the vaginal secretion, may suppurate. If a forceps be used the pessary is apt to break, and it must then be removed in fragments. In all these cases the vagina is more or less inflamed, and the repeated introduction of several fingers becomes more and more painful; spasmodic contractions of the pelvic muscles occur, thus complicating the operation to such a degree that profound anæsthesia is necessary for its completion.

I have repeatedly treated such cases, particularly in old women who had worn pessaries for years, and in whom the external genitals, or, more correctly speaking, the lower portion of the vagina, had undergone senile stenosis to such an extent that the instrument, which was introduced very easily, could not be extracted without causing many deep and freely-bleeding lacerations in it.

Formerly, when the hard rubber used in the construction of these instruments was of a very inferior quality, the S-formed pessary became almost circular when subjected to the heat of the body. I have met with much difficulty in removing such an instrument even from younger patients, lesions of considerable extent sometimes being unavoidable.

Firm bands or bridges of adhesion may be divided upon the pessary by the scalpel; if the former cannot now be removed by the fingers, polyp or other forceps, or a blunt hook the point of which is protected by the finger, it must be removed piecemeal by the bone forceps, thumb-saw, bone saw, or bone nippers. When all foreign substances have been removed from the vagina, it must be thoroughly irrigated with a 3 to 5 per cent. carbolized solution; this should be frequently repeated with the addition of astringent applications to remove the remaining catarrh and ulceration.

It may be mentioned in conclusion that as very large uterine fibrous polypi have been removed through the vagina by the forceps, the latter has also been used to extract a drinking glass.

CHAPTER VIII.

LESIONS OF THE VAGINA AND THEIR RESULTS; VAGINAL CICATRICES.

Quite a number of the causes of vaginal lesions have already been alluded to in the foregoing chapter. These lesions may be divided into spontaneous and those caused by violence or external force, and, according to their location, extent and complications, into simple, rectangular and round, and complicated. To the latter class those lesions associated with openings into adjacent organs belong.

Simple lesions of the vagina occur most frequently during labor. They are spontaneous or the result of violence, belonging, therefore, to the anomalies of labor and, as such, will not be further considered here.

In non-gravidæ vaginal lesions are caused either by the penetration of foreign bodies, or by forcible introduction of the whole hand for the purpose of removing tumors, or by persistent attempts to replace the inverted uterus. Again, they may be caused by the patient herself in attempting a reduction* or, finally, they may result from the unskillful use of gynecological instruments, *e g.*, the forcible introduction of too large specula and, in a similar manner, by rapes upon children or young girls. But the lesions associated with the latter should be referred to rough manipulation, rather than to coition.

The **symptoms** of vaginal lesions, others than those occurring in labor, are dependent upon the size, location, complications and the cause of the injury, *i.e.*, the nature of the instrument producing the lesion. I have often been much surprised, on being consulted by recently delivered women, to find large vaginal ruptures which were marked by no symptoms other than the presence of an increased hemorrhage and some fever. But even the hemorrhage, pain and fever may not appear, and the lesion heal by first intention. In Rey's case, in which a long wooden hay fork penetrated the vagina and peritoneum, union occurred by first inten-

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* Fehling's case, page 135.

tion, and was followed by recovery in 14 days. So also, in Fleury's case, spontaneous recovery occurred though the anterior vaginal wall and bladder were torn by a fall from a wagon upon a stake of wood. Of course, the case will be different when large vessels are torn, giving rise to hemorrhage. This source of danger appears, however, only when the injury is to the introitus of the vagina, implicating the adjacent erectile tissues, or when large vaginal varicosities are torn. The chief source of danger lies in the infection of the vaginal wound and subsequent septicemia.

A recent non-puerperal vaginal lesion must be examined under the strictest aseptic precautions. Dead tissue and every particle of foreign matter must be removed, the wound thoroughly disinfected, and bleeding vessels at once ligated. The wound is then closed with sutures and treated subsequently as in the operations for vaginal inversion, cystocele, or rectocele. If the lesion be high up in the vagina, the uterus and the wounded portion must be drawn down, so that it may be better cleansed and more exactly united.

Lesions of the Vagina with Penetration of Adjacent Organs; Vaginal Fistulæ.

All fistulæ passing from the vagina into any part of the urinary tract, are treated in my handbook on Diseases of the Female Bladder, to which the reader may be referred.

In this connection we have to consider the abnormal communications between the vagina and intestine which appear as recto-vaginal and entero-vaginal fistulæ.

1. Recto-Vaginal Fistulæ.

Ætiology.—Recto-vaginal fistulæ most frequently originate during labor, either spontaneously from too great distention and thinning or laceration of the recto-vaginal septum, or from violence by the hands or instruments of the accoucheur, or else from a splinter of bone in congenital fracture in the fœtus. They also occur at other periods of life. Bednar has seen this condition result from vaginal gangrene in a child four weeks old.*

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* "Krankh. d. Neugeb. u. Säugl.," Wien, 1832, III, p. 206.

G. T. Witter observed the same lesion in a child of seven months, caused by ulceration, and this patient recovered, while Bednar's died from septicemia. When the accident occurs later in life, it has frequently been found that the recto-vaginal septum was perforated by the point of a syringe. Breisky reports such a case in a lying-in-woman.

Furthermore, all those processes which are associated with disorders of nutrition may produce recto-vaginal fistulæ; I have seen it follow typhoid fever in a tuberculous patient, and several operations were required to effect a cure. Other causes of this affection are abscesses, ulcers, particularly syphilitic and lupous, and neoplasms, especially carcinomata; finally, bad, ill-fitting pessaries, worn for a long time, may produce this lesion.

Recto-vaginal fistulæ result also as a complication after repair of perineal lacerations, after operations for rectocele, for vaginal atresia, or for prolapse of the uterus, in the latter especially, when abscesses form in the recto-vaginal wall.

Anatomy.—The size, length, location and track of fistulæ vary greatly, depending upon the cause. In lacerations a longitudinal rent may extend through the entire posterior wall, producing a large opening into the rectum. The larger fistulæ are circular, longitudinal or irregular, or they may be partially occluded by portions of the rectum, so that there are several openings in the vaginal wall. The most interesting case of this kind that I have ever seen was described in my *Berichten und Studien*, vol. iii, p. 272. An inversion of the sigmoid flexure projected through a recto-vaginal fistula, about the size of a dollar, and formed a tumor as large as an apple. At two different places its periphery had become adherent to the edge of the fistula, thus making three openings into the bowel,—a central one through which a colpeurynter could be passed into the sigmoid flexure, and two lateral openings communicating with the rectum.

If the fistula be caused by an ulcerative process, a canal may be formed, the vaginal orifice of which may be at a higher or a lower level than the rectal, or the two orifices may be of different calibers. As a rule, they are larger when the ulcerative process begins in the vagina, though the rectal wall may also be undermined by the suppuration and great loss of tissue

result. The vaginal aperture may be median or lateral; fistulæ opening low down are usually lateral, because the thick, muscular layers of the columna rugarum suffice to turn aside the ulceration. It may, however, as Breisky stated, form a tongue-like covering or valve for the vaginal orifice of the fistula.

Fistulæ at a higher level usually open laterally, or the orifice is drawn downwards from its original site by cicatricial bands.

Symptoms.—These depend upon the size, location and cause of the fistula, the most important being the escape of flatus from small openings, and of feces from the large ones. The latter irritates the vagina and external genitals, and excites catarrhal and ulcerative processes at the margin of the vaginal orifice of the fistula, and of the vulva. They cause much distress, although cleanly patients may materially control these symptoms by bathing the parts, using injections and wearing bandages. Moreover, the fistulæ usually gradually diminish in size as the result of cicatricial contraction, so that much less passes through them until the discharge is ultimately limited to flatus and liquid stools.

A few recto-vaginal fistulæ are spontaneously cured in a short time, but these are rare exceptions. I have described such a case in my treatise, *Pathology of Childbed*, 3d ed., p. 93, where the lesion had resulted from labor. Breisky has also seen spontaneous recovery from this affection. Large fistulæ existing for a long time exhaust the patients, and render them as miserable as those who are afflicted with vesico-vaginal fistulæ. They may thus undermine the constitution and lead to invalidism and phthisis.

The condition may usually be recognized without difficulty by the passage of flatus and feces through the vagina, though it does not follow that every patient who passes flatus per vaginam has recto-vaginal fistula.* Nevertheless feces may be found in the vagina, and still no fistula be present, the foreign substance having entered through the vulva.† Under all circumstances, the communication must be discovered and a probe passed through it. This may prove difficult if the opening be very small or covered, in which case milk must be injected into the rectum

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* See Chapter on "Garrulity of the Vulva," p. 74. † Breisky.

while the entire posterior vaginal wall is exposed, and the point noticed from which the milk escapes into the vagina. The character of the vaginal and rectal openings may generally be ascertained by touch, but if this will not give the information, they must be examined through the speculum or by the elevator or retractor, and it is of very great importance during the operation to diagnosticate any irregular puffiness of the rectal opening.

Prognosis.—It is not very difficult to cure recto-vaginal fistulæ, even though they are quite large. Patience, perseverance, strict antisepsis, accurate denudation and careful application of sutures will generally be successful, in my experience, even more frequently than in vesico-vaginal fistulæ. But in fistulæ which appear as complications of severe constitutional diseases or conditions, the tissues may be so unhealthy that union cannot take place, even slight pressure causing a local slough. I was obliged to operate four times upon such a patient, whose fistula followed an attack of typhoid fever; but, if a lengthened interval be left between such operations, success will usually crown our efforts. It is also well established that cauterization in small recto-vaginal fistulæ is more frequently successful than in vesico-vaginal fistulæ.

Treatment.—The vagina is so mobile and distensible that an operation might be performed even when the fistula is large, or if the latter result from a circumscribed carcinoma, it may be excised, and the wound possibly heal by first intention; unfortunately, in most cases the extension of the disease has been so great at the time the fistula occurs, that excision offers no hope.

Narrow fistulous tracts may be closed by cauterization with fused nitrate of silver, or fuming nitric acid, with the actual cautery, or with a red-hot needle. If the canal be short, however, or if there be no canal and the septum thin, nothing can be accomplished by the latter means; indeed, the opening may be made larger and the surrounding tissues so thickened and hardened that a subsequent operation will require an increased amount of cicatricial tissue to be excised, and thereby become more complicated.

In the majority of cases the plastic operation is greatly to be preferred. The time for operation will depend upon the condi-

tion of the edges of the fistulous opening and of the adjoining tissues; when the latter are inflamed and swollen, as is usually the case with lying-in women, or in consequence of an injury, the operation should be deferred until the congestion has been reduced and cicatrization obtained by injections, applications and tampons.

The patient should be prepared for the operation by administering castor-oil in capsules for several days before to produce free evacuations, and by frequently syringing the rectum and vagina.

It must next be decided whether the operation shall be performed per rectum, per vaginam, or by dividing all the tissues from the fistula to the surface. As a rule, I prefer to operate through the vagina, even in those fistulæ whose rectal opening may be the larger of the two. In this way I have been able to close up large defects of the recto-vaginal wall at one operation, so that I cannot share in the opinion held by some authorities that all fistulæ of the upper third of the recto-vaginal wall should be united from the rectum.

In beginning the vaginal operation, after the patient has been anæsthetized and placed in a suitable position, the uterus and posterior vaginal wall must be drawn down with tenacula or forceps, so that the orifice of the fistula may be brought into view and its edges made tense. It is now advisable to place a salicylated cotton tampon in the rectum, above the fistula, to prevent the descent of fecal matter during the operation. The edges of the fistula are then taken up with a tenaculum or forceps and excised, either vertically or obliquely, depending upon their thickness, so that the whole fistulous margin is removed in one piece. Care should be taken that the periphery of the rectal orifice is excised at the same time. Inequalities are then removed with the scalpel or scissors, the wound irrigated with a 2 or 3 per cent. carbolized solution, and examination made as to how the surfaces may be best united in order to avoid all tension; the wound is then united, either longitudinally, transversely, or obliquely, as the size and direction of the tract will suggest. Lower down in the canal the transverse line is, perhaps, most useful, but several which I had closed longitudinally

healed without accident. The sewing material may be either silk, catgut, wire, or silkworm gut, for the last of which I have a preference. The stitches are passed behind the full breadth of the wound and include the rectal mucous membrane, alternate retentive and uniting sutures being used. I seldom use the first, for I think that those of equal breadth answer the same purpose, and are less liable to produce irregular union and tension.

When they have all been secured and the opening tightly closed, the accuracy of the closure may be tested by injecting milk into the rectum; the tampon is then carefully removed from the rectum, and the latter washed out with borated water, after which blood-clots are washed from the vagina and it is closed by withdrawing the tenacula and retractors. The knees should be fastened together for the first few days after the operation to prevent undue tension upon the perineum and posterior vaginal wall.

If the fistula is small, or the result of a perineo-rectal operation, or if situated low down in the vagina, Simon recommended that the perineum, from the fistula to the surface, be laid open, so that the vagina, rectum and perineum may be united by a triangular wound, as in the perineo-rectal operation. I have employed this method several times with good results. As the hemorrhage need not be great, one is able to shape the edges of the fistula with complete exactness, and thus secure speedy and perfect union. I always pass the sutures, as has already been explained in the perineo-plastic operation, from the upper end of the vaginal wound as low down as possible into the external genitals, and to the margin of the hymen, and use no rectal sutures, but only vaginal and perineal.

Simon attempted to secure union by operating from the vagina, but met with no success, and hence suggested closing the sinus from the rectum as a better method. I followed the latter plan in the case of recto-vaginal fistula resulting from typhoid fever, which has been frequently referred to previously, but met with no better success, union finally being secured by laying open the whole recto-vaginal septum.

The fistulous opening in the anterior rectal wall is exposed by placing the patient in the dorsal position, the pelvis being ele-

vated, then inserting the largest Simon's speculum and two retractors, while the anterior periphery of the anal aperture is drawn up by two tenaculum forceps. After a salicylated tampon has been placed in the rectum the edges of the fistula may be depressed by a tenaculum. Simon passed the vaginal stitches farther from the wound than the rectal, to prevent inversion of the relaxed folds of the rectal mucous membrane. He secured them in the rectum, but as they are then more difficult to remove he extracted some of them by the vagina by pulling the knot halfway through the wall.

That this method is possible without forming a new fistula, I am convinced by my own experience. Four threads which were tied in the cavity of the cervix, after passing through the mucous membrane of the bladder, were pulled through the vesico-uterine wall by concretions which formed on the vesical portions of the sutures, and passed away through the urethra, without causing a new vesico-cervical fistula. In conclusion, I will state with regard to my case of inversion of the sigmoid flexure, that I loosened it from the edges of the fistulous opening as far as possible without incurring the risk of rupture by the use of too much force, and after freshening the surface of the wound, closed the fistula with 15 wire sutures and secured union by first intention.

Narcotics are no longer used in the after-treatment to produce constipation. For the first two or three days only liquid food is given, and then semi-solid stools are had by the daily administration of castor oil, magnesia, compound liquorice powder or salines. If not too long neglected this operation may usually be easily performed, but the division of the sphincter ani to prevent accumulation of flatus and feces, as was recommended by Liston, Copeland, Baker Brown and Richet, seems unnecessary; in my cases even dilatation of the sphincter was not needed.

The sutures need not be removed for weeks or months, only when indications of suppuration appear in their vicinity or in the suture track. Irrigation of the vagina and rectum are not necessary during the first few days after the operation, and should only be used when there is an offensive discharge.

2. Entero-Vaginal Fistulæ.

This condition consists in a fistulous opening or canal between the vagina and some part of the intestine above the rectum, so that a portion of the intestinal contents passes through the vagina. If the lower portion of the intestine is separated from the upper, so that the entire contents pass per vaginam, the condition exists known as *anus præternaturalis vaginalis*. The first condition may result from adhesions between the ileum and posterior vaginal wall in Douglas's cul-de-sac, or by contusion, abscess or gangrene with the formation of a greater or less opening. The cause may also be an instrumental delivery, cauterization of the vagina, and infection or so-called diphtheritic inflammation of the vagina. The condition is extremely rare. Entero-vaginal fistula may occur not only in the posterior vaginal wall at the point mentioned, but also in the anterior, *e. g.*, the vesico-uterine cul-de-sac may have been the seat of a vaginal enterocele. Breitzmann saw such a case in which the rupture occurred on the fifteenth day after a very difficult delivery by version and extraction. The fistulous opening was found in the right vaginal vault, but spontaneous recovery took place in four months. Kiwisch has also seen recovery from entero-vaginal fistula without operation.

Diagnosis.—The discharge resembles chyme, is semi-fluid and sometimes contains bile; a sound may be passed upward and downward, to the right and left, in the intestine, without meeting with any obstruction; and the impossibility of passing an instrument from the vaginal opening directly into the rectum, and finally the history will do much to make the diagnosis plain.

This is more dangerous to a woman than a recto-vaginal fistula because it interferes with her nutrition, and the location of the lesion renders its operative treatment more difficult. The symptoms resemble those of the condition previously described, but the odor is probably less offensive.

In the treatment, but little can be expected from cauterization, which is *a priori* more dangerous than in recto-vaginal fistula. In case the fistula does not heal up spontaneously under expectant and symptomatic treatment, an operation must be performed similar in all respects to that suggested for recto-vaginal fistula.

Anus præternaturalis vaginalis or *anus ileo-vaginalis* can result

only from a large vaginal rupture into which one or more loops of intestine have passed, the latter being injured to such an extent that complete laceration takes place. If recovery follows this serious accident, which can probably be produced only by difficult obstetrical operations, at least two openings in the roof of the vagina, one for the upper, and another for the lower end of the ileum, will be necessary. The nutrition of the patient immediately suffers from the passing away of the entire intestinal contents from the ileum directly through the vagina; great emaciation results, and she constantly complains of hunger.

The **diagnosis** is made in the same manner as in ileo-vaginal fistula: The discharge is to be examined; substances which may be easily recognized, as lycopodium seeds, may be given to the patient by the mouth, and the length of intestine above the lesion approximately determined; inability to force fluids injected into the rectum through the vaginal opening, and, finally, the history of the case. If there be but one fistulous opening and the finger can be introduced into it, the septum between the two portions of the intestine may be felt.

Earlier gynecologists, led by Roux and others, proposed laparotomy for this affection; the portion of ileum attached to the vagina was loosened and united to a fresh wound made in the large intestine, an operation which in Roux's time would have been very bold, and certainly fatal.

Jobert proposed to loosen the ileum from the vagina and unite it to the anterior wall of the rectum, and Simon undertook to cure the patient by laying open the rectum from the vagina, with subsequent transverse obliteration of the latter. Casamayor endeavored to transform the vaginal anus into a fecal fistula by passing one branch of an enterotome through the vagina into the ileum, the other into the rectum. He produced destruction of the strangulated tissue, but could not succeed in forming the fistula. All of these methods have one disadvantage, namely, that the lower part of the ileum and the greater portion of the large intestine are cut off from the digestive processes.

C. O. Weber and, after him, Heine, sought to avoid this difficulty by using an enterotome, one branch of which was introduced into each of the two fistulous openings in the vagina. The septum

was then strangulated and the two communications transformed into one large one. As the septum often closed the vaginal opening by acting as a valve, after Weber's death Heine again applied the enterotome and shortened it, finally closed the vaginal opening by several operations, treated small orifices which remained near the os by cauterization with tincture of cantharides and by red precipitate ointment, and thus cured the patient. Three months later the patient died from general tuberculosis, and the autopsy showed that recovery from the fistula was indeed complete.

Although we may be able to heal the different injuries and perforations of the vagina, still there is by no means complete restoration, for vaginal cicatrices usually remain which are not without influence upon the adjacent tissues, and are capable of producing secondary affections of a manifold nature.

The evil consequences of operations performed during labor make a large percentage of female complaints, almost one and a half per cent. of all genital affections.

The most important symptoms are interference with and pain during cohabitation, sensation of tenseness during defecation, pain in the rectum, or dysuria when the cicatrices are situated anteriorly.

If the fistula has resulted from too early application of the forceps before the os is fully dilated—and beyond doubt the large majority are so caused,—the contraction of the cicatrices displaces the uterus, makes the vaginal portion adhere to the vaginal vault, and hence menorrhagia, primary and secondary sterility, vulvar flatus, catarrh, and circumscribed adhesive inflammations of the peritoneum, with perisalpingitis and pericolpitis. Cicatrices which are located laterally, and unconnected with the adjoining organs, may cause burning in the corresponding half of the pelvis, or iliac pain, which are probably dependent upon affections of the peritoneum at those points. The improvement in the symptoms after colpeurysis proves their connection with the vaginal cicatrices, and renders it probable that the pain is the result of tension or pressure caused by them, or of the remains of inflammatory swelling in the region of the sacro-ischiatic plexus.

Treatment.—Bozeman recognized the fact that the cicatrices associated with uro-genital fistulæ interfered with the rapidity of recovery after operations, and therefore wisely subjected the cicatricial bands to methodical softening, stretching and pulling. This should be generally imitated, even in uncomplicated vaginal cicatrices. Bozeman* first incises the band-like constrictions and then places dilating tampons in position, in the introduction of which one will at once learn the pliability of the tissue. The dilatation should be continued by suitably prepared tents, or if there be sufficient space, with a large colpeurynter, or if the canal be very narrow, with a small Tarnier's balloon.

If these means do not suffice to produce permanent yielding of the cicatrix, portions of it may be excised, and a flap from a healthy part of the vagina utilized to close the opening, and thus render the cicatrix harmless. Very extensive cicatrices, if superficial, may be completely excised. I am convinced that this treatment of vaginal cicatrices has a useful future, although Simon has shown that vesico-vaginal fistula may be healed without protracted stretching of the cicatricial tissue.

Oleaginous inunctions of the cicatrices, vaseline tampons, and mucilaginous antiseptic injections will assist these manipulations, by softening and increasing the pliability of the tissues; these means must be continued for a long time, and afterwards repeated at regular intervals.

In conclusion, we would call attention to the fact that many displacements of the uterus cannot be treated mechanically on account of rigid cicatrices, and these may be subjected to more definite, and not merely symptomatic treatment by gradual dilatation if systematic, and later by incision, and, eventually, by the total excision of the cicatrix.

Even cicatrices situated in the roof of the vagina are not inaccessible to this treatment, for we are no longer compelled to be so anxious in the operations for prolapse and rectocele, when in the vicinity of the peritoneum, and in Emmet's operation the cicatricial bands should be, as far as possible, excised at the time of operating. The reaction will be very slight if the operation be performed under strict antiseptic precautions.

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* Simon, *Wiener Med. Wochenschrift*, No. 27, 1876.

SECTION III.

ANOMALIES AND DISEASES OF THE UTERUS.

The uterus is formed from the two ducts of Müller, which lie parallel and anterior to the Wolffian bodies in the mesoderm. The duct cannot be recognized before the fourth week after impregnation, at which time it appears as a linear furrow in the germinal epithelium, which deepens and then contracts to a solid cord, and later becomes hollowed. The upper orifice opens into the abdominal cavity, and is surrounded by a fringe or fimbriæ, upon which the hydatid of Morgagni may often be found. According to Dohrn, the two ducts coalesce at their lower portions to form the vagina and uterus about the end of the second month, while the upper portions become the tubes. From the third to the fourth month the vagina and uterus cannot be differentiated from each other, but in the course of the fifth month the vaginal portion is formed so that now the boundary becomes sharply defined. In the 8th week the ducts of Müller are still separated throughout their whole extent by the septum, but between the 8th and 12th weeks this membrane gradually disappears, beginning above, where the uterus and vagina are differentiated, and proceeding from this point upward in the uterus, and downward in the vagina.

At the end of the 20th week, the close of the third period of development, not only the vaginal portion is developed, but the angular depression in the region of the fundus has disappeared.

During the second half of intra-uterine life, the fundus grows steadily, so that it arches forward, but the body continues much smaller than the cervix, and the columns of the mucous membrane extend to the fundus.

CHAPTER I.

MALFORMATIONS OF THE UTERUS.

Arrested development of the uterus has been understood only since the publication of Kussmaul's unexcelled work upon the congenital affections of this organ, in 1859; since that time our knowledge of this subject has gradually increased. Kussmaul divided these affections into those which develop during the first four or five months, and those of the last half of intra-uterine life. The first class comprised defective uterus; 2, rudimentary uterus, atresia of the uterus, and bipartite uterus, conditions representing rudimentary development of the uterus; 3, absence or distortion of one-half of the uterus—*uterus unicornis*—with or without distortion of the other cornu; 4, double uterus, with *complete* separation of the cavities (a. *uterus didelphys*, b. *uterus duplex bicornis*, c. *uterus septus*); and with *incomplete* separation (d. *uterus bicornis semiduplex*, e. *uterus arcuatus*, f. *uterus subseptus*). In the second half of intra-uterine life, 5, fœtal uterus and the infantile uterus were included.

Fürst* correctly points out a fault in this otherwise excellent classification, namely, that it is based upon the external appearance alone, insufficient attention being paid to the different epochs of development and the disorders occurring within their limits. According to Fürst there are four periods to be distinguished.

The first period extends to the end of the eighth week, and contains the following abnormalities:—

A. Complete absence of the Wolffian bodies, ducts of Müller, and genital glands.

I. Defectus uteri et vaginæ totalis.

II. Defectus unius lateris: uterus unicornis solidus s. excavatus sine ullo rudimento cornu alterius.

B. Rudimentary solid conditions.

III. Uterus duplex rudiment. solidus.

IV. " bicornis " "

V. " simplex " "

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* *Monatsschrift*, xxx, p. 108–110.

C. Arrested formation of the canals.

VI. Uterus duplex rudim. partim excavatus.
VII. " bicornis " " "
VIII. " simplex " " "
IX. " unicornis c. rudimento cornu alterius.

From the 8th to the 12th week the septum disappears; from the 12th to the 20th, the depression at the upper end; therefore, from the 8th to the 20th week three varieties of four uterine forms appear, viz.:

X. Uterus bicornis septus, subseptus, simplex.
XI. " introrsum arcuatus, " "
XII. " planifundalis, " "
XIII. " foras arcuatus, " "

Thus the entire division comprises thirteen different conditions, twelve of which are arrests in development, while the uterus foras arcuatus simplex, the thirteenth, is normally developed. Considered together with three conditions of the vagina, vagina septa, subsepta, and simplex, we have thirty-six combinations.

In the fourth period of fœtal life, from the 20th to the 40th week, the vaginal folds appear, and also the vaginal portion and uterus; the uterus is more arched or vaulted from the vaginal portion to the fundus and cylindrical, and thus becomes the fœtal uterus, the fourteenth variety.

During childhood to puberty the walls of the uterus and the fundus become thicker; the mucous membrane of the body of the uterus gradually becomes smoother and finally the body preponderates, while the cervix ceases to increase in thickness.

I. Defectus Uteri Totalis. (Absence of the Uterus.)

It is very difficult, indeed scarcely possible, to recognize total absence of the uterus in the living subject, because it may be represented by very thin muscular strands, and, as they can hardly be made out by palpation, it cannot be asserted with absolute certainty during life that they are absent. Confusion may also arise at the autopsy, for portions of the tubes may appear to be rudiments of a uterus. In actual defectus uteri the vagina

is generally rudimentary, the vulva being normal with the exception of the clitoris and occasional absence of hair upon the parts (Saexinger); the mammary glands may likewise be wanting (Saexinger). The broad ligaments are replaced by scarcely perceptible transverse bands in the true pelvis. The round ligaments of the uterus are said to be invariably present (?).

The ovaries as a rule are not normally developed, but still may contain Graafian follicles. If tubes are present, the external fimbriated end is usually hollow, but the remainder solid. The pelvis as well as the person is of the feminine type. Sexual desire may be wholly wanting; amenorrhœa, pain in coition, sterility, dilatation of the urethra, or distention of the rudimentary vagina are the usual consequences.

In making a diagnosis of such a condition, a catheter should be placed in the bladder, the index finger introduced into the rectum, and by conjoined manipulation from the abdomen, rectum and bladder, an attempt made to ascertain whether a transverse band passes across the true pelvis, or whether the ovaries can be found either on or below the terminal line or in Douglas's cul-du-sac.

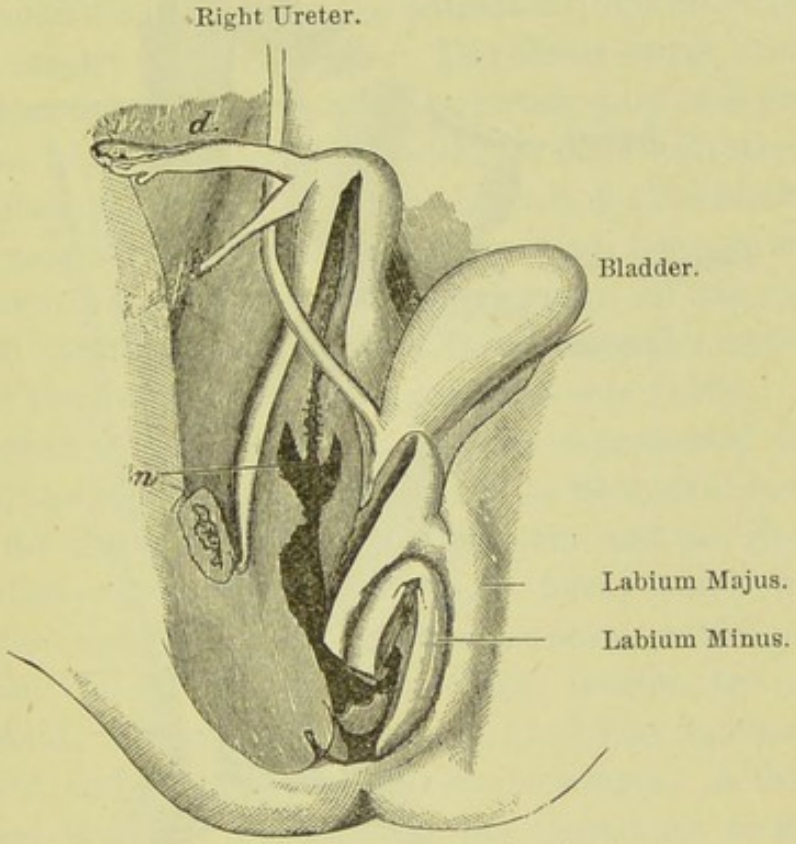
Successful treatment will, of course, be out of the question. Fürst found the following examples of entire absence of the uterus reported by Willemin in 1864, by Holst in 1866, by Saexinger in 1866, and by Knight in 1860. To this list I will add those of the last six years: Bellina, Burton, Cameron, Caro, Coën, Cunningham (post-mortem), Daniel, Depaul, Eder, Eisler, Ellis, Engelmann, Fergusson, Frissel, van Geyzel, Guice, Hulke, Heyernaux, Kiralyfi, Lyman, Maples, Perkins, Polaillon, Pozzi, Puech, Reid, Rendu, Rheinstädter, Riddel, Shepard, Stevens, Temmlji and Valerani. The number of cases is so large, and so few have been confirmed by an autopsy, that the diagnosis in many is certainly doubtful. The same is true of my cases, Nos. 5 and 7.

II. Uterus Unicornis sine ullo Rudimento Cornu Alterius. (One-Horned Uterus without any Rudiment of the Other Horn.)

Here only one Müller's duct is wanting or has become atrophied. The diagnosis of this condition in the living subject is for obvious reasons hardly possible; therefore, the cases reported

by Holst, Hennig, and Pribram, diagnosticated during life, are, to say the least, doubtful. In 1859, Rayer, of Paris, found this condition in a sheep. The vagina may be either simple or divided, and, as a rule, is narrow; the vaginal portion is small, rudimentary, or wart-like. The uterus is either solid* or hollow, and averages from 3 to 6 centimeters (1.2–2.4 in.) in length (Fig. 12). Menstruation, as a rule, never occurs. The

FIG. 12.



Right-horned uterus; left horn entirely absent.

The left round ligament, left ureter, and left kidney are wanting. *d*, right ovary; *l*, right round ligament; *n*, vaginal portion.

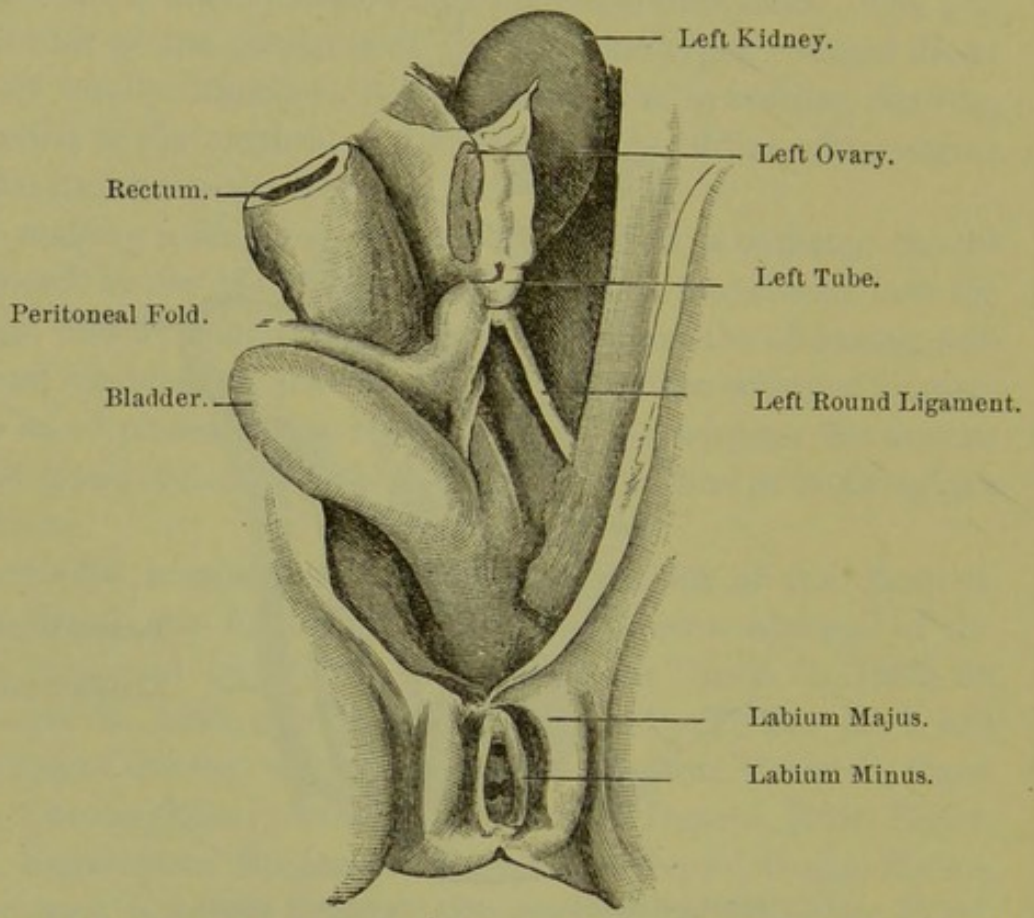
uterus is usually not situated directly in the median line, but rather to one side, toward which side the organ is bent or arched. The broad ligament is absent on the same side as the missing uterine horn. The ovaries may be normally developed on both sides. The uterus unicornis, as a rule, has no fundus, but this

* Holst, "Beiträge," I, p. 43.

is not invariable (Figs. 12 and 13). Frequently there is unilateral development of the bladder, seldom failure of the kidney and ureter upon the affected side.

Two cases of this kind, Figs. 12 and 13, are from our clinical museum in Munich; in one the left round ligament of the uterus, left ureter and left kidney are wanting; in the other, both broad

FIG. 13.



Left-horned Uterus without any rudimentary right horn. The rectum is on the right side, and the broad ligaments, right ureter and kidney are absent.

ligaments, one ureter and the corresponding kidney are absent; the rectum is situated on the right side near the bladder-like uterus. The solid horn was small and muscular; the tube and ovary upon the corresponding side were likewise solid and rudimentary. The kidney and ureter were absent on the same side, and also the corresponding recto-vesical ligament.

III. Uterus Unicornis Excavatus cum Rudimento Cornu Alterius Solido s. Excavato. (One-Horned Uterus with Cavity, with Either Solid or Excavated Rudimentary Horn.)

Cases in which the distorted uterine horn was entirely solid have been reported by Rosenberger and Saexinger.*

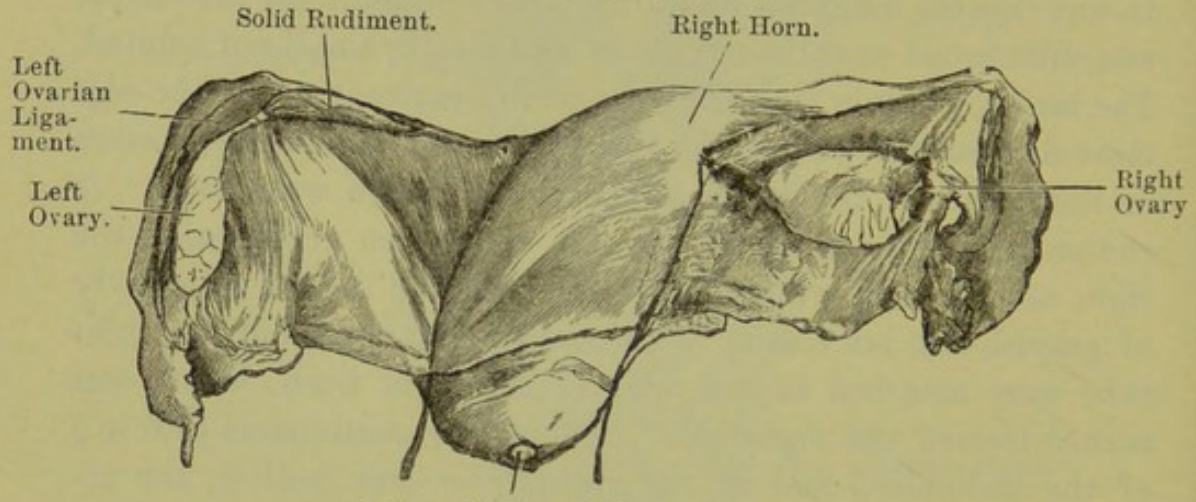
I have seen two such cases, one of which is described in my *Atlas*, plate x, Fig. 1, p. 88; the other, in the third volume of *Berichte und Studien*, pp. 245, 246. The last patient died from infectious puerperal peritonitis. The diagnosis of uterus unicornis was not made during life, for the patient did not enter the hospital till the second stage of labor. The fœtus came down with a foot presentation, and the weakly pulsating cord was prolapsed; the pains being feeble the fœtus was at once extracted. In any case the diagnosis would have been difficult, for the fundus was quite broad near the left cornu, and neither small nor pointed. The large omentum was adherent to the peritoneum of the sigmoid flexure and uterus, and there was a furrow-like depression on the fundus of the uterus where the adhesion was found. A rudimentary growth about the size of a plum represented the right uterine horn, which upon section proved to be a solid body of grayish-red, lax tissue. The ovarian ligament and the right tube were attached to the apex of the right horn, which was turned toward the right side. About four centimeters (1.6 in.) of the abdominal end of the right tube was hollow, the remainder being solid. The right ovary was of good size, flattened, as was also the left, and contained several corpora lutea. A thin, solid band passed from the rudiment of the right horn to the lower part of the left horn. The vagina and vulva were normal.

I could learn nothing from the history of the second case, right one-horned uterus, with a solid rudiment on the left side (Fig. 14). The vagina was single and of average length and width; the os uteri was a transverse fissure, measuring 1.5 centimeters ($\frac{3}{5}$ in.), the cervix somewhat dilated and 3 centimeters (1.2 in.) long; the right corpus uteri measured 4 centimeters (1.6 in.), and its cavity was somewhat dilated and filled with mucus. From right to left the fundus uteri curved laterally, passing into a

* *Monatsschrift*, xix, p. 194.

ridge or band, which at first glance seemed to be the left tube, but which was enlarged at the point of junction with the left ovarian ligament, forming a solid uterine rudiment 2 centimeters ($\frac{4}{5}$ in.) in length. The ovaries were of unequal size, the one attached to the rudimentary horn measuring 22 millimeters (.8668 in.) and 9 millimeters (.3546 in.), in diameter; the other, 30 millimeters (1.182 in.) and 17 millimeters (.67 in.). Numerous cicatrices were found upon each. Cases belonging in this group have been reported by J. A. Stoltz in 1860, three by Virchow in 1860, by Betschler in 1861, by Rosenberger in 1862, by Turner in 1865 and 1866, three cases, by C. Birnbaum in 1867, and by Faber in 1881.

FIG. 14.



Right One-horned Uterus with the left a solid rudiment.

There may be a cavity in the rudimentary horn, a solid cord intervening between it and the other portion of the uterus. In two recently reported cases pregnancy occurred in such cavity from extra-uterine transmigration of semen, according to Turner, Rosenberger and Virchow. Extra-uterine transmigration of the ovule may also occur, as reported by Luschka. Finally, there may be a distorted, but completely excavated, bladder-like uterine horn in uterus bicornis; cases of this anomaly have been reported by Day, Stoltz and Birnbaum, although I am in doubt as to whether Birnbaum's belongs to this class.

Menstruation may be present and conception occur in uterus

bicornis with a rudimentary horn.* If the ovum be developed in the large horn, premature expulsion may occur from the distention, but in our case the child, a girl, was carried to near full term; its length was 45 centimeters (18 inches) and its weight over 5 pounds. If a communication exists with the cavity in the undeveloped horn, the latter may be also distended. If pregnancy occur in the undeveloped horn, rupture usually takes place and the fœtus escapes into the abdominal cavity with fatal internal hemorrhage, a termination which has been observed by Virchow, Luschka and Rosenberger. Such cases may during life be easily confounded with tubal pregnancy, for it is very difficult to diagnosticate the real condition. The decidua of the non-gravid portion must be carefully studied, to see whether it has the fusiform shape of a uterus bicornis; also whether it has two or three openings. Confusion may arise, even at the autopsy, if strict attention is not paid to the point at which the round ligament is inserted. The ovary and tube may often be rudimentary in conjunction with the partially hollowed-out rudiment of the horn.

IV. Uterus Rudimentarius Solidus. (Solid Rudimentary Uterus.)

The recent publications in regard to this anomaly are by Dinner, Doran, Dyhrenfurth, Freudenberg, Gilles, Kubassow, Thompson, and myself. Here the uterus may also be double, *i. e.*, each Müller's duct may be developed, the coalescence of the two having failed, uterus didelphys. The disturbance, therefore, must have occurred before the eighth week. Further, the uterus may be single below, with more or less development of the horns above, making fusiform bodies which are placed upon the flattened or twisted rudimentary uterus, uterus bifidus. Finally, the rudimentary uterus may be solid but single, uterus rudimentarius solidus.

Examples of uterus didelphys have recently been published by Cusco, of Paris, Gusserow, from Simpson's practice in Edinburg, and by Freund.

In all cases the vagina was rudimentary; in one the round liga-

* See above, our Case No. 1.

ment was wanting on one side. The mammary glands and external genitals were normal or less perfectly developed than usual.

Cruise and Saexinger have described cases of single rudimentary uterus without a cavity, and I have met with eight. In two of these I endeavored to form a vagina; in the third, the condition caused no symptoms, the rudimentary corpus uteri was flat superiorly, not curved, and drawn somewhat to one side, reminding one of uterus bifidus. In all my eight cases the mammary glands and external genitals were normal. In one case reported, the mammary glands were wanting and there was no hair upon the pubes; in another, the round ligaments were absent, while the ovaries were perfectly developed.

Of course, there will be no menstruation under such conditions, though there may be very considerable menstrual molimen of which we have already spoken.* If such patients marry, the lower vaginal segment is distended, or coitus is effected through the urethra. It is worthy of mention that in Cusco's case the uterine appendages of the left side were found in an inguinal hernia.

V. Uterus Rudimentarius Partim Excavatus. (Rudimentary Uterus Partly Excavated.)

Arrested formation of the cavity occurs during the first period of development; therefore, it may be found in uterus didelphys or duplex, uterus bicornis, or uterus simplex. Ed. Martin described a case in which a uterus rudimentarius duplex with a cavity in the right rudiment was found with dropsical degeneration of both kidneys. Leudet reported a uterus bicornis solidus in which the tubes were patent.

Holst observed, on examination, a thin, relaxed uterus membranaceus one and a half inches in length, with rudimentary and impervious vaginal portion.

Neither of these patients had menstruated or experienced the molimen, though numerous cicatrices and corpora lutea were found in the ovaries of Leudet's.

The following complications may occur in the anomalies just

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* See p. 104, and Hafner, *Berl. Kl. Wochenschrift*, 110, p. 346.

described. First, an absence, degeneration, or distortion of one or both kidneys, as well as of the corresponding ureter and half of the bladder; this occurs more rarely alone, than in combination with the anomalies under consideration. Figs. 12 and 13, pp. 213, 214. Then the original ducts of the kidney, the Wolffian bodies or Gartner's canals may persist instead of gradually atrophying. Again, the extremity of a Müller's duct may develop into a hydatid of Morgagni, or, finally, extensive congenital primary atresia of the vagina, in contradistinction to the congenital atresia acquired during fœtal life, may be associated with a solid partial or complete uterus bicornis, whereas, the latter form of atresia is found only with a single uterus.

In the second and third periods of intra-uterine life those anomalies are developed which depend upon the disappearance of the septum, and complete external coalescence of the two horns. The septum begins to disappear at the external os uteri and the process is complete in the uterus and in the vagina by the end of the twelfth week. The disappearance of the septum is entirely independent of the external coalescence.

VI. Uterus Bicornis Septus, Subseptus, Simplex. (Two-Horned Uterus with Complete or Partial Septum, Simple.)

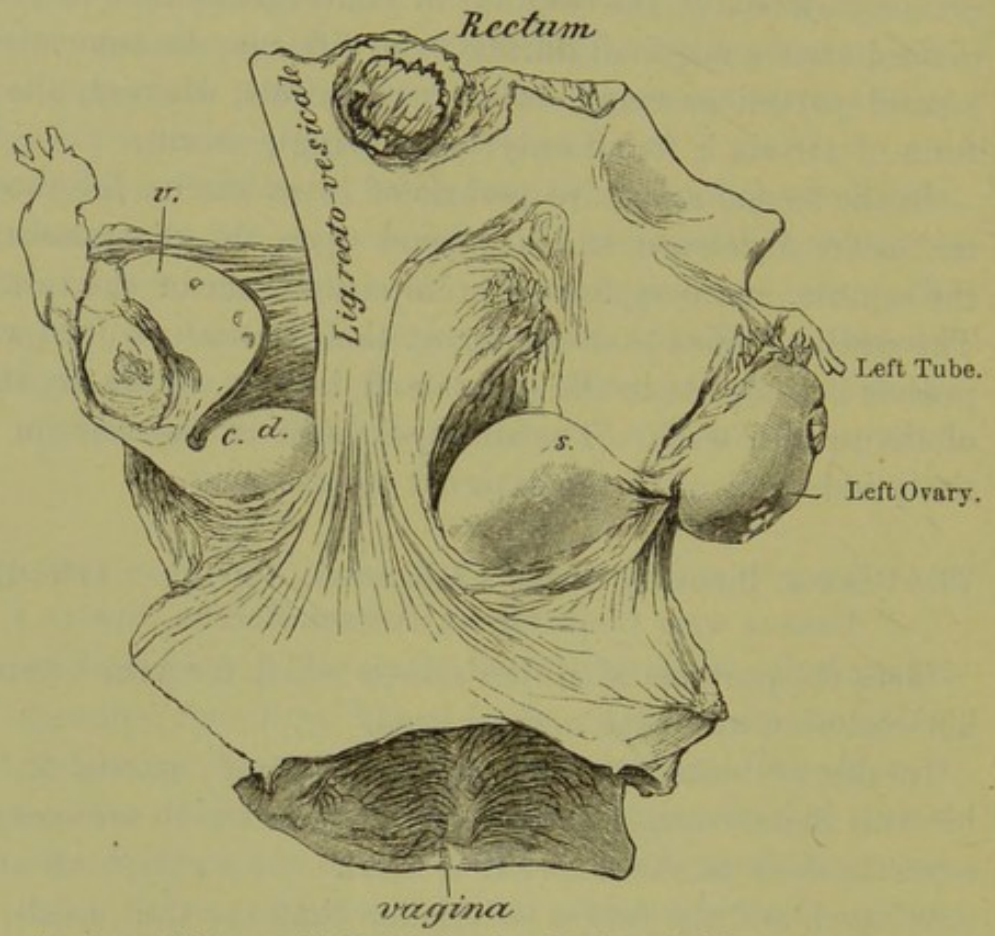
Here the portions of Müller's ducts which form the uterus have not coalesced up to the normal level.

In uterus bicornis septus or, as Kussmaul named it, uterus bicornis bicameratus, there are two cavities which are completely separate down to the external os uteri. As a rule, both are well developed, and the cervix is thicker than the thin, small, cylindrical horns. The anterior uterine wall is usually concave, and the posterior convex; where there is a double vagina, the vaginal portion is also double. The uterus is usually shorter than the normal; occasionally a fold of peritoneum passes from the bladder to the rectum between the horns, the recto-vesical ligament. The most recent descriptions of such cases are by Simpson, Laaser, Gallard, Freund, Rokitansky, Greenhalgh and Faye. Some of these patients never menstruated without great suffering and were sterile, while others have repeatedly conceived, as did Faye's patient. I have observed several interesting

cases of this kind. The first patient, who had double vagina, hematocolpos, and hematometra, has been already referred to upon page 108, and is described in my Atlas, plate xi, p. 88. In the preparation adhesions could be seen between the two horns, and between the lowest portions of the horns and the rectum and posterior peritoneal covering.

The second case is given in the Atlas, plate xviii, p. 382,

Fig. 15.



Two-horned Uterus with Double Cervix. Recto-vesical Ligament.
b, right tube; *v*, right ovary; *c*, *d*, right horn; *s*, left horn.

principally to show the extraordinarily large recto-vesical ligament. In the vaginal vault, between the two small vaginal portions, was a remnant of the vaginal septum 5 mm. ($\frac{1}{5}$ in.) in length. The anterior and posterior columnæ rugarum were strongly marked, and the vagina unusually short and narrow, 5 centimeters (2 in.) long by 6 centimeters (2.4 in.) broad.

The recto-vesical ligament, shown in Fig. 15, is 4 centimeters (1.6 in.) in width, and passes from the middle of the posterior wall

of the bladder to the rectum between the two horns. The latter are unequal in length and thickness, the left uterus being 6 centimeters (2.4 in.) while the right is 5.5 centimeters (2.2 in.) in length. Between the horns the recto-vesical ligament is only 2.5 centimeters (1 in.) wide, but broadens to 8 centimeters (3.2 in.) as it ascends to the anterior rectal wall, from which it may be separated; here it has the appearance of a smooth muscular layer, which suddenly becomes thinner and passes into the peritoneum of the colon. No muscles could be found in this ligament by microscopical examination. Beneath the peritoneum was a layer of fatty embryonic connective tissue containing numerous thick-walled vessels.

In Schatz's case* the recto-vesical ligament was united by bands of adhesion to several loops of the ileum and was without lateral branches. Owing to the fact that but few of such cases have been carefully examined with reference to this point, it is impossible to determine with certainty the significance of this ligament; it may be the cause or the result of the incomplete development, or may originate simultaneously with it.

Normally the layers or folds of peritoneum are separated by the uterus growing upward between them. In my case the ligament seemed to be the consequence of an incomplete unfolding, a view rendered the more probable by the absence of any symptoms of peritonitis in the vicinity of the uterus, tubes or ovaries. The unusually great development of the two horns also renders the assumption of fœtal inflammatory processes being the cause of the anomaly improbable.

The third case, Fig. 16, shows a different combination of uterus bicornis septus or bicollis, namely, with vagina septa; one-half of the uterus had been pregnant while the other still contained decidua at the time of examination. The difference between the two horns was considerable, the left, unimpregnated portion was 8 centimeters (3.2 in.) in length. The superficial layers of the mucous membrane were partly exfoliated, while in the lower strata regeneration had already begun.

The fourth case I saw in the Dresden Lying-in Hospital;† the

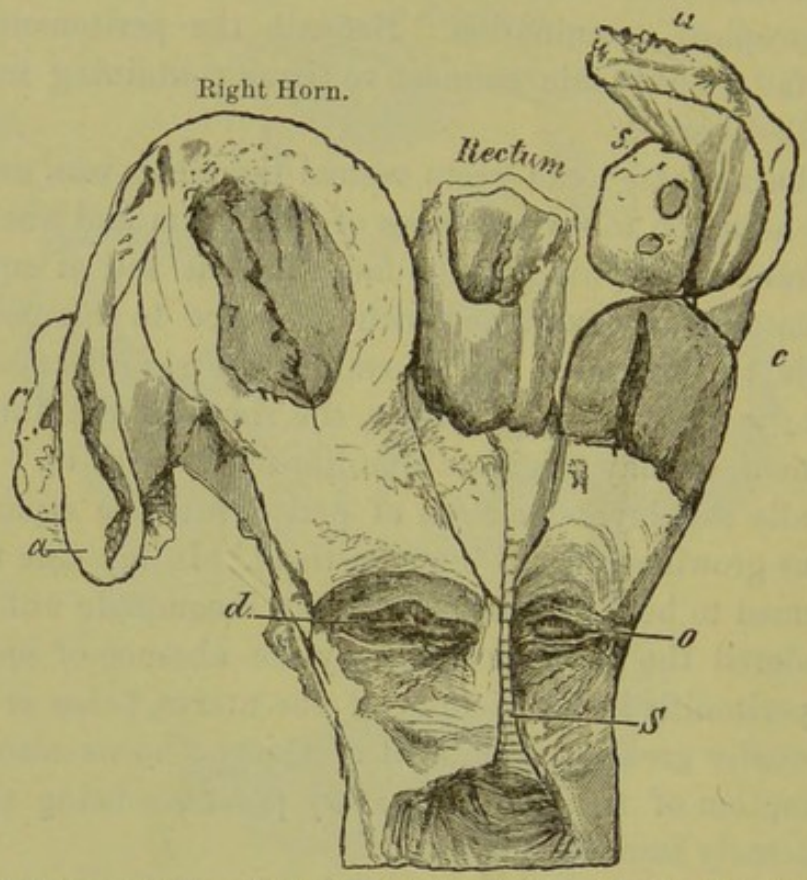
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* *Archiv f. Gynäk.*, 1, 14–23.

† Atlas, p. 386.

patient, aged 24 years, had given birth to a living child in 1878; instruments were not used, and she made a perfect recovery. When admitted we found a double vagina, each part presenting a vaginal portion. The right half was pregnant; in the left half Dr. Wyder demonstrated decidual cells. The patient began to menstruate at seventeen years, the periods coming at irregular intervals of three to four weeks and continued seven or eight

FIG. 16.



Two-horned Uterus with Double Cervix. Double Vagina. Atresia of the Right Tube.

a, atresia of tube; *d*, right orifice; *r*, right ovary; *u*, left tube; *s*, left ovary; *S*, vaginal septum; *c*, left horn; *o*, left orifice.

days; the flow was tolerably profuse, although painless. Her second pregnancy had lasted 262 days; the fœtus presented in the first occipito-anterior position. The pains were weak in the second stage, and, as the fœtal heart was not carefully watched, the labor lasted 70 hours; the fœtus was born dead; the cord was found encircling it twice. The placenta was expelled 25 minutes later. The pains were few and inefficient. During labor the two halves of the uterus could not be sharply defined,

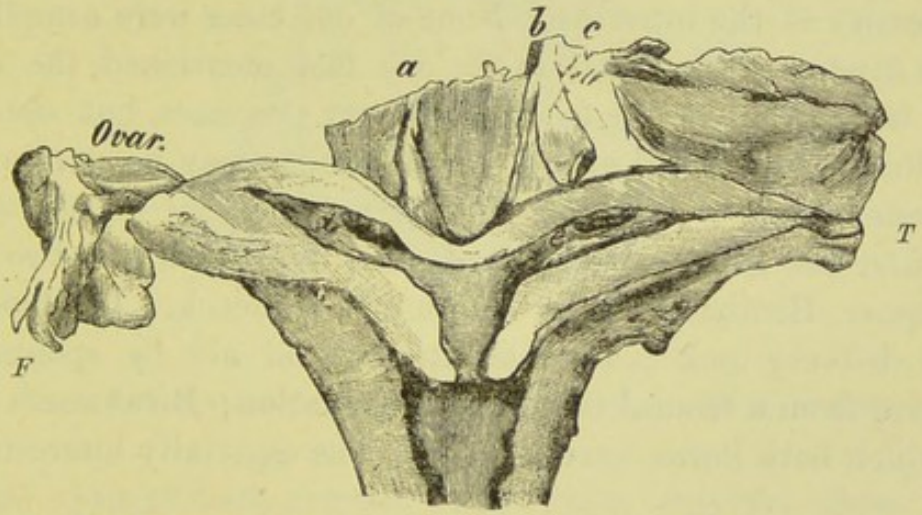
but the depression between them could be recognized as the uterus diminished in size.

It could not be determined with certainty that the previous pregnancy was in the left half. The two vaginæ were of equal dimensions. Two hours after delivery the patient had a severe convulsion from which she fully recovered. The fœtus was 47 centimeters (18.8 inches) long, was rather small, but weighed between five and six pounds.

B. Uterus Bicornis Partim Septus. (Two-Horned Uterus, Partly Separated.)

The septum is usually continued as low as the internal os, as in the cases of Horand and Biesiadecki, or a little lower, as in Trier's case, in which both halves were pregnant. Kussmaul calls this form uterus bicornis unicollis. I have described a

Fig. 17.



Two-horned Uterus with One Cervix. *d* and *e*. Adenomata. *O*, ovary; *F*, fimbriæ; *T*, tube.

preparation showing this anomaly in my Atlas, plate xi, a, p. 198, which was taken from a virgin, aged 21 years, who died from endocarditis (Fig. 17). The left horn was so deeply imbedded in adhesions that at first nothing could be seen of it. Three bands of adhesion passed from the deepest portion of the depression at the fundus across to the rectum, *a*, *b*, *c*. The somewhat round external os led into a dilated cervical cavity, and directly above the internal os the two horns diverged at an angle of 110

degrees. The tube and ovary on the right side were normal, but on the left they were imbedded in numerous adhesions. The three bands of adhesion above mentioned were, first, a short adhesion from the posterior wall of the bladder to the insertion of the right tube; second, a thick ligamentous membrane which passed from the middle of the right horn internally across the cervix, and which then lost itself in the region of the right sacro-uterine ligament; third, the left horn was bound to the bladder and rectum by several adhesions.

Menstruation had always been very irregular in this patient; at first, only once in three or four months, and later it ceased altogether. She died from endocarditis with mitral and aortic insufficiency, infarction of the spleen, and cerebral embolism.

Krieger* endeavored to account for a uterus bicornis, complicated with atresia of the anus, by the persistence of a rudiment of the allantois which he was able to trace from the posterior wall of the bladder between the two horns to the blind extremity of the intestine. None of our cases were complicated with atresia of the anus; in the one last mentioned, the condition was doubtless due to inflammatory processes, but not so in the first case. At all events, the deformity may be attributed to various causes.

Fürst has collected reports of cases by W. Turner, two cases, Heppner, Birnbaum, Tyler Smith and Hancock. In Heppner's case delivery took place without artificial aid by spontaneous version from a frontal to a knee presentation; Birnbaum's case,† in which both horns were pregnant, was especially interesting.

VII. Uterus Introrsum Arcuatus. (Uterus with Concave Fundus.)

In this anomaly the horns of the uterus have coalesced to such an extent that only a slight saddle-shaped depression can be seen at the fundus. The septum may also be complete, incomplete, or entirely absent. Such cases have been described by Heschl, Baart de la Faille and Greenhalgh. In Spaeth's case the fundus was slightly curved inward; the right half was pregnant, the left

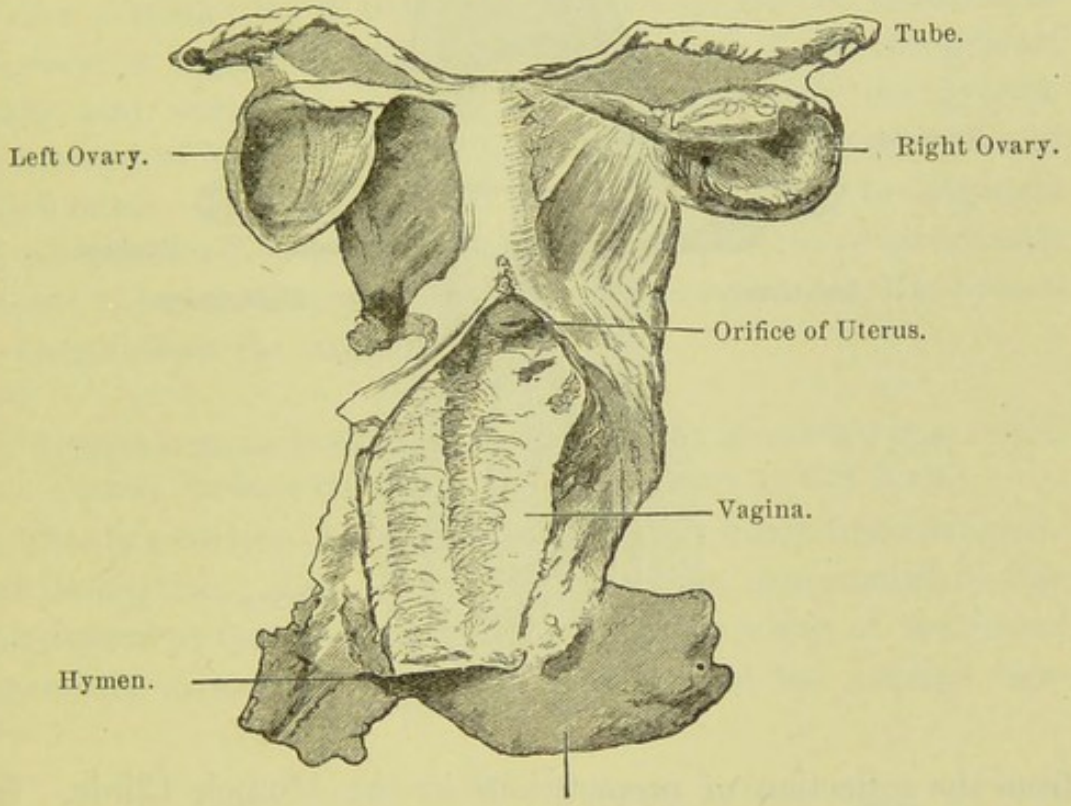
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* *Monatsschr. für Gebh.*, xii, p. 172–190.

† *Monatsschr.*, xxii, 6; xii, 63.

contained remnants of decidua, and the septum passing from the external os to the fundus was ruptured during labor. I have found this anomaly several times in the dead subject, the most interesting case being shown in Fig. 18, in which a still-born fœtus was found to have a uterus introrsum arcuatus with con-

FIG. 18.



Uterus with Concave Fundus. Cystomata of both Ovaries in the Fœtus.

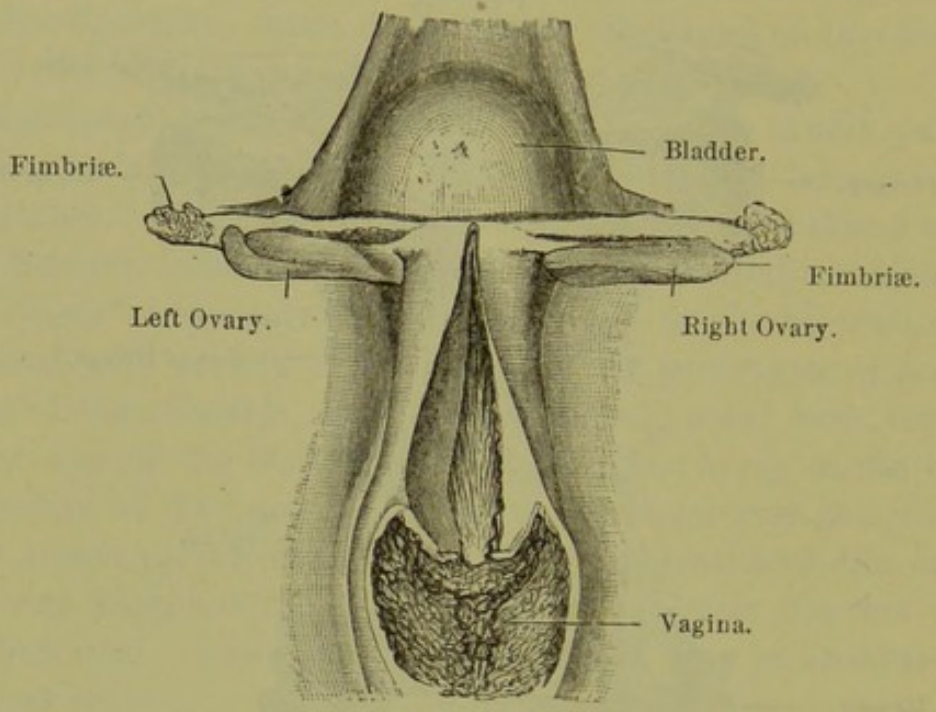
genital cysts of both ovaries. This fœtus weighed about three pounds and was 16 inches in length.

VIII. UTERUS PLANIFUNDALIS. (UTERUS WITH FLAT FUNDUS.)

Here the slight depression at the fundus has disappeared, the upper border of the organ passing in a straight line between the tubes. Previous to the appearance of Fürst's work (*loc. cit.*, p. 201), this arrest of development had been described only by E. Wagner. In this case the entire uterus and vagina were divided by a septum 1½ millimeters ($\frac{1}{24}$ inch) in thickness, the upper part of each cavity being horn-shaped and turned outward. A single

hymen, overlapping in several places, covered both halves of the vagina. One case of this kind, an adult uterus planifundalis with cylindrical-celled adenoma complicated by salpingitis on the right side and an ovarian tumor on the left, is shown in the plate XX, a, p. 40, of my Atlas. Another specimen, Fig. 19, is

FIG. 19.



Uterus with Flat Fundus.

from the collection of preparations in the Munich Clinic. In both cases the vagina and uterus were single; they may also be entirely or partially separated.

IX. UTERUS FORAS ARCUATUS. (UTERUS WITH CONVEX FUNDUS.)

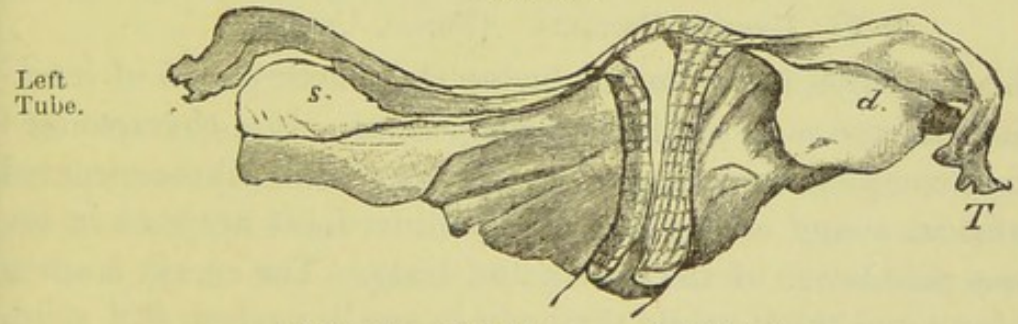
This uterus has the normal form externally, is well developed, and may be single internally; or, there may be a complete or partial internal septum. Kussmaul named the first form, uterus bilocularis s. septus. The whole organ appears rather broader than normal. Occasionally, ridge-like prominences are seen on the posterior wall; the latter may also be present when the cavity is single. Sometimes the vaginal septum remains only in small parts, *e. g.*, the external os alone may be divided into two portions, or, instead of the septum, a ridge representing it may be seen on one or both walls.

Malformations which occur as combinations of the anomalies from VI–IX, are as follows: 1. Congenital vaginal atresia of the anus. According to Krieger, this form results from the persistence of the allantois, the latter preventing the intestine growing toward the external anal inversion. 2. Partial atresia of the allantois, so that no cavity is formed in the horns which originate at the anterior abdominal wall, thus resulting in atresia of the urethra; or, if these two eminences fail to coalesce, to duplication of the bladder.* 3. Persistence of the uro-genital sinus may occur when anything interferes with the growth downward of Müller's ducts.† 4. Imperforate hymen, atresia of the hymen. This anomaly has also been supposed to originate in an abnormality of the allantois, but, as we have previously shown, it has nothing to do with the allantois, because the hymen is formed from the vagina.

X. Uterus Inæqualis ex Impedita Evolutione Unius Lateris. (Unequal Uterus from Impeded Development of One Side.)

This is a variety of arrested development which demands careful description. The case described by me, represented in Fig. 20, showed at first marked differences in the width of the broad ligaments, in the length of the tubes and of the ovarian liga-

Fig. 20.



s, left ovary; *d*, right ovary; *T*, right tube.

ments. The right ovarian ligament was 15 centimeters (6 in.), the left 45 centimeters (18 in.), long, while the ovaries were about of the same size. A section of the uterus showed unequal size

* Rose, *Monatsschrift*, XXVIII, 1866, p. 248.

† Debout's case, Fürst, *loc. cit.*, p. 217.

of the lateral walls, the left 45 millimeters, the right 65 millimeters; the inequality being due chiefly to less complete development of the left side of the fundus. It is evident this was not a case of uterus unicornis, as the illustration plainly shows that the left ovarian ligament passes to the left side of the uterus, and that the left tube opens into the left side of the fundus. Neither can it be a right latero-flexion, as the axis of the organ is not bent to the left, and the slight lateral curvature can be explained by the shortness of the left lateral wall of the uterus. The right and left walls are of about the same thickness. The cervix seems to be remarkably long, and its right and left sides are more nearly alike than the upper parts of the organ. This abnormal form can be understood only by assuming a partial and incomplete development of those portions of Müller's ducts which form the fundus of the uterus.

The inequality in the broad ligaments, tubes and ovarian ligaments previously mentioned is not necessarily associated with the anomaly under consideration, and is probably due to an asymmetrical coalescing of Müller's ducts which originally may have been of the same length. This asymmetrical union may have been due to fixation of one duct and the unusual length of the other, the increased length being caused by tension after its union with the former.

XI. Uterus Fœtalis. (Fœtal Uterus.)

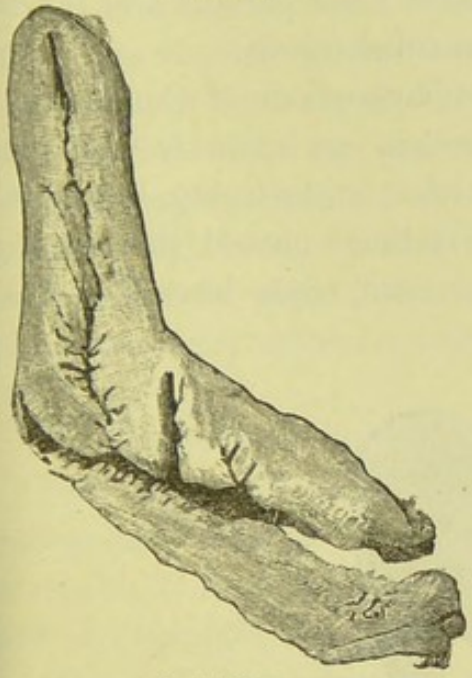
This condition is developed during the fourth period of intrauterine life and may persist in later periods. It is characterized by an incomplete formation of the cavity and the three-cornered cylindrical shape of the uterus. Distinct folds are seen in the mucous membrane of the cervix and body. The cervix is often very long and thick, while the body is small, narrow and solid. In one case of this kind Saexinger confirmed the diagnosis by an autopsy.* The patient died from chlorosis; the uterus was 4 centimeters (1.6 in.) long, and the vaginal portion merely a small perforated tubercle.

I have described and given a drawing of a normal fœtal

* Fürst, *loc. cit.*, p. 220.

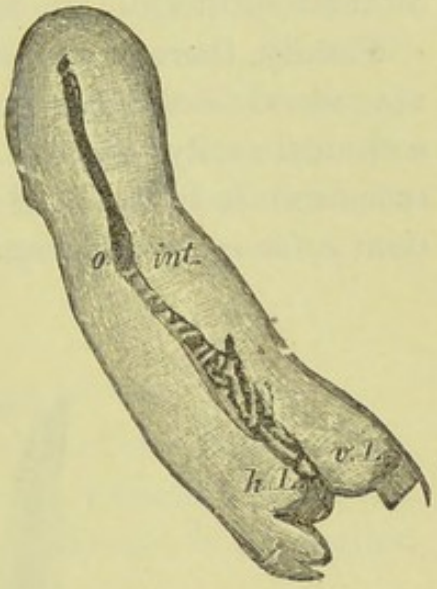
uterus in the Atlas, plate xiii, p. 387. The cavity of the body was only 1.25 centimeters ($\frac{1}{2}$ in.) long; that of the cervix 2.5 (1 in.); the walls are from 5 to 6 millimeters ($\frac{5}{26}$ to $\frac{6}{26}$ in.) thick, and the mucous membrane is thrown into folds which reach above

Fig. 21.



Fœtal Uterus.

Fig. 22.



Infantile Uterus.
v L, anterior lip; *h L*, posterior lip
o. int., internal os.

the internal os. Similar folds occur in the vaginal portion as throughout the whole vaginal canal.

XII. Uterus Infantilis.* (Infantile Uterus.)

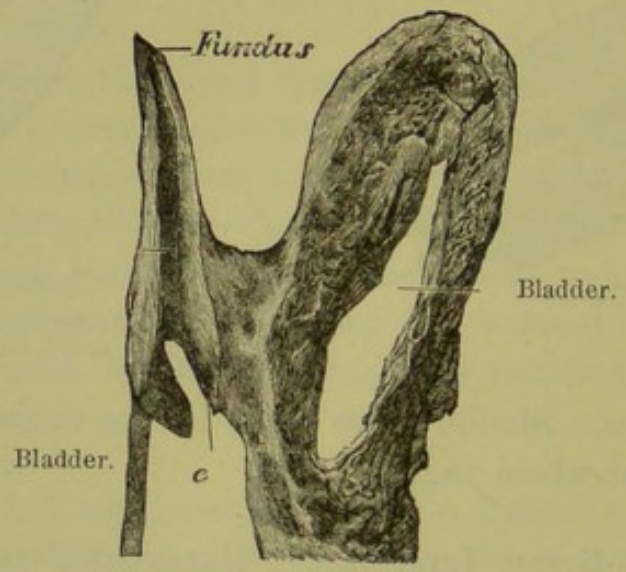
In the infantile uterus the vaginal portion is much shorter, and the plicæ palmatæ pass high up in the organ. The walls are of about equal thickness throughout, so that the increased growth of the body at the expense of the cervix can be readily recognized. If the uterus remains in this condition after puberty, it becomes an abnormality which several anatomists have found associated with a diminutive heart and a general hypoplasia of the vascular system. This will explain why menstruation and ovulation are so frequently absent in these cases. I have had two patients under my care who never had menstruated,—one

* *Vide* Atlas, plate xiii, Fig. 4.

25 years old, and married for more than a year; the second, single and 24 years of age. In the first patient the vulva and vagina were normal, the uterus cylindrical and only 5 centimeters (2 in.) long; the patient was predisposed to tuberculosis. The second patient had a small retroverted uterus, and a sound could not be passed above the internal os; her parents and three of their adult children had died from tuberculosis.

Finally, there is another variety of hypoplasia of the uterus, viz., *uterus (rudimentarius) membranaceus*—an anomaly which is a clinical rarity. I have never met with it in the living, but have twice seen it in the dead subject. Virchow* named this condition *primary atrophy*, and besides his own, cases have been re-

FIG. 23.



Membranaceous Uterus.

ported by von Forster, Fraenkel, Fürst, Heitzmann, Hiller, Holst, Puech, and K. Schröder. In Fürst's case, a girl nine years old, the uterine wall at the fundus was only $\frac{1}{2}$ millimeter ($\frac{1}{52}$ in.) thick, at the sides, 1 millimeter ($\frac{1}{26}$ in.). My cases were, first, a girl of $1\frac{1}{2}$ years, dead from scarlet fever; the *uterus, planifundalis simplex*, was only 2.5 centimeters (1 in.) long, and the ovaries were simply thin strands in the broad ligaments. The second case is represented in plate xiii, Fig. 1, p. 388 of my Atlas. The uterus of this person was only 3.4 centimeters (1.3

* Berl. "Beitr. z. Gebh. u. Gyn.," I, 360.

in.) long, and the walls of the fundus were as thin as paper. (Fig. 23.) The patient died from phthisis and general glandular suppuration. There was but little hair upon the pubes, the introitus was normal, the bladder hypertrophied, and its upper surface connected with the large omentum. The hymen was intact, the vagina short, narrow, transversely striated and very thin; the vaginal portion was small. Muscular tissue was entirely absent from the fundus; the tubes were normal, 8.5 centimeters (3.4 in.) long, and the ovaries, though well developed, showed no cicatrices. In both of Virchow's cases the aorta was narrow, with here and there fatty degeneration of its intima; in one patient the right heart was hypertrophied, and in the other there was fatty degeneration.

Ætiology of Congenital Deformities of the Uterus.

Two classes of causes for abnormalities of development are recognized, those of local origin, and those of hereditary nature, traceable to the influence of constitutional disease at the earliest periods, scrofula, tuberculosis, and rachitis.

Hymen clausus has been found in several members of the same family. (Madge, Yates.)

Many of these anomalies are undoubtedly due to inflammations of the peritoneum during fœtal life. Recklinghausen traced one case of fœtal uterus to membranous adhesions between the uterus and the posterior wall of the bladder. In a case examined by Ahlfeld,* in an infant with partly dilated bladder, complete separation of the genital canals, atresia of the anus, and cloaca, the cause was assumed to be premature and great distention of the allantois from closure of its excretory ducts.

Other probable factors are displacements of the adjacent organs, as of the rectum to the right side, or a drawing upward of the bladder.

I found two per cent. of congenital deformities of the uterus in 600 autopsies. I have also seen 18 cases in the living subject in 20,000 patients, 14,000 parturient women being among the number.

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* *Archiv für Physiol. Heilk.*, XVIII, p. 185.

The causes which lead females with imperfectly developed genitals, to consult the physician are these: 1. Evacuation of the bladder and bowels may be difficult in early childhood, either in anal atresia alone or associated with some abnormality of the bladder. 2. Amenorrhœa exists at puberty with the occurrence of colicky pains or perhaps symptoms of peritonitis. 3. A tumor may be present with violent pain increasing at each recurrence of the menstrual period; hematometra may be the sequence of duplication of the genital organs. 4. After marriage pain in coition may occur, with burning and pressure in micturition. 5. The desire to have children. 6. The various anomalies of parturition, finally, demand the most careful attention.

Cases of the last will not be dwelt upon here, and instead of giving the other symptoms in detail, I prefer to describe the cases I have examined which have not been previously mentioned.

Atresia of the Vagina, Solid Right-horned Uterus (with other Horn Rudimentary?) Ovaries?

1. M. B., 24 years old, single, was a healthy child; has never been seriously ill; has not yet menstruated. During every fourth or sixth week since her twentieth year she has had pain in the abdomen and sacral region, with nausea and vomiting, and abdominal swelling; this condition lasts three or four days. The pain is said to have gradually increased in severity. Habits are feminine. Vulva is entirely normal. It is not noted whether the hymen was present. The vagina is a cul-de-sac about 8 centimeters (3.2 in.) long, through which a cylindrical solid body can be felt somewhat to the right side. A fold passes from the latter to the left pelvic wall. It is impossible to isolate the ovaries. Tumors, from retention of fluid, cannot be found. Upon examination through the vagina and rectum of the cylindrical body which was supposed to be the uterus, a depression like the os uteri could be felt. In the winter of 1864–65 I tried repeatedly to form an artificial vagina, succeeding in penetrating to the uterus, but could evacuate nothing from it, and as the artificial canal always closed, the patient was finally dismissed unimproved.

Solid Rudimentary Uterus; Atresia of the Vagina; Basedow's Disease; Unsuccessful Attempt to form an Artificial Vagina. 1871.

2. Miss W., 21 years old, has suffered since her eleventh year with amenorrhœa and palpitation of the heart; Basedow's disease marked. One year ago the palpitation appeared every four weeks, and was associ-

ated with a tense, swollen abdomen. Condition similar to above patient, except the uterus, which was solid, rudimentary, with an indistinctly felt orifice at its lower extremity. Attempt to form artificial vagina unsuccessful. No hematometra nor accumulation of secretion. The patient was discharged unimproved.

Atresia of the Vagina. Solid Rudimentary Uterus. Ovaries?

3. Mrs. Z., about 25 years old, married 1 year, sterile, came to inquire the cause of her sterility. Vagina was short, rudimentary, broad, 6 centimeters (2.4 inches) long. The uterus feels like a small, single solid body. No menstrual pains. The urethra was so distended from coitus that the finger could be readily introduced. No dysuria. Treatment impossible.

These three cases occurred in Rostock, among 1588 patients. In Dresden I observed the following:—

Atresia of the Vagina; Solid Simple Uterus. Both Ovaries Palpable; Left one, size of a Walnut.

4. L., 29 years old, scrofulous in childhood, had typhoid fever when 23 years old. She has been married five years, but is sterile, and has amenorrhœa and headache; is of average size, a blonde and not pale. Patient says mammary glands are normal; vulva is normal. Small papillomata on inner surface of the nymphæ. Signs of a hymen present; urethral orifice reddened, and to the right side of it there is a depression; the finger may almost be introduced. Behind the hymen there is a cul-de-sac about 5 centimeters (2 inches) in length. Patient thought she formerly had a feeling of weight every four weeks, and has now at irregular intervals pain in region of right ovary. Treatment not indicated.

5. Miss L., 23 years old, with amenorrhœa. The mammary glands, vulva, and vagina as far as the vault, are well developed; but in the vault there is a very small orifice through which the sound cannot be introduced. By bimanual examination, neither uterus nor ovaries can be felt.

6. Miss R., 19 years old, has amenorrhœa, atresia of the vagina, and solid rudimentary uterus; a slight fold or band passes across the true pelvis. Ovaries not palpable. No menstrual pains present.

7. Mrs. S., 31 years old, married for four years, suffers from amenorrhœa. Voluptuous sensation during coition. There is a dilated urethra, but no dysuria. The vaginal cul-de-sac 6 centimeters (2.4 inches) long. Remnants of hymen are found in introitus. There is a full growth of hair on pubes. No retention tumors are apparent. A transverse band in the pelvis may be felt, but neither ovaries nor uterus are palpable.

Atresia of the Vagina; Solid Rudimentary Uterus; Dilated Urethra; no Menstrual Pain.

8. Mrs. Z., 25 years old, married for almost three years, complains of amenorrhœa. She has used alcoholic drinks freely in order to bring on the menses. No sensation is felt in coitus. The mammæ are large, and a drop of serum may be pressed from the left nipple. The growth of hair is abundant on mons veneris and vulva. The urethra, being dilated, admits the finger, but the vaginal cul-de-sac is short, and there is no hymen. The solid rudimentary uterus is 3 centimeters (1.2 inches) long. The ovaries are not palpable, and no menstrual pain occurs.

9. Miss Z., 20 years old, has amenorrhœa. The urethral orifice is dilated, and beneath it are formed two pouches or pockets, from 0.5 to 1 centimeter deep. Vaginal atresia is present; solid rudimentary uterus. There is a trace of both ovaries, and she has sacral pains and headache.

10. Mrs. W. has a uterus bicornis, of which the left horn is the more developed. She is about 45 years old, and a Russian.

11. Mrs. O., 20 years old, has never menstruated with regularity. Amenorrhœa for the last fifteen months. Has a very small, infantile uterus, 4 centimeters long.

12. Mrs. K., 27 years old, has been twice married, but is sterile. The vagina is short and smooth, and the vaginal portion wanting; a button-shaped external uterine orifice. The sound passes 4 centimeters (1.6 inches) into the small uterus, which is infantile.

13. Mrs. B., 25 years old, has been married one year; never menstruated. Her uterus is small and cylindrical, 5 centimeters long. Tuberculosis.

Of these 13 cases, 9 belong in their origin to the first intra-uterine period, Case No. 10 to second period, and 11–13, inclusive, to the fourth. Of these cases, 10 occurred in 5665 patients, averaging 1 case to each 566 patients treated, which is about the same percentage as in Rostock and Dresden. The correct proportion 13 : 7253 would be 1 : 558.

Eight of the patients were married, although 5 of them had never menstruated. The cases, 1–9 inclusive, might have led to divorce, partly on account of interference with cohabitation, and partly from inability to conceive. Therefore, I hold that every mother, whose daughter never having menstruated is about to marry, should require an examination to be made by the family physician before marriage, to ascertain whether the genital canal is pervious throughout, and the cause of the amenorrhœa may be ascertained. Further, no physician should prescribe the

preparations of iron or emmenagogues for a young girl that has reached the age of puberty, whose menses have not appeared, without previously making a careful examination. Again, mothers, whose daughters have not menstruated, apparently because they are comparatively young, but who have severe pain at intervals of four weeks, should insist upon a local examination, for there may be some obstruction to the menstrual flow; or, at least, the abdomen should be examined for a retention tumor. Palpation and percussion are to be employed in these examinations; a tympanitic tone throughout the pelvis would, for example, exclude a retention tumor.

The genital canal in the virgin or infant may often be examined with the sound alone; at least, it will reveal an imperforate hymen, or atresia of the vagina, and, in addition to this, by an examination per rectum the presence of a uterine orifice can be ascertained. By the hand in the rectum, it is certainly possible to pass the sound per vaginam into the uterus.

Appendix.

The Uterine Sound.—As in this place sounding the uterus has been mentioned for the first time, so we must now consider somewhat this method of exploration. It was doubtless employed in ancient times. Chrobak has shown that Paul of Ægina and, probably, Soranus also, made use of it in measuring the vagina. In 1808 a sound was used by Osiander to replace a retroflexed uterus, and since that time many gynecologists have employed it for the same purpose, among others Kiwisch, Velpeau, Depaul and Valleix. But this agent, valuable in diagnosis and therapeutics, was not generally accepted by the profession until the early part of the fourth decade of the present century. Simpson and Kiwisch alike contributed to bringing it into notice, from simultaneously directing attention to a particular instrument.

A good uterine sound is about 30 centimeters long, has a knob at the upper end, and near this is somewhat curved; it is made of flexible metal, and at the lower end there is a handle, the upper surface of which is rough, and the under smooth. About 7 centimeters from the knobbed end, and upon the upper side,

there is a prominence, and the entire length from the terminal bulb for about 20 centimeters is divided by slight depressions into centimeters. These notches must not be deep, or the sound is made rough and liable to break.

The gynecologist should not have one sound only, but several, of various thicknesses and lengths, and made of different materials, as of copper, silver, whalebone or laminaria, and also small and large bougies to be used in place of the sound.

The instrument is introduced as follows. The patient should lie upon her back with the pelvis elevated, or upon her side, at the edge of the bed. The instrument is then passed along the palmar surface of one or two fingers, or using a cylindrical, double-bladed, or duck-bill speculum.

A bimanual examination should precede the introduction of the sound. This examination will determine the position of the uterus, the ease and safety of introduction, and the direction in which the sound should be passed. It is also advisable to evacuate the bladder and rectum, and to place the patient in such a posture that, if restless or timid, she cannot move too freely while under examination. She should always be recumbent, and never standing; I have seen patients almost faint from sounding the uterus in the erect posture, and shall never again resort to it. It is better to introduce the sound with the right hand, for this, in spite of all practice with the left, is the more skilful. Two fingers of the left hand, or, in narrow vaginæ, one finger only should be inserted to the external os and the bulb of the sound passed along its palmar surface. When the bulb has passed the external os, the left finger elevates or straightens the uterus, or, when indicated, the left hand may be removed from the vagina and placed above the symphysis to fix the uterus; but no pressure should be made or, as has often happened, the sound may penetrate the uterine wall.

Resistance is usually felt near the internal os, often due to the bulb catching in the folds of the cervical mucous membrane, and this may be overcome by gentle lateral pressure, or by raising or lowering the handle. Sensitive patients will suffer when the sound passes the internal os; if questioned, they complain of pain in the sacral and umbilical regions, or they have a sen-

sation as though they were menstruating. The sound now slips in easily, and the unemployed hand may be used to palpate the tip of the sound through the fundus of the uterus, as this alone will prove that the instrument has reached the end of the cavity or show the direction in which it has entered.

It may be advisable to introduce the sound using the speculum, at least until it has passed beyond the external os, if the latter be narrow or when a demonstration of the method is to be given. The movements of the sound are much interfered with by the cylindrical speculum; it can be but slightly bent and can be elevated or lowered only in conjunction with the speculum. Moreover, this speculum fixes the cervix more than is desirable for sounding. The disadvantage is less marked or even absent if the bivalve or duck-bill speculum is used. If an obstruction is met with at any point, force should not be used to overcome it, but the hands must be changed, a precept of great importance in many gynecological examinations; if the sound be guided with the left hand, for example, and the uterus fixed with the right, one will often be astonished by the ease with which the head of the sound enters the uterus.

The purpose of exploration by the sound is, in the first place, for diagnosis. We learn whether the uterus is pervious or whether there is a constriction or complete obstruction of the cavity, and its location. It is easy to be deceived upon this point, for a thin, pointed sound may be caught in the folds of the cervical endometrium, while a larger one readily passes over them. But if a sound of moderate size will not pass, one of smaller size must be used, or eventually, if the lower portion of the organ is at all pervious, a dilating agent must be first employed to determine the nature of the obstruction.

Again, the sound is introduced to determine the length of the uterus. When the uterus is not fixed or displaced by tumors, the measurement is easy if the bulb of the sound can be felt through the fundus. The index finger of the hand guiding the sound is now passed along the rod and pressed firmly against the anterior lip, the handle of the instrument being held in position by the other hand. The finger pressing against the anterior lip is held in position whilst the sound is being withdrawn, and the length

may now be read from the scale. When there are tumors situated in the uterine walls externally, anteriorly or posteriorly, the introduction of the sound to the end of the cavity may be difficult or impossible, and false measurements are here easily made.

The width of the cavity is also of importance. In the first place this is determined by the facility of movement; the ready entrance of the sound above the internal os shows the cavity to be wide, and this is verified by moving the sound about upon its long axis, so that the concavity is now anterior, now posterior, or at the sides. The size of the cavity may be ascertained by sounds of various diameters, or by those with larger olive-shaped bulbs.

A knowledge of the thickness of different parts of the walls is also of importance; and here, again, the sound is of service. The uterus should be palpated in all directions, through the vagina, abdomen and rectum. Tumors of the uterus, and the direction of the cavity will also be recognized, as well as slight variations in consistence, painful points and small myomata.

Some conclusion regarding the character of the uterine mucous membrane may be formed from the appearance of the sound upon its withdrawal, for if it is covered with mucus, a catarrhal condition is probable; the sound may be introduced through the speculum, and the mucus afterwards examined by the microscope, when the character of the catarrh can be accurately determined. If the sound is bloody when withdrawn, provided no force was used, or if blood flows from the uterine cavity subsequently, the mucous membrane must be greatly congested. If solid pieces of tissue are removed with the sound, further investigation will explain the exact affection of the mucous membrane which is present.

If we do not find the uterine cavity is in the usual direction when pelvic tumors are present, but by manipulation observe that the sound takes some other course, this will inform us of the direction of the cavity, a matter of much importance, especially in such malformations of the organ as uterus bicornis and unicornis. The importance of this fact in secondary displacements of the uterus has already been alluded to.

Changes in the position and shape of the uterus are easily recognized by the sound. The experienced examiner can dispense with it, it is true; and the sound is not used for this purpose so

much as formerly, but is still of importance in diagnosis when the abdominal walls are very rigid and the bimanual examination is difficult. When various opinions are held in the diagnosis of conditions, the sound may be used to demonstrate the displacement present in the case, thus giving useful information.

We also employ the sound to test the mobility of the uterus in the pelvis when bimanual examination is impossible on account of tumors in its tissues or vicinity. If with the sound we can separate the uterus from a tumor, we can form a definite opinion upon its connection. Such opinions are, however, not invariably correct, as my own experience will testify; for example, in a case of fibro-sarcoma of the right lateral wall of the uterus, the anterior wall and the fundus were so mobile that I was certain the entire uterus was in front of the tumor, while the operation showed it to be as above stated. This mobility, it will thus be seen, also depends upon the flexibility of the organ.

Finally, the uterus has been sounded to ascertain the nature of its contents. It is obvious that retained secretions may be evacuated by this means, for further examination. It has already been stated that the character of the uterine walls and superficial mucous membrane may be ascertained, or pieces of soft tumors be removed for this purpose.

Some have even gone so far as to suggest employing the sound to diagnosticate early pregnancy, but this is in the highest degree objectionable. The introduction of the sound is contra-indicated when there is the slightest suspicion of pregnancy, and its use under such circumstances is a crime, since it may, and often has, destroyed the life of the fœtus. Of course a pregnant uterus may be accidentally sounded in spite of all precautions. It has occurred twice in my own experience, the first time in a patient whom I had treated a long time for retroflexion, and who came to me one day on account of the same trouble after having been sterile for seven or eight years. I replaced the uterus with the sound, and learned later that she was pregnant at the time. She did not abort, however, but gave birth to a strong, healthy child. In the second case, that of a patient who had consented to an operation after being under my care for prolapse of the uterus, I repeatedly sounded the uterus both before and after

performing anterior and posterior colporrhaphy, so that I might be able to demonstrate the decrease in size by the retention of the organ. Instead of diminishing, it continued to grow larger, the patient going to full term. While this shows that careful sounding does not always produce abortion, still these were exceptions rather than the rule, and patients have often told me that they have aborted a short time after being thus examined by their physicians, some of the latter being reputable gynecologists. So much the more, therefore, will the ovum be liable to destruction at the hands of inexperienced physicians.

The sound serves as a useful therapeutic agent. It is often of value in the reposition of a displaced uterus. The indications will be considered in the chapter upon malpositions. Following the example of B. S. Schultze, however, the use of a sound for this purpose is becoming more and more restricted. There is a variety of "repositors," used by Marion Sims, Mitscherlich, and others, which should be discarded, for they are capable of doing much harm in the hands of the inexperienced. These instruments are not designed to be used as sounds, but as levers, and are thus the more liable to penetrate the uterine walls.

Slight adhesions and stenoses of the uterine cavity may be removed by the sound; again, it is employed to produce rapid dilatation, or to apply remedies to the uterine mucous membrane, as in severe hemorrhage.

We should not undervalue the dangers which attend the introduction of the sound, such as pain, uterine colic, faintness, and even syncope, hemorrhage, rupture of adhesions between the uterus and adjacent organs with exudation of blood into Douglas's cul-de-sac, and even perforation of the uterus with consequent peritonitis. The interruption of pregnancy has already been mentioned.

If the uterine orifice of the tube be dilated, the entrance of a sound with a small knob cannot be doubted. Usually, however, the tubes are not penetrable by the sound. Excluding Bischoff's and Hildebrandt's cases, in which the orifices were dilated, it is most probable that, from Hoening's investigations, the cases of Duncan, Veit, L. Tait, and Zini were really

examples of perforation.* Penetration of the sound to a depth of 15 or 20 centimeters (6 to 8 in.) has been observed, and held to be due to perforation, by Simpson, Hoening, Schroeder, Martin, Noeggerath, and others. Excepting slight hemorrhage and pain such perforations at the hands of experienced gynecologists seem, as a rule, to cause but little disturbance.† The sound may pass so high that the handle touches the os uteri, and the knob, or its tip, be felt through the abdominal wall. But it is certainly better to withdraw it immediately than to spend any time feeling for the upper extremity. Usually it is due to a degeneration, as sarcomatous or carcinomatous, or at least in the puerperal uterus, that such perforation is made. This accident has never happened to me, but perhaps I have failed to recognize it. Slight hemorrhages, or local inflammations, may result from a perforation which, if great force be used, may occur not only through diseased walls, but also when they are thick and resistant.

Again, the use of the sound may lead to incorrect diagnoses more or less serious to the patient. B. S. Schultze‡ has called attention to this point, which I consider so important that I quote his remarks in full: "If one considers that the sound is very often used when neither position, form, mobility, nor fixation of the uterus is known—for many consider it to be the very instrument to determine the above-named conditions—if one observes further, that many physicians, indeed, even specialists, use one and the same sound for every uterus, then it cannot seem strange that in very many cases it will meet with obstructions, although the cervical lumen may be of normal width." Schultze proves very conclusively that stenosis of the uterus is really much less frequent than has been diagnosticated, and that the direction of the canal is oftener the cause of difficulty in the introduction of the sound than its small calibre.

He says further, that "whoever is proficient in bimanual examination will agree with me in greatly limiting its employment for the diagnosis of positional changes of the uterus." I coincide with him in every respect, and for more than a decade have

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* *Berliner Kl. Wochenschrift*, 1870, No. 16.

† Chrobak, pp. 67, 68. ‡ Lagenväerenderungern, p. 53.

warned my students against hasty and unnecessary use of the sound. Though we occasionally employ it to ascertain the length, form and thickness of the uterine walls, and the state of its mucous membrane, still it should be, generally, the length and breadth of the uterine cavity which are measured, and for this purpose we cannot do better than use Schultze's long, flexible, copper sound, which has a tip 3 to 5 millimeters ($\frac{1}{8}$ to $\frac{1}{5}$ in.) thick.

In conclusion, I will refer to some remarks by Chrobak* on this subject. He says that quite frequently women misrepresent their condition by giving the physician symptoms which indicate the use of the sound, simply because they desire to have an abortion produced, and that, too, by an experienced practitioner. This I believe to be true, though I recall no such instances in my own experience. I also believe that many females consult physicians and gynecologists especially because they are generally known to resort to this means of examination.

Returning to the value of the sound in imperfect development of the uterus, we insist, in the first place, that great prudence is essential here, since the organ is often short and its walls thin, sometimes even thin as paper as in the membranaceous uterus. The direction of the tube in uterus unicornis is frequently such that the sound will enter more readily, and upon slight pressure even penetrate its walls. The main reliance therefore must be placed upon bi-manual examination, and all force avoided, if necessary deferring the examination to a future time and after complete evacuation of the bowel.

As the diagnosis should comprehend not only the existence of arrested development but the causes as well, it is essential that the entire genital apparatus be explored, including adjacent organs and other malformations that may be present. The mammæ, mons veneris, labia majora and minora, clitoris, hymen, vagina and vaginal portion must all be carefully studied, that more light may be thrown upon this dark field of gynecological investigation.

Treatment.—We are generally able to do but little for the

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* *Loc. cit.*, p. 66.

anomalies under consideration. Cases of solid rudimentary uterus only, without retention tumors but having menstrual pains, will probably be permanently improved or cured. Much may further be done where blood or secretions are retained by an atresia, or pregnancy has occurred in a uterus unicornis, or, finally, in case a simple septum or band interferes with cohabitation, conception and labor.

The pains may be removed or lessened by the administration of antispasmodics and narcotics, and by external application or by chloroform and chloral, and morphine per rectum. If these remedies do not afford relief, and the ovaries are diseased, the pains being severe and recurrent, castration may be indicated. Kleinwächter has performed the operation under such circumstances, but without success. It will probably be considered justifiable by every one. But these double ovariotomies are by no means as easy as the removal of a single ovary; the ovaries are often embedded in adhesions, and extremely difficult to remove. The treatment of retention tumors is referred to in the chapter upon "Atresia of the Uterus." Fœtal, infantile, membranous and primarily atrophied uterus require treatment locally and constitutionally, *i. e.*, tonics, sea-bathing, iron, quinine, etc., for the system in general, and locally, sitz-baths, injections, and especially electricity are indicated; in the application of the latter one pole is placed upon the mons veneris, or the insertion of the round ligaments, and the other connected with a sound introduced into the uterus; or, one pole may be placed at the os uteri and the other in the rectum; or, again, both are placed in the rectum, the current acting upon the insertion of the posterior uterine ligaments.

Further, all means, both internal and external, usually known as emmenagogue, are of great service; their action will be considered under the subject of amenorrhœa. I must state, in conclusion, that I have seen little or no result even from protracted use of any of these agents, in fœtal, infantile, or the small atrophied uterus. If pregnancy occurs in a uterine horn having no inferior outlet, nothing remains to be done except a partial Porro's operation, *i. e.*, laparotomy with extirpation of the pregnant horn, an operation which is certainly justifiable.

When septa are present either in the vagina, os uteri, cervix or body of the uterus, it may be desirable to divide, or to completely excise them. The shortest and least dangerous method is to sever them with the sharp point of a Paquelin's cautery.

Girls suffering from amenorrhœa dependent upon an infantile or malformed uterus such as uterus unicornis, bicornis, or septus, should be advised not to marry before menstruation becomes regular, and the whole body is well developed.

CHAPTER II.

CHANGES IN THE FORM AND POSITION OF THE UTERUS.

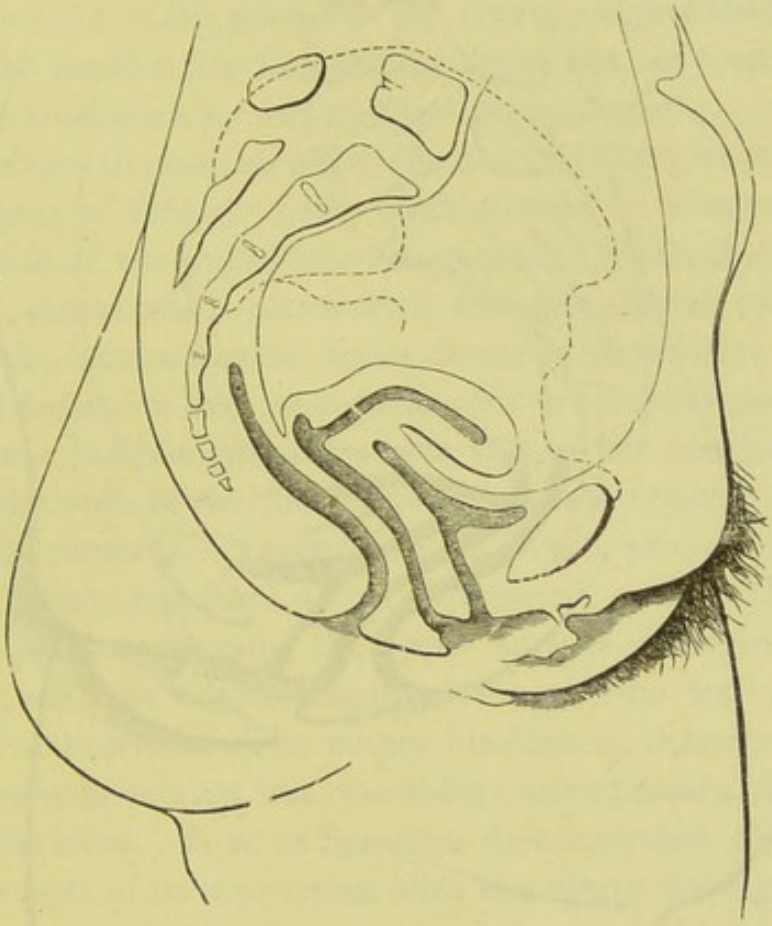
The recognition of displacements of the uterus obviously depends upon our knowledge of its normal position, which is by no means easily established, as the very numerous treatises upon this subject by anatomists and gynecologists will testify. B. S. Schultze has certainly contributed more than any other investigator to the solution of this problem. In 1865, I called attention to the fact that the puerperal uterus is normally anteflexed, and, since about 1870, Schultze has ably and successfully advanced his views upon this question and gradually converted most authors to his opinions. Our present knowledge of the normal position of the uterus may be summarized as follows: When the bladder and rectum are empty, the virgin uterus lies with its fundus behind the symphysis pubis, the os uteri about 2 centimeters ($\frac{4}{5}$ inch) anterior to the sacral promontory, and the vagina and cervix forming nearly a right angle (Fig. 24), while in the parous woman the angle is acute.

In the erect posture the long axis of the uterus is, therefore, almost horizontal (Fig. 25). The whole organ is also somewhat twisted, the vaginal portion toward the left and the fundus toward the right hand.

The uterus is retained in this position by the vaginal walls and muscles of the pelvic floor, and also by the adipose tissue of the vulva, nates and thighs, which assists in closing the vulvar orifice; further, by the pelvic fascia which encompasses the upper portion

of the cervix—the pubo-vesico-uterine and sacro-uterine ligaments. The folds of Douglas contain strong muscular fasciculi which do not simply pass backward, as Luschka states, but almost directly upward,* forming practically a *musculus attollens uteri.* They cross upon the uterus, and unite just below the body, while posteriorly they are inserted partly into the muscular tissue of the

FIG. 24.



Normal Position of the Virgin Uterus.—*From Schultze.*

rectum and partly into the sub-serous connective tissue at about the level of the second sacral vertebra.

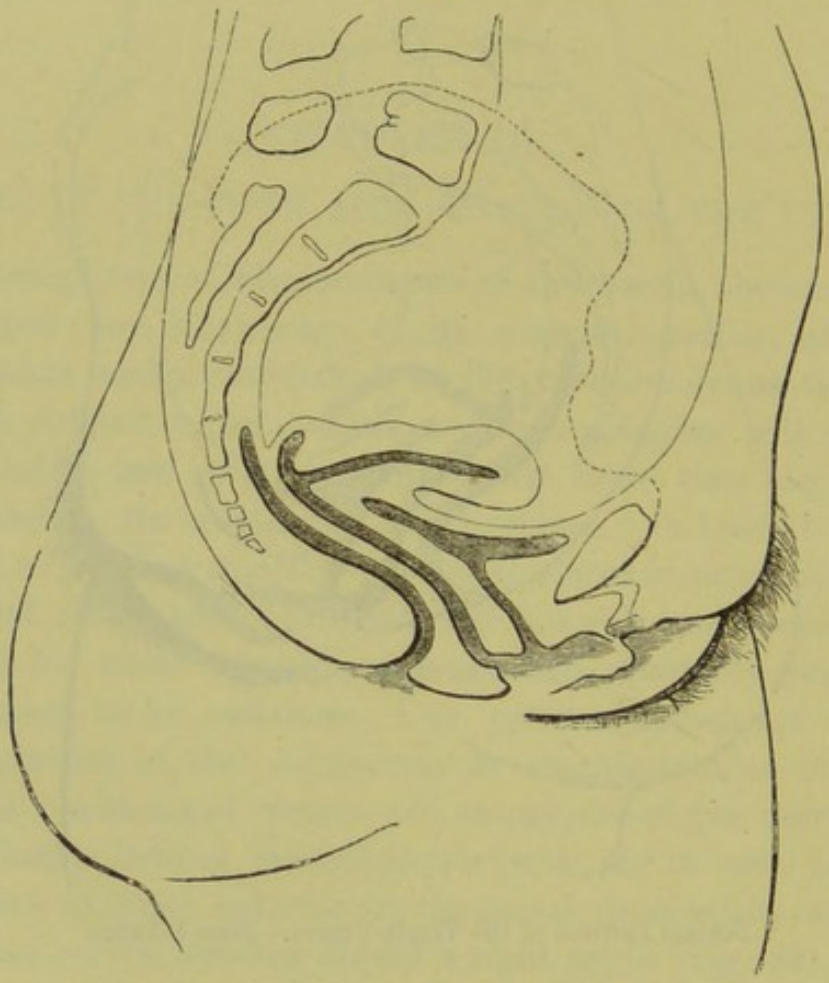
These folds are greatly hypertrophied during pregnancy, but, according to Schultze, are frequently atrophied or destroyed by pathological processes.

Two other sources of uterine support must be described, which act principally upon the anterior wall, viz., the connective tissue

* Schultze, *loc. cit.*, p. 110.

between the bladder and uterus, and the round ligaments. The former, though considered a loose tissue by anatomists, is, nevertheless, so firm that the connection is very seldom broken, and it causes the uterus to follow the movements of the posterior wall of the bladder. The round ligaments may serve to approximate the anterior uterine wall to the anterior pelvic and abdominal walls. The broad ligaments and the lax folds of the uterine peri-

Fig. 25.



Normal Position of the Uterus in a Parous Woman.—*From Schultze.*

toneum are likewise a means of support. Finally, the uterus is retained in its normal position by the peculiar structure of its walls, their relative thickness and power of resistance and their relations to the above-mentioned supports being normal. The uterus is more flexible in childhood than in the virgin, and the unimpregnated more than the parous uterus.*

* Schultze.

The normal uterus is by no means fixed in any particular position but is always mobile. Its movements depend upon the varying fulness of adjacent organs, upon respiration, intra-abdominal pressure, and the posture and movements of the individual. In the dead subject, in which the influence of abdominal pressure and muscular action is removed, the passive mobility alone remaining, we frequently find the uterus to have become retroverted or retroflexed. Our conclusions with respect to the normal position of the uterus in the living subject should, therefore, not be based upon the post-mortem, but only upon careful clinical examination by experienced gynecologists.

The changes in position which the uterus undergoes with regard to the degree of fulness of the bladder, may be observed by the introduction of the sound into the uterus. When the bladder is distended, the uterus is retroverted and retroflexed, while, when emptied, the uterine fundus again descends anteriorly. Schultze holds this descent to be a consequence of the subperitoneal connection between the bladder and uterus, and of the peculiar manner in which the walls of the bladder approach each other in the evacuation of its contents. These walls do not approach each other from all points, but from above downward, so that the longest diameter is the conjugate; the upper surface is slightly convex inferiorly, and the whole length of the uterine wall thus rests upon this depression. The empty bladder is, therefore, not circular upon cross section, but resembles a stem pessary, the urethra forming the stem. It is, as Schultze demonstrated, dish-shaped, the upper part of its connection with the uterus belonging not to the lower, but to the upper segment of the empty bladder, as may be easily proved by the sound.

When the rectum is full it pushes the vaginal portion forward, or, when the uterus is rigid, the entire organ; if the uterus be relaxed, however, and the bladder empty, the former is even further anteflexed. But when the bladder is full, the descending fecal mass within the bowel elevates the uterus between the rectum and the bladder.

Fulness of the rectum is a transient condition in healthy persons, usually occurring only once daily, but its influence is not always manifest, and, if so, for only a short time. A marked and

permanent projection forward of the cervix occurs only when the sacro-uterine ligaments become abnormally pliable, these ligaments in the normal condition elevating the cervix after evacuation of the rectum, *i. e.*, assisting in the restoration of the anteversion. It is not yet certainly known whether the round ligaments have the same influence upon the non-gravid uterus that they exert upon the pregnant and puerperal uterus—an action which corresponds anteriorly to that of the utero-sacral ligaments posteriorly.

Abdominal pressure influences to a great extent the mobility of the uterus. In the erect posture, it is equivalent to the pressure of a column of water about 30 centimeters (12 inches), but it fluctuates with every change of posture.* If a patient is asked to cough while the vaginal portion is engaged within the speculum, the movements of the uterus may be plainly seen. A pulsating movement may at times be found, similar to that which we observe in the tip of the upper foot after sitting awhile with the legs crossed. When the uterus is normally fixed in the pelvic fascia, the vaginal portion executes a movement during inspiration, the opposite of that of the body of the uterus, the latter descending anteriorly, while the former is elevated posteriorly. Upon introduction of the sound, this change of position may be very distinctly demonstrated. Anteversions of the uterus are often aggravated by this abdominal pressure, so that, if the organ be pliable, an anteflexion may result; the same is true of retroversion, ending in retroflexion.

The influence of the intrinsic weight of the uterus upon its position becomes the more evident according to its increase, the more relaxed connections of the organ, the diminished intra-abdominal pressure and the rigidity of the abdominal walls. In the normal uterus with normal connections, anteversion and anteflexion are easily replaced, despite this weight.

In addition to the movements of the normal uterus, which depend upon the bodily condition of the person, its position is influenced by a variety of extrinsic forces, such as sexual excitement and explorations by the hand and instruments. By these

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* Schatz.

means, the vaginal portion may be pushed backward or drawn forward, the body of the uterus pressed downward, elevated or retroverted, etc. Lateral displacements or twisting of the uterus upon its long axis are quite possible, as may be seen when the sound and cylindrical speculum are manipulated while in position.

From the foregoing description it is apparent that the position of the uterus is not a fixed, rigid and undisturbed one, but rather that it is a movable organ, every breath, every word and action, every variation in the fulness of the rectum and bladder influencing its position. It can, therefore, become abnormal only when the normal mobility of the organ is interfered with, lessened or abolished in any given direction, *i. e.*, when the organ is held in a fixed position.

Displacements of the uterus are classified according to their direction, whether above or below, to the right or left, according to the extent of displacement, whether total or but partial; according to the surrounding tissues and the canals involved. Hence, these are:—

1. Elevation, descent and prolapsus of the uterus.
2. Ante-, retro-, dextro- and sinistro-position.
3. Anteversion and flexion, retroversion and flexion, dextroversion and flexion, sinistroversion and flexion.
4. Torsion.
5. Inversion.
6. Herniæ.

In many cases, the dislocation does not exist as a simple one but several are combined, as in the very frequent displacements backward, in lateroflexion and descent of the entire organ, in prolapse of a marked type and retroflexion, or in inversion of the uterus with prolapse and descent.

Version, as a pathological condition, is an abnormal extension of the uterus, in which both the normal and pathological angles are wanting. In pathological flexion, the version of the same name is presupposed.

Retroversion with bending upon the anterior surface or anteversion with bending upon the posterior surface may also occur.

I. Changes in the Level of the Uterus.

1. *Elevation of the Uterus.*

If the non-gravid and normal uterus is wholly or partially above the true pelvis, it is at an abnormal level. The causes of this displacement are not intrinsic but should be sought in the condition of the adjacent organs. The dislocation occurs either because the normal uterus is pushed or drawn out of the pelvis, or because the puerperal uterus is prevented from descending by adhesions or by cicatricial contractions in its ligaments. All tumors developing beneath or by the side of the uterus may displace it, *e.g.*, large tumors of the vulva and of Bartholin's glands; hematomata, fibromata, sarcomata or cysts of the vagina; myomata or cysts of the broad ligaments; and fibromata or cysts of the ovaries. When the latter enlarge while lying in Douglas's cul-de-sac, they usually displace the uterus anteriorly. If they grow more deeply toward the pelvic floor and under the vaginal portion, they, like the pedunculated myomata of the cervical canal, may lift the whole organ out of the pelvis. But if they grow upward from the true pelvis, they will pull the uterus up with them, while the sessile tumors which grow from the hilus, between the folds of the broad ligaments, at first displace the uterus laterally and then upward over the edge of the pelvic inlet upon that side. Sessile myomata which are situated upon the posterior uterine wall, as well as retro-peritoneal sarcomata, at first displace the uterus forward; then, as they continue to invert the cul-de-sac toward the vagina, the uterus is gradually pressed upward so that the vaginal portion appears above the symphysis and the whole uterus may be felt in front of the tumor and above the true pelvis. Contracting parametric exudations and peritonitis with resulting broad adhesions prevent uterine involution and draw the uterus to the side and fix it there; or the adjacent organs, the tubes or ovaries, are rendered immovable, this fixation preventing the descent of the uterus. In all the displacements above mentioned the elevation of the uterus is not simple but is combined with ante-, retro- or latero-position or, not infrequently, with torsion.

The **diagnosis** of elevation of the uterus is often difficult, espe-

cially when the uterus lies behind the tumor, or when the vaginal portion can scarcely be reached by the finger, and the tumor is so large that it has become firmly wedged in the pelvis. As a rule, the direction of the vagina indicates the direction of the dislocation, but it is by no means easy to isolate the body of the uterus from large tumors. When it is essential to determine the dimensions and position of the uterus before resorting to an operation, the patient should be anesthetized and a careful bimanual examination made. If the vascular souffle can be detected in the vicinity of a movable cylindrical body lying before the tumor, the diagnosis will be facilitated.

The uterine sound is not to be used without great caution, as the parenchyma of the organ may have undergone such changes that the introduction of an instrument is no longer entirely without danger. The growing tumor causes elongation of the uterus with thinning of its walls; and as it is more frequently attached in the vicinity of the internal os, the muscular fasciculi may become so much stretched at this point that the peritoneum alone keeps body and neck together.* Moreover, the pressure of the tumor changes the direction and diminishes the lumen of the uterine cavity, thus increasing the difficulty in passing the sound.

The **treatment** will be directed not to the dislocation *per se* but to its cause. It should especially be considered as to whether the uterus will invariably return to and remain in its normal position; for, as all its connections have been loosened, an increased mobility is *a priori* to be expected. The uterus is more liable to become prolapsed, as the expanding tumor has caused stretching of the fascia, vagina and vulva.

2. *Descent and Prolapse of the Uterus.*

Historical.—An anatomical differentiation of the internal genitals into uterus and vagina was first made in the sixteenth century by Gabriel Falloppia; it is therefore evident that the Greek, Roman and Arabian physicians held that dislocation of the uterus downward was identical with inversion of the vagina.

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* Klob, *loc. cit.*, p. 82.

But the connection between the two organs is so intimate that doubtless many of the anomalies described by them as procidentia uteri were correctly diagnosticated, notwithstanding the deficiency of anatomical knowledge. Hippocrates recognized several degrees of deformity in this class of affections: Quum quidem uteri osculum suum non demittentes et pudendi eminentias non contingentes transmoti fuerint foras, levissimus morbus est. Quum vero in anteriorem partem promoti fuerint et osculum in pudendi eminentias ac labra immiserint . . . . et si quidem infra descendens et aversus in inguen se immiserit dolorem coxendicum ac capitis exhibebit. Celsus briefly mentions, in liber vi, cap. x: "At si os vulvæ procedit intus reponendum est." Soranus very exactly described prolapsus of the uterus, saying that this organ could be completely or partially prolapsed, and that it looked like an ostrich egg. As causative factors, he mentioned a fall from a height, with rupture of one of the uterine ligaments, the hurried removal of the chorion in abortion, the unskilful extraction of the fœtus during labor, the retention of flatus, the lifting of heavy burdens, and various injuries. Other causes described by him were particularly the psychical affections manifest in the invalid, and the senile relaxation of the muscles and ligaments supporting the uterus. He names as first among the symptoms hemorrhage, then pain in the soft tissues, hips, epigastrium and pudendum. It is, moreover, evident that he must have examined the tumor very carefully, for he describes it as being at first much reddened, and subsequently paler. He condemns the practice of Euryphon, which consisted in hanging the patient by the feet from a ladder, and that of Euenor, who placed a piece of beef in the vulva, not knowing that the decomposition of the meat would lead to ulceration. He recommended reposition by the finger or a sponge, and retention by means of a sponge or cotton saturated with vinegar; he directed the legs to be fastened together. Indeed, he constructed a sort of elastic pessary of wool covered with linen, which he saturated with vinegar or decoction of myrrh or pomegranate, and thereby effected a reduction. When the reposition was very difficult, he advised phlebotomy to produce relaxation. If the uterus or any portion of it had become gangrenous, he suggested its removal with the

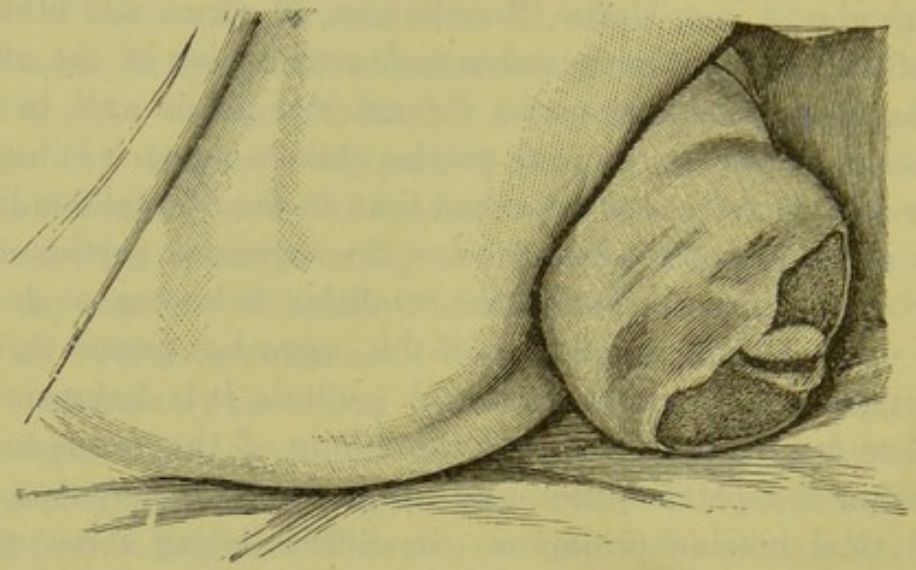
knife, believing this plan to be comparatively harmless. Moschion, A.D. 150, stated that the entire uterus sometimes passed beyond the labia, while Ætius, A.D. 550, and Paul of Ægina disputed the existence of a total prolapse, which view was also adopted by Kerkringius, J. von Horne, Roonhuysen, Meckzen and others.

Definition.—In retroversion and retroflexion of the uterus, the vaginal portion approaches the anterior pelvic wall, in some cases being really lower in the pelvis, while in many it is higher; but in all it is more easily reached than in the normal condition. If the vaginal cervix is found below the narrowest portion of the pelvic cavity, near the outlet, the condition is known as descent of the uterus. When a portion of this organ has passed through the outlet, and beyond the external genitals, it is designated incomplete uterine prolapsus. If the fundus of the uterus can be felt below the pelvic outlet, and usually below the vulva, it is called total uterine prolapsus. In differentiating these conditions it is much better to name the variety of a displacement according to its relation to the pelvic cavity alone, thus leaving the soft parts out of the question.

Anatomical Changes.—The changes occurring in the vaginal tissues have already been discussed upon page 119, and we will therefore now consider those of the uterine tissue alone. In the first place the vaginal portion is swollen, hyperemic and livid; erosions and ulcerations after a time appear upon the lips of the uterus, and are to be regarded as analogous to bed-sores, being sharply circumscribed and invariably occurring upon the lowest portion exposed to pressure when the patient is sitting, and not simply caused by irritation from the urine (Figs. 26 and 27). The external os becomes distorted and distended; indeed, the ectropion is sometimes so great that the internal os forms the lowest part of the tumor, being surrounded like a wall by the os externum. If the patient be requested to bear down while the uterus is in this condition, the descent of the internal surface of the cervix and the internal os and the ascent and the dilatation of the internal os may be plainly seen. The distortion and hyperemia of the vaginal portion not infrequently cause hyperplasia of the mucous membrane in the form of small polypi, varying in size from a pea to a cherry.

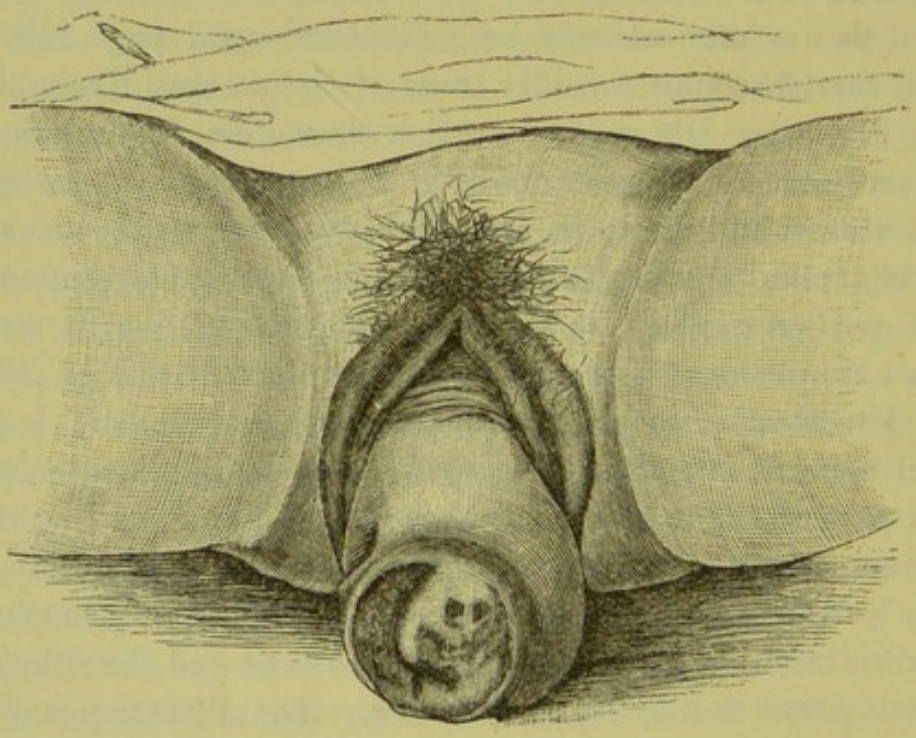
The dislocation of the vaginal portion first causes the fundus of the uterus to assume a more vertical position; it is then

FIG. 26.



Incomplete Prolapse of the Uterus. Hypertrophy of the Vaginal Portion. Large Pressure-sore about the Os Uteri.

FIG. 27.

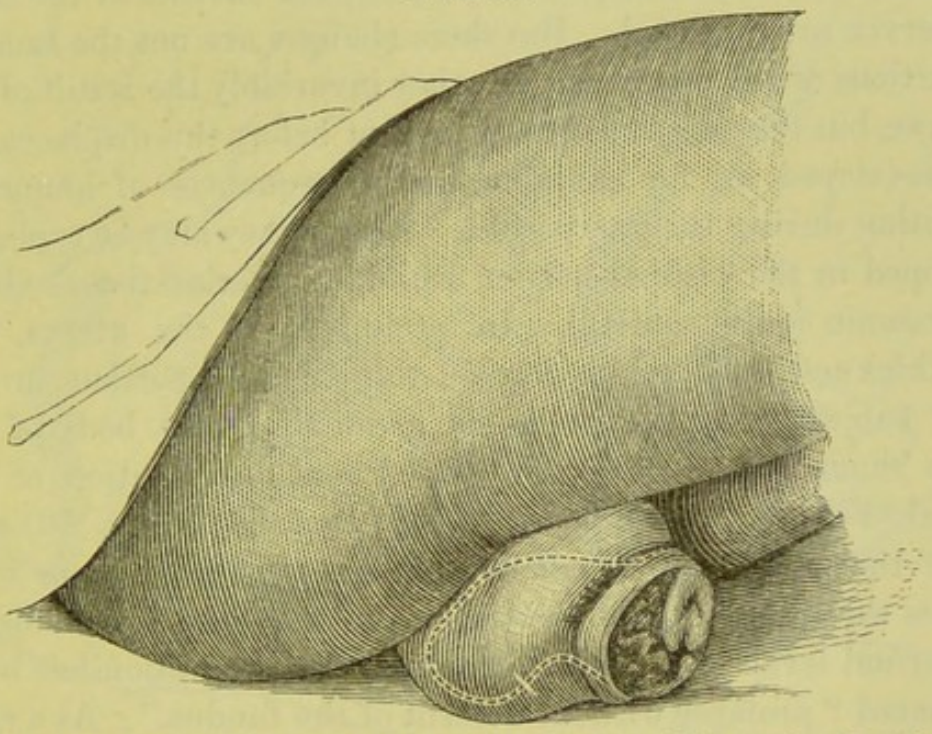


pressed backward by the accumulation of urine in the bladder and, as in this position all force acting from above exerts itself

upon the anterior wall, the uterus is, as a rule, retroflexed.* Passive hyperemia of the broad ligaments ensues. Inflammatory processes in the vicinity of the organ do not always supervene, although frequently such a degree of inflammation may exist that its reposition is impossible.

We have already alluded to dislocation of the anterior wall of the vagina and the posterior wall of the bladder, cystocele, which may further be associated, because of the dilated ureters, with hydronephrosis and nephritis. The fundus of the bladder

FIG. 28.



Complete Prolapse of the Uterus with Retroflexion and Cystocele. Complete Inversion of the Vagina. Ulceration of the Labia.

usually rests upon the fundus of the uterus, and their unusual depth in the pelvis would at once be obvious if the cavity could be observed from above. Loops of intestine may lie in the posterior cul-de-sac, but this is usually occupied by the body of the uterus and an enterocele thus prevented. The different ligaments are often so much relaxed that the uterus can be raised into the abdominal cavity from 3 to 6 centimeters (1.2 to 2.4 in.) above the normal level. The condition of the peritoneum was

* See Figs. 27 and 28.

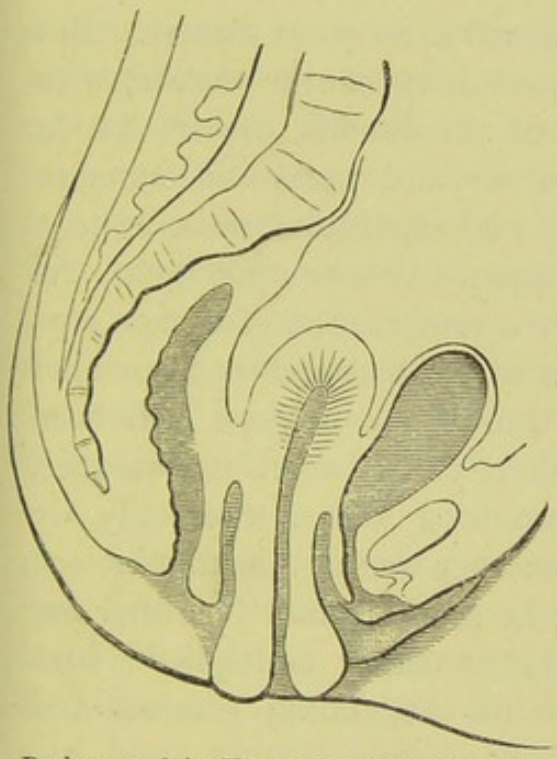
especially interesting in a case of O. von Franqué, shown in plate i. There was between the uterus and bladder a pocket which extended below the most projecting portion of the cystocele, thus forming a third separate peritoneal cavity. But in the case represented in plate xix *a*, of my Atlas, this pocket descended to just above the internal os. The condition of the uterine wall is like that of chronic metritis. The muscular structure is thickened and infiltrated, the strands of connective tissue thicker, the entire wall sometimes softer from œdema and sometimes firmer; in acute cases it is hyperemic and livid. The mucous membrane is relaxed and thickened, and, as a rule, the cavities of the body and cervix are enlarged. But these changes are not the same in all portions of the organ, nor are they invariably the result of the prolapse, but they may have been present before this displacement was developed, as, for example, the consequences of abnormal involution during the puerperium. Again, they may be typically developed in the vaginal portion while the uterine tissues above this remain quite normal. In prolapsus of the uterus, the size, thickness and relaxation of the vaginal portion in the living subject may sometimes be great, while the body of the uterus shows little or no change. Finally, elongation of the vaginal (Fig. 29), supra-vaginal or intermediate (Fig. 30) portion of the cervix may occur to such a degree that the os even projects through the pelvic outlet, while the fundus remains at the normal level in the pelvic cavity. This condition has been designated "prolapse without descent of the fundus." As a rule, the dislocation downward is associated with the changes in form which have been already mentioned, viz., complete or incomplete prolapsus, nearly always in connection with retroflexion, though exceptionally the totally prolapsed body may be anteflexed. Descent of the cervix through the vulva without dislocation of the vaginal walls is extremely rare, for I found only 9 cases in 1618 clinical examinations.

Ætiology.—Prolapse of the uterus may occur at a very early age, as Monro has seen it in a child only three years old. The case of congenital prolapse reported by Villaume to the Academy at Paris is not described with sufficient detail, and seems to have been associated with an inversion. I have seen several

cases of acute primary prolapse in young girls, in one resulting from a fall from a ladder while carrying a load on the shoulders; another patient was supposed to have been injured by lifting and carrying a very heavy object.

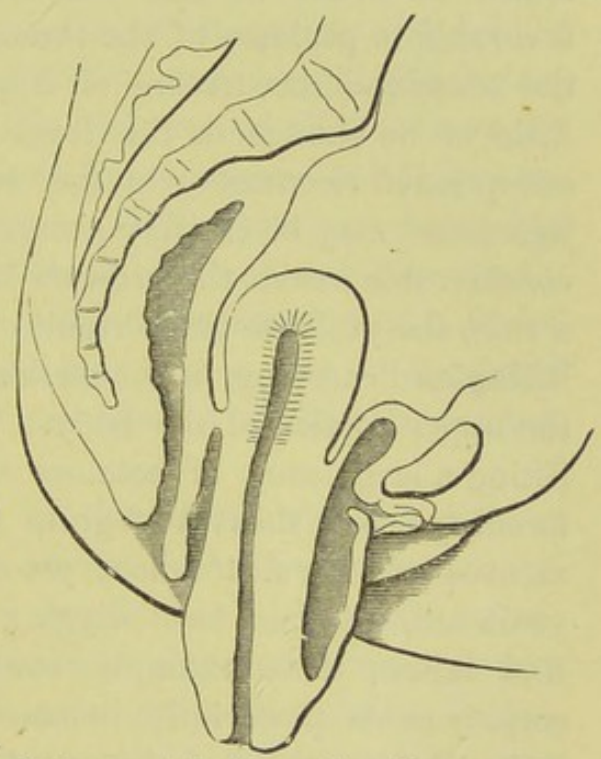
Prolapse is most frequent between the ages of 25 and 35 years, *i.e.*, during the child-bearing period; such cases are not primary but secondary in time of appearance, for they are preceded by relaxation of the vagina, the soft parts of the pelvic floor and the uterine ligaments, particularly the sacro-uterine.

FIG. 29.



Prolapsus of the Uterus from Hypertrophy of the Vaginal Portion.—*From B. S. Schultze.*

FIG. 30.



Prolapsus of the Uterus from Hypertrophy of the Middle Part of the Vaginal Portion.—*From B. S. Schultze.*

In Savage and Kiwisch's experiments to artificially produce a prolapse of the uterus, the tension of the ligaments last mentioned offered the greatest resistance, the prolapse occurring as soon as they were divided. The uterine displacements resulting from relaxation of the sacro-uterine ligaments lead to prolapse of the anterior vaginal wall, for they cause an inversion of this, with the posterior wall of the bladder, into the lumen of the vagina, by producing an approximation of the uterine and pelvic insertions of the vagina; the converse, however, does not occur.

The most important predisposing causes are pregnancy and labor, and the most frequent exciting cause is too early exercise of abdominal pressure during the puerperium. In the usual course of events the posterior uterine ligaments are relaxed, the vagina is elongated and loosened from the bladder by pregnancy, while its lower support is removed by the distention of the vulvar orifice during labor. This being the case, the anterior vaginal wall is forced down to or through the vulva by such movements as standing, walking, carrying, coughing, bearing down, lifting, ascending stairs, the inversion being aggravated by accumulation of urine in the bladder; thus arise the conditions favorable to prolapse of the uterus and subsequent disease. But the occasional occurrence of hypertrophy of the cervix, with little or no change in the level of the fundus, proves that in exceptional circumstances the sacro- and pubo-vesico-uterine ligaments may be entirely normal and capable of resisting to a considerable extent the pressure brought to bear upon them. As a rule, the prolapse is the result of a combination of causes, *e. g.*, lifting and carrying, in connection with backward movements of the upper portion of the body. One of the patients had been lifting a large sack of potatoes shortly after abortion; another, handing heavy sheaves of grain up to a wagon when only six months past her fifth labor; yet another was a woman nineteen years old, who had been digging in hard ground just after her first labor; these examples could be easily multiplied; such employments powerfully increase the abdominal pressure and lessen the resistance of the uterine ligaments.

Prolapse may be caused by obstetrical operations in which strong traction is exerted upon the uterus or laceration of its ligaments is produced. Deep perineal lacerations predispose to prolapse by removing the natural support of the vagina. Nevertheless we sometimes meet with complete absence of the perineum from lacerations which extend far up the rectum, resulting even in fecal incontinence, without prolapse of the uterus; this proves that the strength of the uterine ligaments and the size and relations of the uterus greatly influence its position or, at least, that relaxation or rupture of one of its supports does not immediately result in prolapse. B. S. Schultze believes that in such

cases the uterus is fixed by parametric exudation, restricting its downward movements.

Again, the uterus may be gradually driven downward by forces from above, such as tumors in the true pelvis, growing ovarian tumors, or by excessive ascites; indeed, the gravid as well as the non-gravid uterus may be thus affected. I have, for example, performed ovariotomy upon a patient in whom an ovarian tumor as large as a man's head lay upon the fundus of the uterus; the pregnant uterus had raised it above the umbilicus, but, being then hindered from further growth in that direction, it gradually descended into the vagina and protruded latterly. I have also had three cases in which pessaries of the largest size, which seemed almost too large to be extruded, were repeatedly forced out by ascites; the effusion finally disappeared after nine or ten tappings, and then a comparatively small pessary sufficed to retain the prolapsed parts in position. Furthermore, prolapse has been attributed to constant pressure upon the abdominal organs, from tight lacing, this pressure being transmitted to the uterus and its appendages; but I have never seen a case of this kind nor have I been able to find one recorded in the literature upon this subject.

A. Mayer observed prolapse of the uterus and two herniæ in a patient convalescing from cholera. As the same author had found 60 cases of inguinal hernia in 160 patients suffering from prolapse, it seems as if the displacement causes a traction upon the peritoneum which predisposes to hernia. It has also been suggested that prolapse might more readily arise in thin, emaciated subjects than in robust individuals. The latter hypothesis may be true of the climacteric period, but not of early life; the tissues of the uterine ligaments are in no way influenced by this condition; on the other hand, the ligaments certainly have less weight to support in spare than in obese subjects. It is not known whether a vertical pelvis predisposes to prolapse. Very large pelves, long uterine ligaments and retroverted positions of the uterus may be considered as predisposing influences, in so far as they admit of more extended motion of the uterus, cause the vaginal portion to descend nearer to the

introitus, while the pressure upon the fundus favors inversion and descent of the posterior vaginal wall.

That prolapse may be aggravated by stone in the bladder was proven by Ruysch's cases, some 41 calculi being found by him in the bladder of a woman 81 years old who had prolapse of the uterus and cystocele. Whyte, Deschamps and B. S. Schultze have reported similar cases. Schultze found in the bladder of a patient who had suffered with prolapse for 20 years, 12 angular calculi, averaging 1 centimeter ($\frac{2}{5}$ in.) in diameter. After reposition of the organs, the calculi moved down to the neck of the bladder; some were spontaneously evacuated and the others removed through the urethra. More recently, cases in which the stone was evidently a result of the prolapse, and not the cause, have been reported by Galabin, 1880, and Eyster, 1880 and 1881. Obstinate, chronic constipation and also large pedunculated tumors attached to the lips of the uterus or the cervical canal may aggravate or directly produce prolapse and descent of the uterus. This is, however, very rare, and the displacements are much more frequently not the causes but the sequences of these conditions.

According to my observation, prolapse of the uterus occurs no more frequently among poor patients than among the wealthier classes, the proportion being 6.6–7 per cent.: 6.8 per cent., but the affection was much less severe among the rich; indeed, often so slight in the latter, that a poor patient would not have consulted a physician. Only 2.6 per cent. had marked descent or prolapse of the uterus, and yet this proportion is more than double that given by Vedeler (1.2 per cent.). The statistical researches of B. S. Schultze have made known three important facts which, in a great measure, explain why the same causes may produce retroversion, with descent, in one person, retroflexion in another, and prolapse of the uterus in a third. In the first place, retroversion is quite common in virgins and women who have never been pregnant, prolapse extremely rare; secondly, in parous women it is usual to find not only retroversion but also prolapse; further, prolapse is infrequent in women who can avoid overtaxing themselves, though they may have given birth to a

number of children, while it is all the more frequent among poor, hard-working women. Finally, prolapse is common in old women of all classes. Prolapse in the old is the result of senile atrophy of the muscles of the pelvic floor, and the disappearance of adipose tissue from the nates, thighs and external genitals. Closure of the vulvar orifice is no longer maintained, every increase of intra-abdominal pressure affects the uterus and vagina, and the former, which has probably already been retroverted and below the normal level, finally gives way to the pressure. If, when the uterus has become retroverted, the woman can spare herself, enjoy rest and avoid violent exertion, this condition gradually changes to a retroflexion.

The latter very rarely ends in prolapse, as every new force acting upon the uterus drives it deeper into the hollow of the sacrum, and brings the cervix forward and upward. But if the patient is compelled to work hard, the retroverted uterus lying in the axis of the vagina becomes gradually more depressed, and finally both descend to the vulva.

The puerperal state favors the occurrence of retroversion by distending, elongating and displacing all the connections of the uterus, thus making a dislocation of the vaginal wall much more liable; with this the bladder descends, increasing the inversion of the anterior vaginal wall, and so pulls down the retroverted uterus. This is the more probable if there be a laceration of the perineum or if the vulva be relaxed and gaping; the necessary support for the anterior vaginal wall is taken away; the opposing pressure from the posterior vaginal wall which tends to prevent increase of the intra-abdominal pressure is wanting, and the elasticity of the vagino-vesical wall soon becomes insufficient to withstand the pressure from above. We therefore conclude from these considerations that, in chronic cases, retroversion with descent is almost always the initial stage of prolapse, and that relaxation of the supporting ligaments, the sacro-uterine especially, is the principal cause of this displacement. In conclusion, of the patients examined by us 26 per cent. had borne one child; 52 per cent. two to five children; and 22 per cent. from five to ten. Of 349 women examined,

8	patients	were	from	16 to 20	years	old, an average of	2.3 per cent.
82	"	"		20 to 30	"	"	23.5 "
77	"	"		30 to 40	"	"	22.0 "
88	"	"		40 to 50	"	"	25.2 "
21	"	"		50 to 60	"	"	6.1 "
55	"	"		60 to 70	"	"	15.7 "
18	"	"		70 to 80	"	"	5.2 "
349							100.0 per cent.

Symptoms.—In acute prolapse of the uterus there are strong, almost irresistible pressure and bearing down, tearing, lancinating pains, a feeling of great weakness or syncope, retention of urine or traction on the ureters, and even symptons of peritonitis, as in inversion of the uterus. These symptoms may persist even for a time after reposition. There may further be pain and discomfort in walking and standing, or inability to maintain the erect posture. I have also seen prolapse in young girls by whom but little complaint was made, although the affection was of acute origin.

When prolapse has become chronic, the patients are distressed by the distention of the vulva and by the bearing down and descent of the soft parts during walking, standing or lifting. Nervous females, at an early stage, complain of tearing pains during defecation and of dysuria, of a feeling of insecurity when walking and of a sensation as though all the parts were about to sink down. In many patients the symptoms are extremely slight, not excepting those connected with the bladder. Even when cystocele is present most patients urinate with but little inconvenience; incontinence of urine was observed in 40 per cent. of cases by Verdier, but we found that scarcely one per cent. were thus affected. I have never seen stone in the bladder result from retention of urine in this affection. Constipation, while not rare, is not an invariable result, but often one of the causes of the affection. Other disturbances of digestion, such as cardialgia, nausea, vomiting, anorexia and emaciation, may be due in part to dislocation of the intestines into the true pelvis,* in part to traction

* *Vide* "Anterior vaginal enterocele," p. 134.

upon and dilatation of the ureters and pelves of the kidneys, and partly from affections of the peritoneum. Such symptoms are, however, unusual.

The consequences of prolapse, with regard to the functions of the uterus, depend upon the existing parenchymatous changes and upon the condition of adjacent organs, especially the ovaries. Menstruation greatly varies, being sometimes normal, sometimes scanty or again very profuse; as a rule, it is lessened rather than greatly increased. Conception is not impossible, the prolapsed portion being pushed up either before or during cohabitation. Harvey and Chopart treated patients in whom coition took place through the uterine orifice.* The comparative rarity of prolapsus of the gravid uterus, when contrasted with the frequency of prolapse generally among the poorer classes, seems to be sufficient evidence that prolapse lessens the probability of conception. It is true that the number of children, averaging 4.3 to each patient, is not less than we find among perfectly healthy women, but all these percentages are really higher, from the fact that they are made from patients in whom the prolapsus had been caused chiefly by frequently occurring pregnancy. It is also possible that the hypersecretion, the displacements, the hyperplasia and the condition of the retaining ligaments may furnish an obstacle to conception. The displacements of the tubes and ovaries would furthermore tend to impede the passage of spermatozoids.

If a prolapsed uterus be neglected and thus allowed to increase in size, irritation of the external portion is increased, erosions and ulcerations appear upon its surface and the corresponding portion of the vulva, the discharge is offensive, and the appearance of the ulceration excites suspicion of graver disease. The condition may even lead to partial gangrene, as shown by cases of Scanzoni and Elmer. Finally, in great and long-continued prolapse, adhesions may be formed between the intestine and the pelvic organs, which will make reposition of the prolapsed parts impossible, and which are usually followed by fatal uremia.

Diagnosis.—Prolapse of the uterus and its particular variety

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* Franqué, *loc. cit.*, p. 14.

and cause will be recognized by the history of the case, by inspection, by movement, by coughing, by bearing down on the part of the patient, by palpation of the tumor externally and through the rectum, by the introduction of the sound and by reposition of the tumor. Many patients who complain of prolapse have instead inversion of the vagina and tumors of the vulva, or of the vagina, or of the uterus. Inspection of the external parts is indispensable. The means by which we diagnosticate cystocele and rectocele have been previously stated. It is obvious that prolapse of the uterus can only be known when the os uteri is found at the vulva. The relations of the vaginal portion must next be determined, as to whether it is directly covered by the vaginal walls, whether the vaginal lumen is wholly inverted, whether the vault exists neither anteriorly nor posteriorly, or as to whether the portion is elongated and the vault deepened. In the meantime the patient should bear down so that we may see how large the tumor becomes, and what changes of shape occur. We next resort to digital examination, in order to find out how far the body of the uterus protrudes through the pelvic outlet and beyond the vulva. In total prolapse we are able to grasp the fundus of the uterus below the pelvic outlet or the vulva, as shown in Figs. 27 and 28. Having learned from the history or examination that the body of the uterus is not enlarged, or by the occurrence of menstruation that the uterus is not gravid, the sound is next to be introduced to determine the length of the different parts of the uterus. First, the distance from the external to the internal os must be measured, the latter being recognized by the resistance it offers to the introduction of the tip of the sound. At the same time we note the condition and extent of the cavity and the thickness of the walls of the uterus, or the presence of adhesions between the latter and adjacent organs. Hypertrophy of the vaginal and intermediate portions will be recognized by measuring the anterior and posterior vaginal vaults, the length of the cervical canal, and by ascertaining the length and position of the body of the uterus. In hypertrophy of the vaginal portion, the vaults are somewhat deepened and the cervical canal above it shortened; in intermediate hypertrophy, there remains no anterior vault, the posterior vault is moderately deep and the whole cer-

vical canal is elongated; finally, in supra-vaginal hypertrophy, the vaginal vault, anteriorly and posteriorly, is effaced, the cervix is longer than normal; and in all three forms the fundus is felt at the level of the symphysis or but very little lower. Whether this change in the cervix be cause or effect of the prolapse will be determined only after further study of the diminution resulting from reposition and retention. In the majority of instances it is an effect and soon disappears after the uterus is restored to its normal position.

After all the parts found in the vulva and pelvic outlet have been examined by inspection and touch, and the condition diagnosticated, reposition should be attempted, in order to establish whether this can be perfectly accomplished and without difficulty, and whether the uterus, when replaced in the pelvis, can be brought into its normal position.

Treatment.—The practice of retaining the prolapsed uterus in position by means of mechanical support is as old as surgical medicine. During the last fifty years, however, this has to a considerable extent been supplanted by the more radical means of operations, Marion Sims, Mende, Emmet, Fricke and G. Simon having devised operative means for the cure of prolapse, and this, too, long before the introduction of Listerism. The results of the operation have proved more favorable from year to year, until, with the introduction of antiseptic precautions, the treatment of prolapse by pessaries is becoming progressively limited.

Nevertheless many women fear even the thought of an operation, and, furthermore, there are many cases in which a radical cure can be expected without it. The value of prophylactic measures is so obvious that we need not dwell upon them. They consist in carefully watching the events of pregnancy, labor and the puerperal state, in guarding against injuries, in avoidance of violent exertion, in removing constipation, etc. The relaxed pelvic floor should be strengthened by abdominal supporters provided with a T bandage passing over the external genitals. Too early getting up after labor should be forbidden, and, if there is any tendency to inversion of the vagina, the patient must be kept in bed for at least two or three

weeks; especially ought a woman to be warned against an early return to household duties soon after an abortion. We have already considered the treatment of catarrh, relaxation and elongation of the vagina. The remedies and methods thus used assist in the cure, it is true, but alone they do not suffice and the relief is not permanent.

It therefore, as a rule, becomes necessary to resort to means for securing retention: pessaries. There are two varieties, the simple and the stem-pessaries; their number is legion and new ones are being constantly made. They are employed not only by physicians but by midwives and charlatans, all the more frequently because women think the selection and insertion of a pessary a matter of small importance. This is a great mistake, for it is undoubtedly true that they are often misapplied, and much harm is caused by them, even in the hands of physicians.

I will mention here only those varieties which I now use in my practice: First, C. Mayer's ring pessaries of pure rubber or caoutchouc; they are of much service in slight descent of the uterus. The pessary is selected to suit the displacement and must retain the vaginal wall above the introitus, without causing undue pressure or tension, even when the woman bears down. After each menstruation the instrument ought to be thoroughly cleansed in a solution of corrosive sublimate or carbolic acid; the patient easily learns to remove and insert the supporter. Elastic, hollow rings filled with air have also been long in use, but should be discarded as unsuitable, for the temperature of the body soon causes escape of the air; after this they shrink and the vaginal secretions adhere to them and erode the vaginal walls.

The hollow ring pessary of hard rubber is a better instrument, but it has one general fault, the central opening being too small and the diameter too great. The anterior lip becomes easily strangulated in the small opening, with subsequent pain and swelling. When this form is used, the opening in the ring should correspond to the size of the vaginal portion. Breisky recommends that the pessary be warmed to the temperature of the body and then inserted while the patient is in the knee-elbow

position; after the vagina has been dilated by a duck-bill speculum, distended by air, and the uterus and ovaries brought into as high a position as possible, the instrument should surround the vaginal portion and adapt itself to the vaginal vault. These precautions being observed, it will often be possible to retain the uterus in its normal, anteverted position. Then, when the physician has convinced himself that the ring secures complete retention, by having the woman bear down after it is inserted, and repeating the experiment on the following day, the pessary may be left undisturbed at least until the next menstruation.

Another variety is the sleigh-runner pessary of B. S. Schultze, which is especially adapted to the treatment of prolapsus of the uterus, as it not only restores the normal position, but also admits of the normal movements of the uterus. According to Schultze, the 8-shaped pessary requires a certain firmness of the pelvic floor in order that it may furnish the necessary support; that instrument is therefore less suitable than the sleigh-runner pessary, because this firmness is rarely present. Schultze, therefore, selects such sleigh-runner pessaries as are either simply hook-shaped, (*a*)  , or (*b*)  , or (*c*)  shaped, thus giving support partly to the anterior uterine wall and partly to the anterior vaginal wall. The form (*c*) he uses especially for the relaxed, wide vaginæ of old women. Schultze emphasizes the fact that one should not give up all hope of restoring the absent firmness to the normal supports of the uterus, when the patient is young and the prolapse is not of too long standing. If great care be used, and a local tonic treatment employed, while a suitable pessary retains the uterus in position, the normal condition of the genitals may be restored. The puerperium and the subsequent period would probably be the most favorable time for making the attempt.

I am not partial to the Zwanck-Schilling-Eulenberg "hysterophores," not only because they are constructed upon an incorrect view of the origin of the prolapse, but because they distend the vagina transversely, instead of elevating the anterior or posterior wall, and because they frequently cause severe injuries to the

soft parts. I have quite recently had to operate upon a vesico-vaginal fistula caused by such an instrument. The Langaard hysterophore is even more objectionable.

I have likewise discarded the use of the Roser-Scanzoni apparatus, once frequently recommended by me, for if there is any considerable pressure from above, the strongest spring will not hold back the vaginal wall, and the pelotte will be expelled; or the friction of the metallic band under the pelvic arch causes painful ulceration near the urethra.

When the introitus is very wide, the genitals much relaxed, and there is strong pressure from above, many patients will be benefited by the stem-pessary, which was introduced by Zängerle. It consists of a ring of oakum, covered with linen and heavily coated with varnish, which is furnished with a stem having three branches with knobbed tips about as thick as the butt of a pen-holder, and about 8 centimeters (3.2 inches) long. The credit for this pessary has also been given to Ed. Martin. It is made of five or six different sizes, and is kept in stock by most instrument makers. It is more difficult to introduce than the ring pessaries; when it has been passed some 5 or 6 centimetres (about 2 inches) into the vagina it is suddenly pushed above the levator ani, and is kept from being expelled under strong pressure by the stem which presses against the thighs or vulva. This pessary remains more firmly in position than many others, but unfortunately the opening in the ring is usually too small, and there is danger of strangulating the vaginal portion. Intelligent patients soon learn to remove it without assistance, and praise it highly.

The tendency of the varnished coating to wear off has been already referred to. In some very severe cases, I have thought it advisable to use the largest sizes of varnished oakum pessaries without stems; they were so large that they were introduced with difficulty. In one case, that of an old woman who would not submit to an operation, the largest size was employed, but the instrument would not lie horizontally in the pelvis and was therefore placed vertically, in which position it retained the parts, to the great joy of the patient.

Breisky has recently recommended the almost forgotten ball or egg-shaped pessary for women beyond the menopause. He has

them made in five sizes, out of hard rubber, passing gradually from the egg-shaped to the globular, leaves them in position from three to six months, and gradually reduces the size. For convenience of removal, he employs a steel traction instrument similar to the obstetrical forceps. When it is absolutely impossible to employ a self-retaining pessary, he applies a T-bandage, which sustains a pear-shaped body of hard rubber, corresponding in size to the lumen of the vagina.

Patients who have had much trouble with pessaries most readily submit to the operation, and, as the poorer classes, who must earn their bread by hard labor, soon become conscious of the imperfection of these instruments, they most frequently seek operative assistance. Nevertheless I have performed this operation upon many patients belonging to the better classes of society. In both the fourth and fifth editions of K. Schroeder's *Lehrbuch* is found the statement that the operative treatment of severe prolapse of the uterus is attended with much hemorrhage, is not without danger, and that union by first intention is not always secured; that this must be impressed upon the patient, and the dangers and advantages carefully weighed. I consider this somewhat exaggerated. In the majority of instances we can promise certain cure from the operation which is, as a rule, quite free from danger.

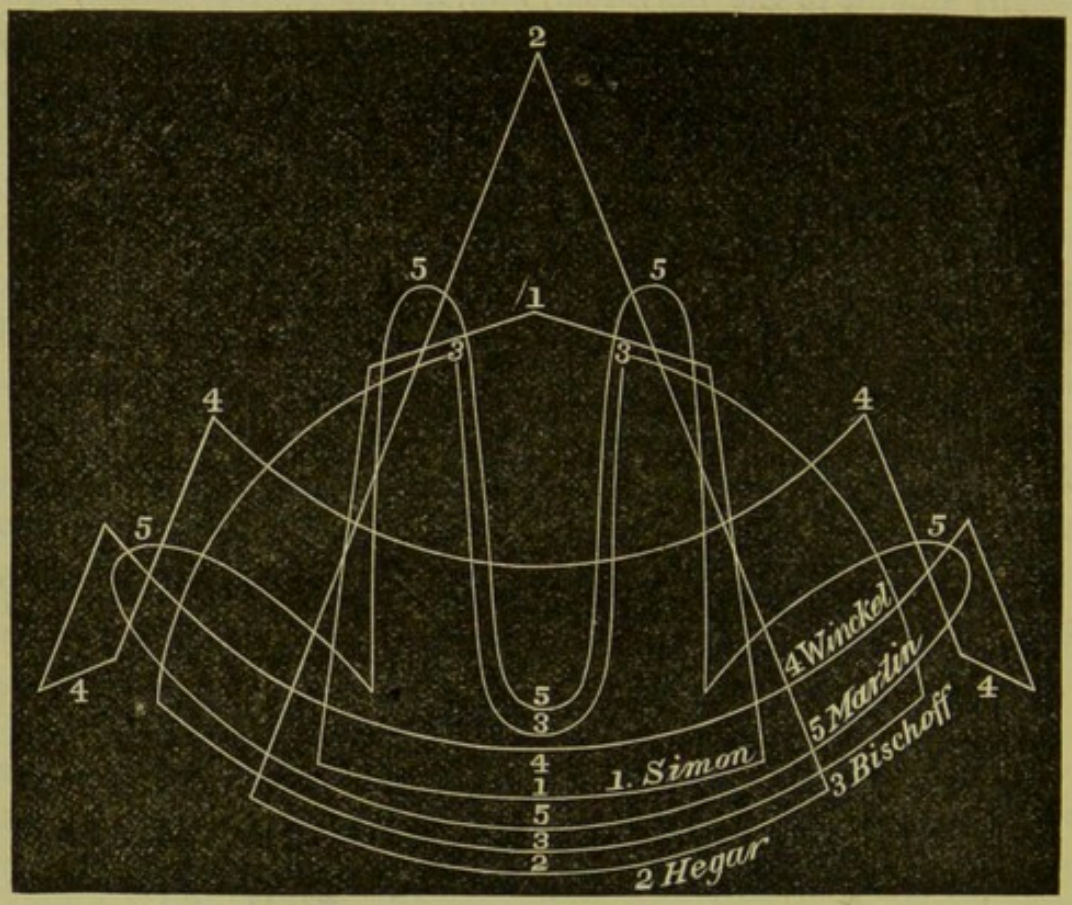
The Operative Treatment of Prolapse of the Uterus.

Gérardin, of Metz, was the first to propose, in 1823, that the vaginal canal should be denuded of mucous membrane at two opposite points near its lower end, and these points united by bringing the freshened surfaces in apposition.* He did not, however, put the plan in execution. Mende next proposed the formation of an artificial hymen, a sort of hymenorrhaphy, but did not perform the operation. Fricke performed episiorrhaphy, denuding the lower third of the labia majora, including the posterior commissure, and uniting the denuded surfaces by the button-suture. As a substitute for this operation, Heyfelder, Dommes and Schieffer passed one or more rings through the

* *Archives générales de méd.*, III année, tome 8, Paris, 1825, p. 132.

labia majora. Benjamin Philipps employed fuming nitric acid, and Dieffenbach, Henning, Kennedy and Velpeau cauterized the vagina with the actual cautery in longitudinal lines in order to produce retention by cicatrization. Desgranges made use of chloride of zinc, and attempted to produce stenoses of the vagina by the application of strong clamp forceps. Recently K. von Rokitansky produced stenosis in eight cases by including folds of the vagina by an elastic ligature.

Fig. 31.

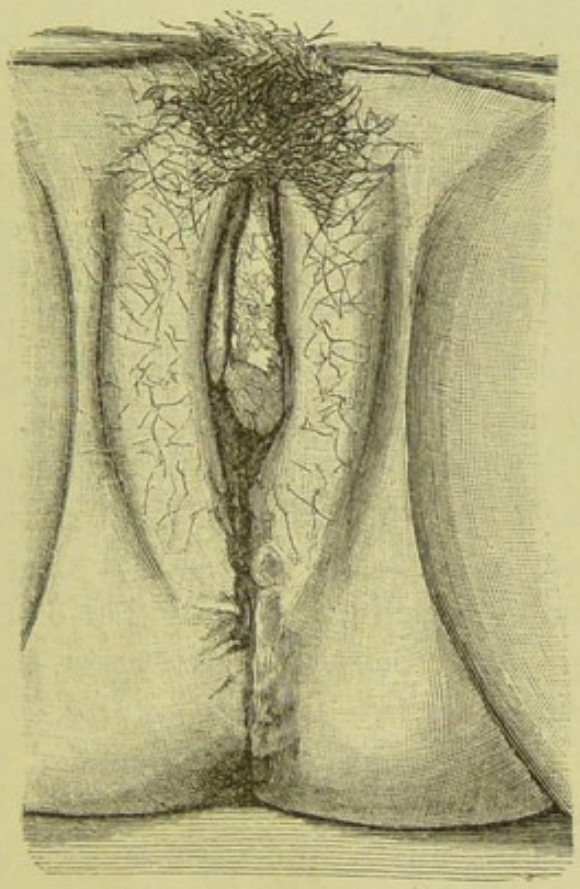


Marshall Hall first performed colporrhaphy of the anterior wall and was followed by Velpeau, v. Langenbeck and C. Braun. A definite mode of performing anterior colporrhaphy was introduced by Marion Sims, who first denuded a V-shaped surface and afterward sutured this surface in the form of a trowel. Emmet made a triangular denudation because he had observed that the cervix might become included in the upper portion of the breach. The German gynecologists of the present day have returned to the method originated by Marion Sims, viz., anterior colpor-

rhaphy, in which an oval flap is excised from the anterior wall of the vagina, an operation described on pages 129–131.

The principal methods in use at the present day are represented in Fig. 31, which shows the contour of each denudation. These are the methods of G. Simon, Hegar and Kaltenbach, which are known as perineauxesis, and that of Bischoff, colpoperineoplasty, which has likewise been described in detail on

FIG. 32.



Complete Prolapse of the Uterus, with Retroflexion, cured by Hegar-Kaltenbach's operation. *Vide* Figs. 27 and 28. Perineal cicatrix and lengthening of the perineum visible.

page 133. The more recent methods, therefore, alone need description in this connection.

To Simon belongs the credit of having first proposed and performed the most important of these operations, colporrhaphy, which combines the threefold indication which all previous methods had sought to fulfil, viz., stenosis of the vagina, strengthening of the recto-vaginal septum and arching forward of the vagina. All subsequent methods may, therefore, be re-

garded as modifications of Simon's operation. In Fig. 32 I have represented the vulva of the patient, shown in Figs. 27 and 28, who was cured by the Hegar-Kaltenbach plan.

The author sought to meet these three indications, in the case of young women with prolapse, by the following method: The denudation is made in the lower third of the vagina, its anterior edge being the carunculæ myrtiformes, and its breadth in the vagina about 2 to 2.5 centimeters ($\frac{4}{5}$ to 1 inch). Laterally, it reaches to within about 3 or 4 centimeters (1.2 to 1.6 inches) of the urethral orifice. After the labia majora have been separated, the anterior vaginal wall drawn backward by a long urethral catheter of the thickness of a finger, and the posterior wall pushed upward, we begin by washing the vaginal wall with a 5 per cent. carbolized solution. The mucous membrane is now pulled down by a double tenaculum inserted at the middle of the internal navicular fossa, and the posterior wall penetrated for a breadth of 2 centimeters ($\frac{4}{5}$ inch). The contour of the portion to be excised is now marked out by the scalpel. We then dissect upward on the left side for about 6 centimeters (2.4 inches), and then similarly upon the right side. The two flaps remain attached at their bases to the vagina, but they are shortened about one-half, so that each will be only 2 or 3 centimeters ($\frac{4}{5}$ to 1.2 inches) long. After thorough disinfection, the two flaps are united in the middle by two or three sutures, so that they form a bridge across the denudation. The denuded surface is then united from below upward in the middle line by deep sutures of silkworm gut, so that, finally, the stitches form a **T**; then the anterior and posterior lateral edges of the two upper flaps are united by superficial sutures. When all the sutures have been passed, the thick catheter, which has been constantly held in position by an assistant, is in the introitus of the vagina. The vagina is now irrigated through it, coagula washed out and the vulva cleansed. When the thighs are now brought together, nothing can be seen of the vertical suture, as the orifice of the vulva has been closed by it. I formerly operated without making the flaps, but added them later, in order to provide for a mucous covering entirely around the vaginal orifice. Two of my patients were afterward delivered of children at full term in the Dresden

Clinic; this bridge was partially incised in each case and reunited after labor, the prolapse being permanently cured. Schede has also operated several times in this manner with good results. I have now successfully employed it in ten cases, and years have convinced me that the bridge will withstand a very considerable pressure from above. The operation requires but three-quarters of an hour to an hour and the hemorrhage is slighter than by the other methods. As a rule, I leave the deep sutures in position for 12, 14 or 16 days, and require the patient to remain in bed for a few days longer. The bend in the vagina lies at a lower level and is more marked than in the other operations, while the septum is thickened only 2 or 3 centimeters ($\frac{4}{5}$ to 1.2 inches).

During the last twenty years, the plastic operation for proapse has increased in popularity, that proposed by Hegar being most frequently performed. With regard to the latter, I expressed the fear that the stenosis of the vagina which extended high up into the vault would be lacerated at the next labor, but this fear was apparently groundless. I have myself successfully operated upon patients by Hegar's method, and afterward delivered them without injury to the vaginal cicatrix. Up to 1880, Hegar had performed his operation 136 times, and generally with a good result. P. Müller, of Berne, has recently cured three cases of extremely severe prolapse by performing laparototomy in the following manner: After making an abdominal incision 5 or 6 centimeters (2 to 2.4 inches) in length, by the sound, he pushed the uterus up to the opening, performed supracervical amputation of the organ, and with a clamp fastened the stump in the abdominal wound. The patients were cured, but one had hernia follow, which required wearing an uncomfortable bandage, and which might have been accompanied by distressing symptoms. The opinion which I expressed in regard to this operation in the "*Pathologie der Weibl. Sexualorgane*" has been approved by B. S. Schultze in these words: "In my opinion, prolapse of the uterus is not an indication for laparotomy. The operation would be feasible only when the uterus could be replaced, and there are certainly less dangerous means of securing permanent reposition."

In 1868, L. A. Neugebauer returned to the old method of Gérardin for the cure of prolapsus of the uterus, by excising a portion of the mucous membrane, 4 centimeters (1.6 inch) in length by 1½ or 2 centimeters (⅗ to ⅘ inch) in width, from the

Fig. 33.

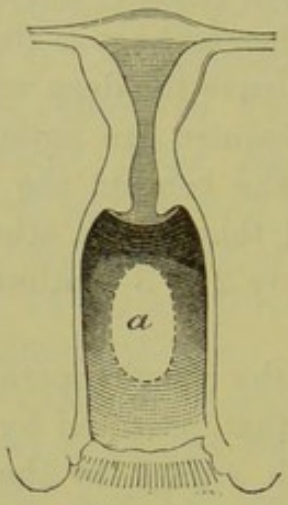
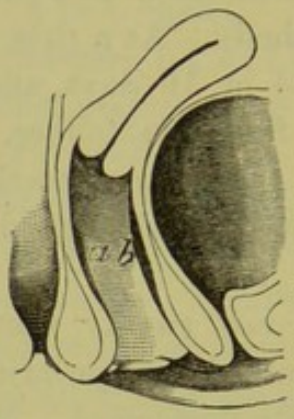


Fig. 34.



median portion of the anterior and posterior vaginal walls, or, under certain conditions, from the anterior lip of the cervix and the posterior vaginal wall (Figs. 33 and 34), and uniting both

Fig. 35.

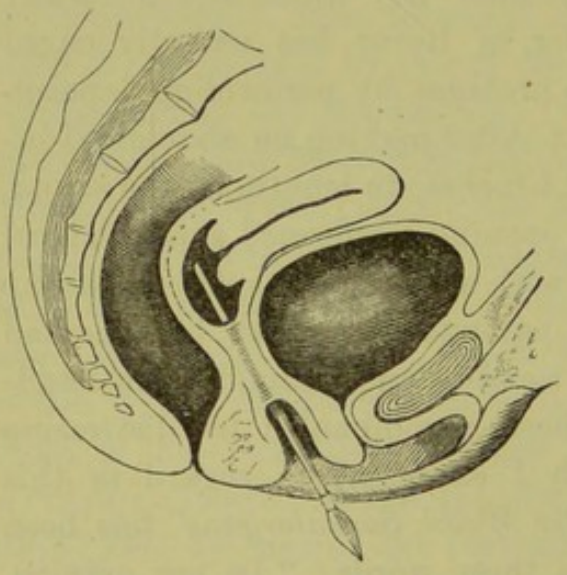
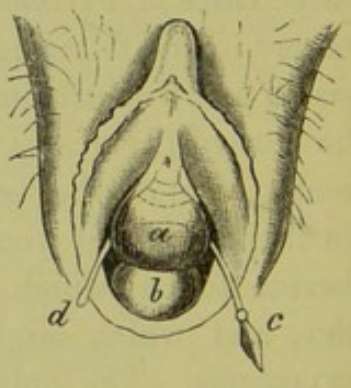


Fig. 36.



denudations by sutures. This results in the formation of a median bridge, which is situated from before backward in the vagina, and prevents a recurrence of the prolapse (Figs. 35 and 36). Previous to 1881, Neugebauer had performed this opera-

tion eleven times with very good results, and considered it especially adapted to those chronic cases of prolapse in which the rima gapes, and the lateral walls can be drawn down only by greatly distorting the parts, thus making posterior colporrhaphy and colpoperineoplasty impracticable. Of late years, many cases have been successfully treated by this plan.

Spiegelberg's method is somewhat similar to the above. In cases in which the prolapse of the anterior vaginal wall was so great that he feared he would not be able to shorten the surface sufficiently by the posterior vaginal suture, or when he was unable to prevent the descent of the anterior wall even by repairing the perineum, he caused a sort of suspension of the anterior wall from the posterior before performing perineoplasty. At first, the lateral denudations were made according to Simon's directions; but, afterward, he united the middle of the lower portion of the anterior with the middle of the upper portion of the posterior wall, and then passed the posterior perineo-vaginal sutures after the suspension had been finished. Although this denudation was about 4 centimeters (1.6 inch), still a relatively small extent of adhesion occurred, and along each of its sides the finger could be passed to the cervix. The latter moved from one side to the other, and even at times forced the adhesion downward. If labor eventually occurred, the adhesion might become lacerated, or it might possibly become necessary to divide it. This is, however, no objection to so simple and safe a method. Spiegelberg states that he has employed this combination of methods in many cases with great advantage.

In my opinion, anterior colporrhaphy alone, or in connection with posterior colporrhaphy, is preferable to the method just described, for no deformity results. Neugebauer's operation is, however, worthy of a trial in old patients, and it is my intention to employ it as soon as a suitable case presents; hitherto, I have met with no case in which it seemed to be indicated from impossibility of performing the other operation.

Le Fort's method, which has recently become popular in France, consists in denuding both vaginal walls in the median line to a length of 6 centimeters (2.4 inches), and a width of 2 centimeters ($\frac{4}{5}$ inch); these two surfaces are then united by

twelve sutures, five on each side, one above and one below, thus forming two parallel vaginal canals.*

Panas recommended the employment of catgut, in order to avoid the necessity of removing the sutures, a procedure which is very troublesome. This operation is, in every respect, similar to the one originated by Gérardin and reintroduced by Neugebauer.

Total extirpation of the uterus has been done when the prolapse was irreducible and the symptoms persistent and dangerous. Gebhardt first performed it in 1836,† and he has recently been followed by Juergensen,‡ Kehrer,§ Kaltenbach, Hahn, A. Martin,|| Edwards and Choppin.

The method of operating is the same as in extirpation of the carcinomatous uterus, which will be described hereafter. In women who are still menstruating, it will be necessary to simultaneously remove both ovaries, as troublesome symptoms may occur if they are allowed to remain.

When there is considerable elongation of the vaginal portion, or such a thickening of the lips that much improvement cannot be expected from the reduction alone, or should there be danger of the parts prolapsing through the narrowed vagina, either the entire vaginal portion should be excised, or a wedge-shaped piece taken from each lip, and the surfaces brought together. In the complete amputation, the upper incision must be somewhat convex, so that the edges of the wound may be easily united, and the operation can be rendered almost bloodless by applying an elastic ligature above the portion to be excised (Martin). Care must be taken, however, not to place it too near the line of incision, or it will slip off when the piece is removed. The posterior lip should be excised first, and then the anterior. The sutures of silk or silkworm gut, which must be strong, are passed behind the entire breadth of the wound. Of course, the operator will provide for a canal to the uterine cavity.

A better operation than that just described is Simon's; in this he removes a wedge-shaped section, the point of which extends

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* *Annales de Gynécologie*, 1877, VII, p. 299-306.

† *Oppenheim's Zeitschrift*, XII, 515. ‡ *Oppenheim's Journal*, IX, 570.

§ "Beiträge z. exp. u. klin. Gynäk," II, p. 140, 1879. || Düvelius.

high up into the cervical wall, while the base is formed by the lower portion of the lips; the posterior lip is removed first, as in the above operation. I have often successfully employed this method.

I have, also, frequently removed the hypertrophied vaginal portion with the galvano-cautery. This operation is short, usually bloodless, and the so much dreaded atresia of the external os can be prevented by passing a metallic stem into the cervical canal as soon as the wound made by the loop has healed. As anterior and posterior colporrhaphy done at one time is attended with considerable hemorrhage, even when completed in about an hour, it is not a matter of indifference in the case of anemic, debilitated women that removal of the vaginal portion is attended with additional hemorrhage.

From personal experience I think it better, nevertheless, to do all the operations at one time, and have so done for years. One will soon acquire such dexterity that the denudation, arrest of hemorrhage, and application of sutures, can be completed in from twenty to thirty minutes in anterior or in posterior colporrhaphy, so that the entire operation for prolapse, including the excision of the hypertrophied vaginal portion, can be done within an hour.

On several occasions, I have found it necessary to afterward excise the vaginal tubercle with scissors, it having protruded from the vulva; the wound was united in the median line.

The removal of sutures and subsequent treatment are the same as in the operation for vaginal inversions, which have been previously considered.

Various unpleasant sequelæ, which followed Hegar's and Bischoff's operations, induced A. Martin to apply the suggestions made by Freund, in the operation for perineoplasty. Placing the patient in the dorso-coccygeal position, he draws down the posterior vaginal wall and makes it tense above the introitus by two tenaculum forceps which are passed up to the vault. The posterior columns will then usually be distinct as a ridge in the median line, but, if they can neither be seen nor felt, their position upon the replaced vaginal wall in situ may be determined without difficulty. The columns are now included by lateral

incisions, and a flap about 5 centimeters (2 inches) long by 1.5–2 centimeters ($\frac{3}{5}$ to $\frac{4}{5}$ inch) wide is removed on each side, and the edges at once united by deep and superficial sutures in such a way that the longer, external edge of the wound may be used as a skin-covering below the lower end of the columns. The vaginal wall being then replaced, a denudation of about the same width is made at the orifice, for about one-half its height, beginning at the junction of the skin and mucous membrane; the edges are then united from below upward and from within outward. The material for sutures should be of silk, but ligation of vessels is to be avoided as far as possible.

A. Martin cautions against too high union of the introitus, as it makes it difficult to remove the vaginal sutures, and furthermore, the stretching in coition may produce great complaint, as he has observed in two cases. The shape of his denudation is shown in Figure 31, No. 5, on page 270. He asserts that he has obtained perfectly satisfactory results from this method and that retention of very severe prolapse has been secured; but when we carefully examine the cases reported, it is seen that 5 out of the 20, or 25 per cent. were *not* cured or only partially cured. Further, the patients were not long enough under observation after the operation to warrant a positive statement as to their condition. It is obvious that less blood is lost than in Hegar's or Bischoff's operation, but the posterior vaginal wall is left broader and the bend or angle appears to me to be too slight.

In my judgment the results obtained by Hegar's and Bischoff's methods are so favorable and the number of patients restored by them so great, that neither Martin's nor my own can successfully compete with them. To be successful, any one or all of these methods must be employed, for the lack of success is very often due to want of dexterity by the operator, and not from fault of the method.

Quite recently, an original operation has been introduced for prolapse of the uterus, viz., the operation of Alexander and Adams. It consists in shortening the round ligaments and thereby fixing the prolapsed and retroflexed uterus more anteriorly and at a higher level. The operation will be fully described in the chapter on "Retroversion." We here briefly remark that a

number of patients thus operated upon are still obliged to wear pessaries; that others have further had colpo-perineoplasty done,* and that Alquié had previously, and W. A. Freund subsequently, advocated and done this operation.†

It remains to be seen whether the operation has before it a successful future, although I have reason to doubt it, for the ætiological factors have not been sufficiently considered and a new anomaly of position replaces the old.

II. Anterior, Posterior and Lateral Displacements of the Uterus.

1. *Anteposition of the Uterus.*

Displacement of the entire uterus toward the anterior pelvic wall, anteposition of the uterus, either transient or permanent, is caused by tumors which arise from the posterior pelvic wall, from the rectum and its contents, from Douglas's cul-de-sac, or from the posterior wall of the uterus itself. Osteo-fibromata and sarcomata of the sacral region, periostitis with exudation and displacements of the lumbar vertebræ into the true pelvis must dislocate the uterus forward. More frequently this malposition is the result of protracted constipation, or of stenosis of the rectum from cicatricial contraction, or of tumors in the anterior rectal wall. B. S. Schultze has given us an illustration of such a tumor of the anterior rectal wall which had elevated and anteflexed the uterus. Still more frequently the collection of various solid or fluid masses in Douglas's cul-de-sac produces this displacement, *e. g.*, ascites, sarcoma of the peritoneum, a developing extra-uterine ovum, or retro-uterine hematocele. The dislocation may also be produced by loops of intestine, posterior vaginal enterocele, but it is by no means the rule, as we have seen when discussing this affection.‡ It is furthermore obvious that an ovarian tumor growing behind the uterus will push it forward. As a rule, some other displacement, such as elevation or a lateral position, is present in combination with the anteposition.

Again, the entire uterus may be brought nearer the anterior

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* Gardener. † *Centralblatt für Gynäkologie*, 1885, No. 7, p. 10.

‡ See Landau's and Breisky's cases, p. 134.

pelvic wall by traction upon its anterior wall, by the shrinking or contraction of a parametric exudation, by injuries, by circumscribed gangrene of the vesical wall, by vesico-vaginal fistulæ, or by contracting peritoneal adhesions. If there be no coexisting tumors behind the uterus to prevent a further dislocation, the fundus being fixed backward by the upper border of the broad ligaments, a retroflexion will gradually be produced by the intra-abdominal pressure.

The changes which take place in the structure of the uterus in anteposition depend partly upon the nature of the tumors producing the dislocation and partly upon the alterations which the supports of the uterus have undergone. Many of them, *e.g.*, the cicatrices of vesico-vaginal fistulæ, will persist after the fistula has been cured, and thus permanently displace the uterus. Other conditions, such as retro-uterine hematocele, ovarian tumors and ascites, admit a return of the uterus to almost its normal position, and the same is true after complete absorption of an ante-uterine exudation. Other causes, again, by producing relaxation of the sacro-uterine ligaments, produce descent and retroversion as soon as the uterus has become movable, and contracting posterior parametric exudations may transform the anteposition into a pathological anteversion and anteflexion, a latero-flexion, or, eventually, into torsion of the uterus. Finally, myomata of the posterior uterine wall will produce permanent and unchangeable antepositions.

The **diagnosis** of anteposition and its causes is not always easy; sometimes a long period of observation and repeated examinations are necessary. The mistaking an hematocele for a retroflexed uterus and attempts at reposition have several times resulted in the sudden death of the patient.* I have personal knowledge of a case in which an accident alone prevented a physician from persevering in an attempt to replace an hematocele.

The direction of the vagina and its length, the amount of stretching it has undergone, the condition of the vaults in front of and behind the uterus, and the thickness of the lips of the

* B. S. Schultze, p. 81.

uterus must all be considered in the examination. Introduction of the sound should be avoided in all cases in which a rapidly growing, painful tumor is the cause of the displacement, *e. g.*, in hematocele, peritonitis and in parametritis. The differential diagnosis of the various tumors of Douglas's cul-de-sac will be considered in the chapters upon myomata and ovarian tumors.

The treatment will depend upon the cause. Tumors which originate or continue the trouble should be reduced in size, absorbed or extirpated if possible; the methods of removal will be considered in the chapters relating to the various tumors. Cicatrices, contracted exudations and bands of adhesion can hardly be overcome, at most can only be stretched, and if they yield readily, they may permit a return of the uterus to its normal position.

2. *Retroposition of the Uterus.*

Retroposition of the uterus, in which the whole organ lies almost parallel to the axis of the pelvic inlet, may likewise be produced by pressure upon its anterior or traction upon its posterior wall. The most frequent causes are probably peritonitis and parametric processes affecting the posterior wall. Usually only the cervix, the folds of Douglas's cul-de-sac and the sacro-uterine ligaments are affected by these processes, and in such cases anteversion and anteflexion are the rule, retroposition and retroversion being rare. If peritoneal adhesions on the posterior wall fix the uterus in this position the displacement will remain permanent. In such cases, according to B. S. Schultze, the ampulla of the rectum is always distended and gaping, even though the bowel contain no feces. In ovarian tumors, especially when the uterus was previously retroverted, the upward traction upon the fundus of the uterus and difficult evacuation of the bladder may produce the retroposition. There are other causes of this deformity which may be mentioned here, such as tumors of the posterior wall of the bladder, concentric hypertrophy of the bladder, chronic ischuria and tumors of the anterior uterine wall, especially myomata.

The **symptoms** depend upon the causes, and especially upon inflammatory affections in the vicinity of the uterus. Diagnostic points can be obtained as to the direction, shape and size of the misplaced uterus from the history, and from the rectal, even with

the half hand introduced, vaginal and bimanual examinations. The sound must be used with great prudence and only after exclusion of pregnancy, inflammatory diseases and exudations.

The **treatment** must also be governed by the cause. According to B. S. Schultze, the manual separation of peritoneal adhesions is to be undertaken with great care if hematocele has once been present.

3. *Extramedian Positions of the Uterus.*

Myomata in the lateral walls of the uterus and in one of the broad ligaments, ovarian tumors and parovarian cysts growing between the folds of the broad ligaments, echinococci of the true pelvis, and especially parametric exudations which first dislocate the uterus to one side and then by contraction draw it to the opposite side, are the most frequent causes of extramedian displacement. The vaginal portion is directed downward, while the anterior and posterior vaginal vaults remain in normal position. If a *parametritis atrophicans, i. e.*, a chronic parametritis which is characterized by early shrinking of tissue, be the cause of the displacement, the latero-position occurs at once and always toward the affected side. Freund has reported cases of this character. Moreover, a slight extramedian position of the uterus is extremely frequent, so frequent, indeed, that it can hardly be considered an abnormality; quite a number of instances are shown in the author's Atlas. That it does not result from disproportionate size of the broad ligaments, but is a consequence of it, I conclude from the difference which can always be demonstrated between the tubes and the ovarian ligaments, as this disproportion is a consequence of the departure of the uterus from its normal position. These extramedian positions are in my opinion, therefore, independent of the peritoneum, and are caused wholly by some distortion or unequal union of Müller's ducts which coalesce to form the uterus. I found this anomaly 48 times in 343 patients; the vagina was nearly always exactly in the median line of the pelvis.

The uterus is usually placed eccentrically in the roof of the vagina, one vault being a wide cul-de-sac, and the other a narrow cleft. According to Velpeau, the right extramedian position is

much more frequent than the left, a fact which Klob has explained by the position of the rectum at the left. I cannot wholly agree with this view. In the first place, the left position occurs just as frequently as the right, for in 343 patients I found the right extramedian position 23 times, the left 25 times. The most important consideration, however, is the unequal lengths of the tubes and ovarian ligaments, which points to a congenital rather than an acquired displacement. The frequency of its occurrence, 14 per cent. in living subjects and still oftener at the post-mortem, likewise indicates its early origin.

This displacement is of secondary importance. It might be *a priori* expected that vascular disturbances, etc., or interference with the passage of the ovule would be more apt to occur upon the loose, relaxed side, or that this side would be more susceptible to puerperal infection than the shorter and tenser side.

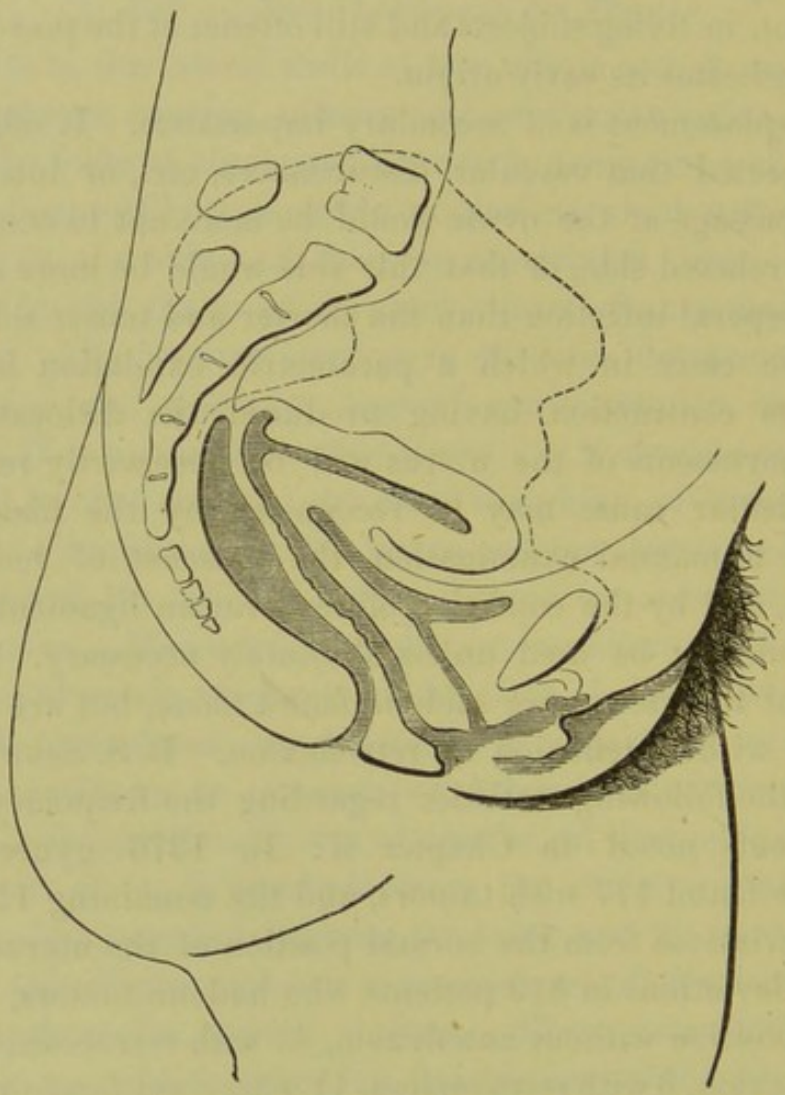
In those cases in which a parametric exudation has been present, its contraction having produced the dislocation, the passive movements of the uterus will be necessarily restricted. The particular cause may be recognized by the history, the results of bi-manual examination, the presence of remains of exudation, and by the condition of the ovarian ligaments. The sound should not be used unless absolutely necessary. Lateral positions of the uterus are seldom found alone, but are usually combined with anteflexion or retroflexion. B. S. Schultze has compiled the following statistics regarding the frequency of the displacements noted in Chapter ii: In 1376 gynecological patients he found 177 with tumors, and the remaining 1199 with various deviations from the normal position of the uterus; there were 896 deviations in 819 patients who had no tumors, viz., 10 with anteposition without anteflexion, 33 with retroposition without retroflexion, 8 with retroversion, 11 with right latero-position, 5 with anteflexion and 2 with retroflexion, 22 with left latero-position, 8 with anteflexion, and 7 with retroflexion.

From the above it is evident that the right extramedian position is at least no more common than the left. Unfortunately, I can give no exact percentage from personal observation, as I have paid especial attention to the cause only, and frequently neglected to make full notes of the cases under my charge.

4. *Anteversion and Anteflexion.*

Definition.—Since anteflexion is the normal position of the virgin and nulliparous uterus, as anteversion is in the parous woman, pathological anteversion will signify a permanent or less movable anterior position, especially of the fundus, than normal. The flexibility of the organ is lessened. In pathological ante-

FIG. 37.



Extreme Anteversion, the Result of Chronic Metritis and Posterior Parametritis.—*After B. S. Schultze.*

flexion, the flexion is permanent, and, as a rule, the uterus is still further displaced by fixation in retroposition consequent upon the distention of the bladder. Abnormal flexibility may also cause abnormal flexion.

Ætiology.—Here, as elsewhere, pathological anteversion and

anteflexion usually result from diseased processes external to the uterus.

The abnormal rigidity and other parenchymatous changes which we find associated with anteversion are caused by subinvolution, especially after abortions, by acute or chronic inflammatory conditions following the latter, or by hyperplasia of the connective tissue. These conditions are, however, very frequently associated with posterior parametritis, which produces rigidity and shortening of the sacro-uterine ligaments, thus increasing the anteversion and rendering it more permanent (Fig. 37). Finally, various diseases of the peritoneal covering of the uterus are not infrequent complications.

The **symptoms** depend upon the inflammatory condition of the tissues, and consist chiefly of vesical disturbance, dysuria and a constant desire to urinate, consequences not only of the statical conditions present, but also of the venous hyperemia of the organs. The dysmenorrhœa and sterility which are so frequently associated with the displacement result from the coëxisting chronic metritis and parametritis.

The condition may be recognized by the diminished passive mobility of the anteverted uterus and by its immediate return to the pathological condition after it has been lifted up; furthermore, any motion of the fundus will be readily transmitted through the rigid body to the vaginal portion.

Permanent anteflexion from external causes may result from peritoneal adhesions, as in Fig. 40, page 288, from shrinking and shortening of the round ligaments, from ovarian tumors or tumors of the posterior uterine wall, such as myomata and broad-based adenomata, also (according to E. Martin) from subinvolution of the posterior vaginal wall at the site of the placenta.

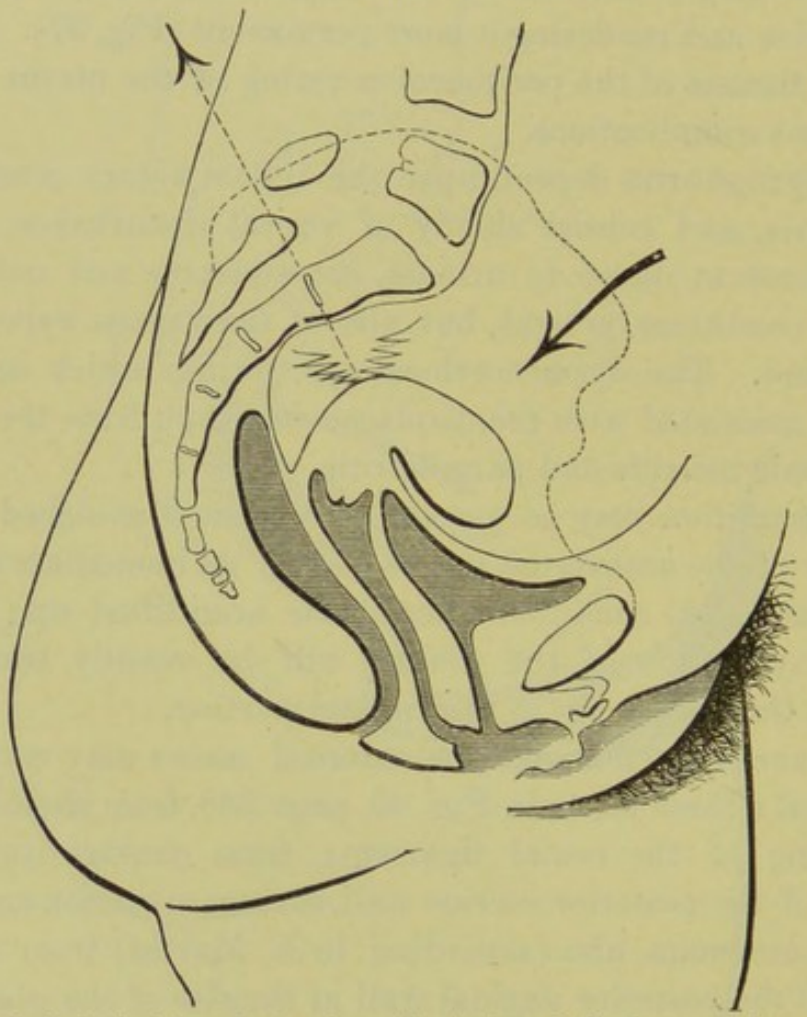
But such causes are much less common than those inflammatory conditions external to the uterus which elevate the cervix and produce corresponding elongation of the vagina, to which attention was first directed by E. Martin;* see Fig. 38. This posterior parametritis is not necessarily a result of labor, but may also be caused by disease entirely apart from the puerperal

* *Loc. cit.*, p. 123, II. Aufl.

state, such as chronic constipation with long continued tension upon these ligaments, catarrh of the uterus with retention of the secretion, injuries and, what is presumably most frequent, gonorrhœal infection.

Another variety occurring frequently is "puerile" anteflexion, in which the anterior vaginal wall is shortened, the slender cervix generally conical and the intermediate portion lengthened;

FIG. 38.



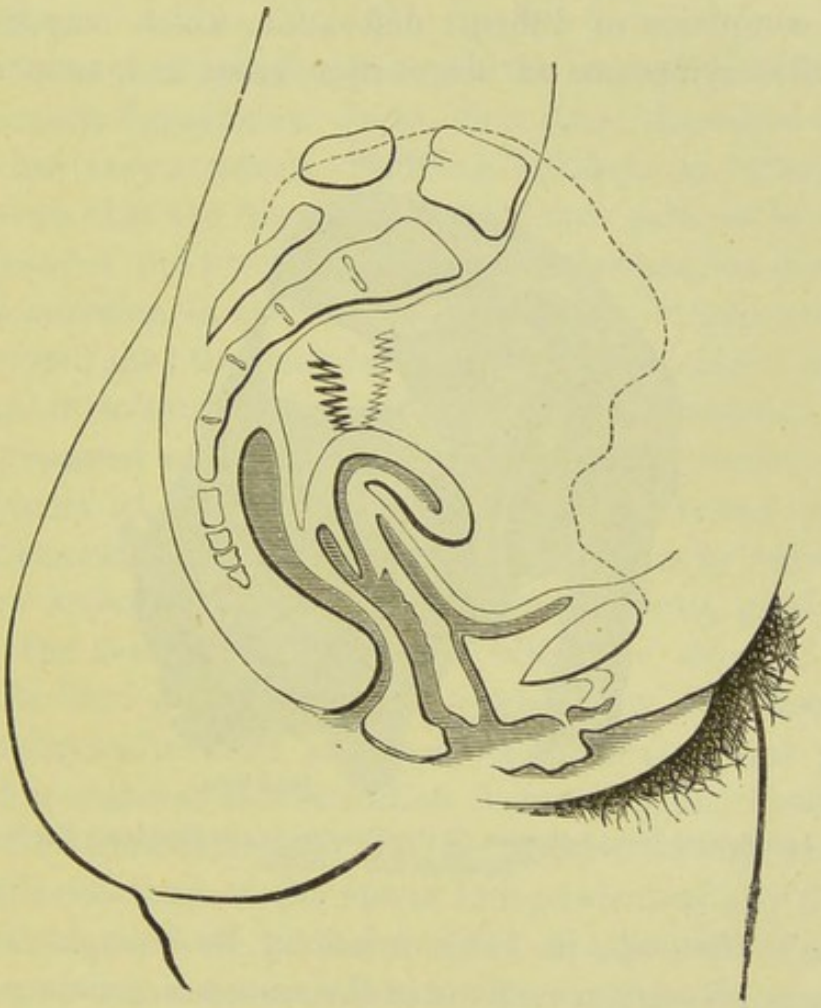
Pathological Anteflexion from Shortening of the Sacro-uterine Ligaments.—*After B. S. Schultze.*

these abnormalities predispose to anteflexion, especially when the organ is very flexible and the bladder empty. (See Fig. 39.)

In most cases of this variety the body of the uterus will be found to be normally developed. The shortness of the vagina and the characteristic form of the vaginal portion are of chief diagnostic value. From parenchymatous changes within the

uterine walls and diminishing flexibility, the normal anteflexion may become exaggerated into a pathological one. A flexion may likewise result from a partial atrophy or condensation of the wall or from parametritic tension. It has been asserted that in the pathological flexion the tissues may partially disappear or become absorbed at the point of flexion; according to Schultze (*loc. cit.*, p. 109), however, this is more frequently secondary, but

FIG. 39.



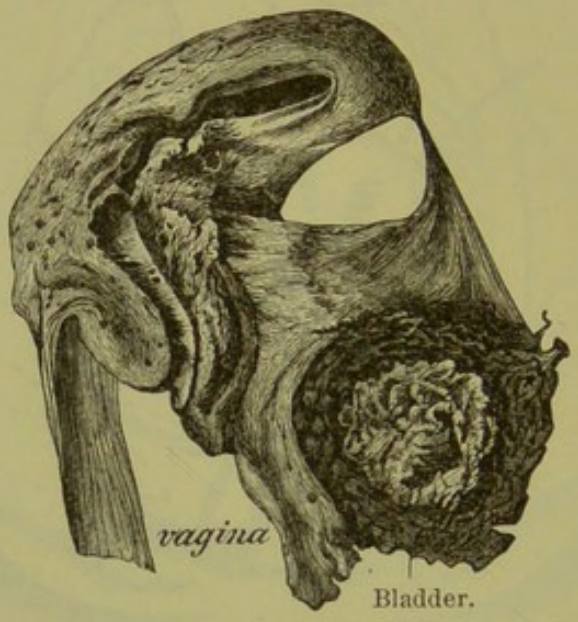
Puerile Anteflexion.—*After B. S. Schultze.*

I have no personal knowledge of such a condition. (Fig. 40, p. 288.) Angulation of either the body or cervix of the uterus very probably arises from partial absorption of the wall upon the side involved in the curvature.

The **symptoms** are those generally to be attributed to the resulting parametritis, endometritis and retention of the secre-

tions. It is worthy of attention that Schultze has found the most rigid and permanent cicatrices with fixed displacement to result from a perforating puerperal parametritis. In this connection, he again calls attention to the distended, gaping condition of the rectum, even when empty, a condition which results from the rigidity of the surrounding tissues due to the exudation. Only in the stage of cicatrization do the folds of Douglas's pouch contract, the edges of the sacro-uterine ligaments approaching each other and drawing the uterus toward the sacrum. Now the patient complains of difficult defecation, which may become so severe that symptoms of obstruction arise, and, as in a case of

FIG. 40.



Anteflexion from Adhesion of the Fundus to the Bladder. Cervical dilatation and catarrh.

Schultze's (*loc. cit.*, p. 116), colotomy be thought necessary. Various unpleasant sensations in the rectum are among the most constant and disagreeable symptoms in chronic cases of non-puerperal character. There is pain before defecation, or after the evacuation of each hardened fecal mass, or even occasionally when the stools are soft. Quite frequently defecation so weakens the patient, even though there be no pain, that syncope has to be contended with. If there is stenosis of the rectum, the fecal masses are flattened or ribbon-shaped, or are extruded in small lumps resembling goats' dung. Schultze states that he has seen

obstinate diarrhœa associated with this condition, which he considers to be dependent upon the disease in question, and to be similar to the combination of symptoms found in nervous dyspepsia as described by Leube.

The constant desire to urinate, which is another symptom, both of anteversion and of anteflexion, depends upon vascular disturbances, upon the distortion produced by the retracted cervix and also upon the pressure of the rigid uterine body upon the wall of the bladder (Fig. 40). Catarrh of the bladder is not rarely present.

The influence of anteflexion upon the sexual functions is a matter of much importance. In the first place, disorders of menstruation are very common. We are indebted to Schultze for having shown that the dysmenorrhœa of such patients is not due to anteflexion of the uterus, and that the designation *dysmenorrhœa from retention* is, therefore, a misnomer. It had been generally accepted that the bend in the body of the uterus near the internal os interfered with discharge of the menstrual blood, and that repeated spasmodic contractions of the uterine muscle were necessary to force the fluid along the narrowed passage. Schultze demonstrated the inaccuracy of this view, by repeatedly, during the attacks of most violent dysmenorrhœa, passing the sound to the fundus of the uterus without a drop of blood following it; not a drop of blood flowed from the uterus for hours and days afterward, although the canal remained patent. Scanzoni has observed this condition in uteri acutely anteflexed. This form of dysmenorrhœa may be present during acute or chronic inflammations of the uterus independent of any flexion; indeed, with a decrease in the severity of a posterior parametritis, a previously anteverted uterus may regain its curve by increase in its flexibility, with decided improvement of the dysmenorrhœa. Moreover, the pains usually begin before the menstrual flow and persist as long as this is scanty, diminishing in severity or disappearing altogether only when it becomes profuse. The cause, therefore, of the painful contractions may be attributed to the fulness of the uterine blood vessels, just as the after-pains of primiparæ may cause suffering from coexisting metritis or

parametritis, while they would not be perceived if the complications were absent.

It cannot be questioned that cases do occur in which stenosis of some part of the uterine cavity may make a mechanical obstacle to the passage of menstrual fluid, and that severe pains, resembling those of labor, may be followed by a more profuse flow; but, as a rule, stenoses of the canal, with flexion of the uterus, and in general, are much less frequent than has been diagnosticated. Not infrequently menstruation occurs without discomfort, even when the os is so contracted as scarcely to admit a sound of 2 millimeters.

If, however, in such cases the menstrual flow appear suddenly and be very profuse, mechanical dysmenorrhœa will follow, just as it will when the os is of normal size, if the blood coagulate or pieces of the exfoliated mucous membrane be driven into the canal and are expelled by strong contractions. In the sensitive and inflamed uterus these spasmodic contractions produce intense suffering, whereas the clots and pieces of membrane would be expelled from the healthy uterus without any symptoms whatever.

Chlorosis and amenorrhœa are frequent sequelæ of anteflexion in virgins. According to Schultze, the chlorosis is often directly dependent upon posterior parametritis, which is evident from the corresponding increase and diminution of the one with the other. Very many women having anteflexion due to contraction of the sacro-uterine ligaments become and remain sterile. In 70 patients treated for this affection, Schultze found 37 sterile, of whom 33 had given birth once at term, 11 were married and remained sterile, and 22 had unruptured hymens. Of 75 cases of anteflexion treated by E. Martin, 27 had never been pregnant, 23 had been delivered and 25 were unmarried.

The cause of sterility in such cases is not the anteflexion, but depends upon the train of inflammatory symptoms such as endometritis and salpingitis, oöphoritis and parametritis, which either destroy the spermatozoids, or exert an unfavorable chemical influence upon the ovum, or offer a mechanical obstruction to its passage; even after the ovule has reached the uterus, it is usually

expelled at an early stage of pregnancy. When the inflammatory process has been removed, however, conception often takes place. Schultze believes the fixedness of the anteflexion and the rigidity of the angle in the puerile or so-called congenital anteflexion is due to metritis and parametritis; furthermore, that the dysmenorrhœa and sterility are results of the inflammation, principally because these symptoms do not appear with the advent of menstruation, but, as a rule, only after menstruation has existed for a considerable period.

Diagnosis.—Anteflexion will be recognized upon bimanual examination as pathological by the higher level of the cervix, its approximation to the posterior pelvic wall, its lessened mobility and by the diminished passive mobility of the body of the uterus. The body, however, lying further back than usual, may be difficult to palpate, and on account of the position of the vaginal portion anteflexion is often mistaken for retroversion. This mistake is especially liable to occur when the supravaginal portion of the cervix is unusually large. Rectal examination will reveal the prominent sacro-uterine ligaments, their tension, narrowness and sensitiveness. The introduction of the sound will now prove that the anteflexion is pathological, as the normal elevation and straightening will be absent when the bladder is filled. The instrument must first be bent, so as to correspond to the direction of the uterine canal, otherwise serious injury may be inflicted. The degree of flexibility of the uterus may be ascertained by introducing the index and middle fingers of one hand into the vagina, and extending and moving the organ with the other hand which grasps the fundus externally; in the same manner we can learn of any fixation of the organ posteriorly, or of adhesions between the uterus and bladder and other abdominal organs.

The following statistics, gathered from my private practice, will serve as proofs of the preceding statements. I have in my possession notes of 233 pathological anteversions and anteflexions, and also of 1000 retroversions and retroflexions, in 5665 patients. Ever since about 1860, when I became convinced that these positions were not abnormal ones, I have been exceedingly careful in making the diagnosis. At Rostock, in 1000 patients I found 14 anteversions and 79 anteflexions, an average of 9.3 per cent.;

and also 56 retroversions and 70 retroflexions, a proportion of 12.6 per cent. At that time, therefore, according to my experience, the difference between these varieties was not so marked as at Dresden. But I found, nevertheless, that the difference was not due solely to increased care in diagnosis of the first class, of which only 4 per cent. were noted at Dresden, but that it was also due to the greater relative frequency of retroversions and flexions, which increased from 12.6 per cent. to 17 per cent.

In the above 233 cases there were 45 anteversions and 188 anteflexions. The proportion of anteversions to anteflexions was, therefore, 1 : 4, which corresponds very nearly with Schultze's, viz., 79 : 296. The frequency which I have noted is, however, much below his, being only 375 in 1376 patients, or an average of 27 per cent. From this, I have no doubt that I frequently overlooked and failed to recognize the lighter grades of this displacement.

In addition, 45 were single and 188 married, 53 among the latter having been sterile, averaging 28 per cent., and of these 4 had been sterile from 1 to 2 years, 22 from 2 to 5 years, 14 from 5 to 10 years, and 2 from 10 to 17 years. The period of sterility is not reported in the other cases.

Of the remaining 133 I have noted the number of confinements in 56, or one-half, as follows: 19 had 1 child, 10 had 2 children, 9 had 3 children, 10 had 4 children, 5 had 5 children, and 3 had 6 children, a proportion of 2.6 children to each patient, which is about one-half of the usual fertility. There were 32 abortions to 145 deliveries at term, or 22 per cent. From these notes there can, therefore, be no doubt that pathological anteversions and flexions materially lessen the fertility of the patient.

With regard to complications, I have noted an abnormally narrow external os in eleven cases, and one of membranous dysmenorrhœa. Deep cicatrices in the vagina or os uteri were found twice; parametritis and perimetritis seven times; peritonitis, once; these complications were, however, not carefully enough sought after. Oöphoritis and ovarian tumor were each found four times. Myoma is noted but three times, but, as is well known, the diagnosis of myoma with anteflexion is very difficult without the

sound, and a tumor of the anterior wall might easily be mistaken for an anteflexion. The frequency of wandering kidney as a complication is curious, as it was found four times on the right side, three times on the left, and once on both sides.

Among other symptoms, I found that pain in the mammæ during menstruation occurred in two cases.

Treatment of anteversion: When the fundus of the uterus has become acutely displaced and fixed behind the symphysis of the pubes by any mechanical action, the reposition of the organ is indicated and this is usually easily accomplished. Chronic anteversion, however, must be treated according to the cause, be it metritis or posterior parametritis, as described in the chapter on the treatment of anteflexion. Mechanical treatment of the displacement can be resorted to after removal of these complications, and then only when the uterine tissue has not recovered its normal flexibility, and the fixation of the uterus through shortening of the ligaments is no longer associated with inflammatory manifestations. When the anteversion causes pain and discomfort, an operation for drawing the cervix downward and forward, and thereby elevating the uterus, may be resorted to, as suggested by Sims and Simon. Sims dissected a transverse flap, several centimeters long and about 1 centimeter broad, in front of the vaginal portion, and a parallel flap of the same size 3 or 4 centimeters (1.2 to 1.6 in.) lower down, and then united the raw surfaces in such a way that the portion of vagina between them formed an external fold. This patient soon became pregnant, passed through a normal labor and was entirely relieved of her former affection. Simon denuded the anterior lip and united it to the vagina at a lower level than in Sims's plan.

It has also been attempted by means of pessaries to mechanically improve the position of the uterus. Graily Hewitt employed the sleigh-runner pessary of Schultze in a reversed position, using it as a cradle-shaped pessary to elevate the anteverted uterus. Schultze maintained, however, that the cervix of the uterus should not be fixed posteriorly in the pelvis, because this is the most frequent cause of anteversion; also, that while relaxation of the anterior vaginal vault is presupposed, it does not always exist; and that traction upon the sacro-uterine ligaments might

produce another attack of posterior parametritis, relaxation of these ligaments and, secondarily, retroversion.

The intra-uterine stem-pessary should never be employed unless the vaginal portion is at the same time fixed in the middle of the pelvic cavity by a vaginal instrument such as Mayer's ring or Hewitt's pessary. The use of the stem-pessary attached to a bandage is dangerous and in the highest degree reprehensible.

When anteflexion has become pathological, it can be cured only by treating the cause, and when the latter consists of firm adhesions or tumors in the walls which cannot be removed, the treatment must be largely symptomatic.

Posterior parametritis most frequently claims our attention; here rest, avoidance of all sources of irritation to the inflamed sacro-uterine ligaments, and the direct treatment of the inflammation are of greatest value. Complete rest in bed is necessary on account of the pain always present; the physician must insist upon sexual continence, and render defecation easy. The latter indication is met by warm enemata and by such mild cathartics as calcined magnesia, infusion of rhubarb with sulphate and chloride of sodium in 1 to 3 fluidrachm doses, decoction of buckthorn and couchgrass root, Carlsbad salts with bicarbonate of sodium, Hunyadi Janos or Ofener bitterwater. The painful intestinal tenesmus may be relieved by warm, oily or mucilaginous clysters, by 10 to 15 drops of laudanum in an injection, or by suppositories of one-third of a grain of extract of belladonna.

If these remedies do not influence the pain felt before appearance of the menstrual flow, and it increases, Schultze recommends depletion of the vaginal portion to lessen the sensitiveness of the sacro-uterine ligaments and reduce the inflammation. Blood may be abstracted from the cervix in two ways, either by scarification or by leeches. A tolerably large quantity can be drawn by making an incision 1 or 2 centimeters ($\frac{2}{5}$–$\frac{1}{2}$ in.) long in the mucous membrane, the vaginal portion lying in the speculum and the lips of the uterus being slightly everted. Of course, if a definite quantity is to be drawn, it must be collected as it flows. When enough has been obtained, the incision is painted with a 2 per cent. carbolized solution and a tampon of cotton

saturated with the same solution firmly pressed against the lips, and the speculum removed. The patient may remove this tampon in ten or twelve hours. This scarification may be repeated every three or four weeks, as I have seen much good result from it. This method is to be preferred to that of Spiegelberg, who makes a deep incision with the scalpel, extending up to the region of the internal os; the wound is more superficial in scarification and the vascular mucous membrane more easily furnishes the necessary quantity of blood.

In ordinary cases of anteflexion, Schultze considers the application of leeches the preferable method. They are applied as follows: After thorough disinfection of the vagina, the portion is held in a cylindrical speculum of suitable size [a milk-glass speculum is best], and, when all the mucus has been removed and the lips dried, the vaginal portion should be isolated by pressing the speculum against the uterine walls, care being taken that no part of the vagina projects into the lumen of the instrument; this procedure will close the os uteri, or at least compress the lower portion of the cervix, so as to prevent the leeches from crawling into the uterus. A couple of vigorous leeches having been placed in a perfectly clean test-tube should now be held firmly against the anterior or posterior lips at the point where it is desired they should attach themselves; or they may be allowed to slide from the glass into the speculum toward the portion and then retained by a plug of cotton. Having become attached they will drop off when filled; or, if they cling too long, a grain of salt placed upon them will soon cause them to drop off.

When the os is small, precautions are otherwise unnecessary; if wide and gaping, however, the leeches must be prevented from crawling into the cervical canal by placing a plug of salicylated cotton or a piece of compressed sponge within it. Should the leech have crawled into the canal, however, Veit suggested that it be cut off if within reach or, when already inside, that a solution of salt be injected into the uterus to hasten its removal. Weber recommended passing a thread through the tail of each of the leeches before its application as a sure means of removing it if necessary. Beer's experiments in bdellatomy have

proved that this in no way interferes with the drawing power of the leech.

Should a leech crawl into the uterus, it may cause violent uterine colic, severe hemorrhage and even convulsions; hence this is not a matter of indifference. Veit had them to crawl into the uterus twice in his own experience, but says that uterine colic may very frequently occur independently of this accident, being caused solely by reflex irritation due to the sucking of the leech. The colic may be associated with hysterical paroxysms, vomiting or even mental aberration. Scanzoni, Veit and Leopold have observed acute eruptions of the skin, the development of an intense erythema, or a marked urticaria, with symptoms of fever and mental dulness, which disappear in a few hours. Veit states that he has been gradually limiting the applications of leeches to the vaginal portion, and I must make the same statement regarding myself; I was formerly accustomed to use them much more frequently in metritis and posterior parametritis than at present. After being convinced that the therapeutic value of leeches was often less than had been claimed, I used them with diminishing frequency, although never having seen severe symptoms of the nature previously stated occur in any of my cases. At times, I have had subsequent hemorrhage which was only discovered by the patients themselves, whilst lying in bed, when in an almost fainting condition. In such cases, acupressure must be resorted to, especially when the hemorrhage is arterial and cannot be checked by styptic powders, such as alum or tannin, or by the pressure of a plug of cotton saturated with Monsel's solution. Severe hemorrhages are more liable to occur when the leech has attached itself to the vaginal vault. Too frequent uterine depletion may be followed by anemia or may leave cicatrices on the vaginal portion, which afterward cause much trouble. I recall a patient who often had leeches applied to the portion by a gynecologist, and, as a consequence, it grew rough and irregular, the os small, and, since the bloodletting, her menses almost ceased.

Though 15 or 20 grams (4 to 5 drachms) of blood are usually drawn by each leech, the quantity may sometimes be much greater. Chrobak states that, excepting those cases in which as

much blood as possible must be drawn, from four to six leeches are sufficient; more than six of the large variety or eight of the smaller will not draw well at the same time, as they are too greatly crowded in the speculum and thus interfere with one another. In my judgment this number is too large, as, during the last fifteen years, I have never applied more than a pair of leeches to the cervix at a time, and am pleased to find that Schultze never orders more than two or three of the large variety in anteflexion. The subsequent hemorrhage may be favored by throwing warm water into the speculum, or by directing tepid vaginal injections, and having the patient frequently bear down.

Leeches are, of course, contraindicated during pregnancy, although exceptional cases have occurred in which gestation was not interrupted by local abstraction of blood. Again, an acute inflammation of the uterus and neighboring parts contraindicates local bloodletting; likewise, a swelling, erosion or other affection of the uterus. Several days of quiet or rest in bed should be insisted upon after the local abstraction of blood. If catarrh of the uterus be associated with the anteflexion, it may be cured by methodical irrigation with a carbolized solution, as described in the chapter on catarrh of the uterus. When the catarrh is of gonorrhœal origin, as may be proved by finding gonococci in the purulent discharge, I usually paint the entire uterine cavity with a 1 or 2 per cent. solution of corrosive sublimate. The stagnation of the secretion and consequent parametritis call for the use of absorbents, especially of iodide of potassium, in globules of cacao butter, in the proportion of 0.2 : 3.0, or in tampons saturated with an aqueous or glycerin solution having a strength of 50 : 150. When the pain is severe, 15 to 20 drops of tincture of opium should be added to each tampon. Vaginal injections of warm or salt water or mucilaginous fluids, or warm general baths are to be used; the patient may be ordered to the brine baths of Kreuznach and Hall in Upper Austria, the peat baths of Franzensbad, Elster and Cudowa, the sand baths of Blasewitz, near Dresden, and of Köstritz, near Gera, where the patient is subjected to a high temperature for hours; these are all of service and highly recommended by B. S. Schultze. Good effects are produced by hot douches of 37° to 43° R. (116° to 129° F.), used,

with not too great force, one, two or three times daily for months; and, finally, such mild laxative waters as Kissingen, Marienbad and Ofener bitterwater, should be prescribed. By these means the parametritis and such sequelæ as otherwise cause permanent contraction of the ligaments may be removed; the latter then become more elastic and the entire uterus more movable and less rigid. As the metritis declines, the dysmenorrhæa and sterility disappear, and with them the causes of depression and weakness, and the patients show rapid improvement.

But if sterility persist in spite of the improved condition, we must accept Schultze's directions and seek for the cause. If the latter remain obscure, the uterus should be dilated to aid the possibility of conception; this will fulfil at least one condition which is known to us, viz, free entrance to the uterine cavity, and it may be that it will compensate for the unknown cause and the abnormal condition which are beyond our control.

The advocates of intra-uterine treatment select just such cases as these for the application of the stem, and this is the only point upon which I differ with Schultze. He says that the anteflexion of the uterus occasions no more discomfort after the inflammatory complications have been cured. I hold that with a suitable stem pessary the uterus might be straightened, but even with this instrument the uterus remains fixed posteriorly shorter than normal; the pessary would change it either into retroposition or anteversion, and each of these positions would be a greater departure from the normal than the anteflexion which we are endeavoring to remove. It would therefore be advisable in such cases, to follow Chrobak's suggestion to elongate the shortened sacro-uterine ligaments by methodical traction on the vaginal portion. Richter applied this traction by the sound, a method which has little to recommend it, as serious results might follow. The tendency to recurrence, however, is quite considerable in any case, and we should therefore avoid employing any means which could light up a new posterior parametritis.

On account of the good results obtained in a great many cases, I remain an advocate of intra-uterine elevators, although employing them less frequently than formerly. With occasional exceptions, I have discarded their use in retroversions and retroflexions,

as we have now at our command much better and more efficient means of treating these affections. But in anteflexions, after all inflammatory symptoms have disappeared, two indications call for the use of the intra-uterine stem. The first of these is dysmenorrhœa, unattended by inflammatory symptoms, such as catarrh, pain in the sacro-uterine ligaments, or thickening of the uterine walls, but in which pains of varying intensity recur with each return of the menses, pains which are probably connected with either a permanent mechanical or a spastic stenosis of the internal os. Although sounding the uterus in such cases may not evacuate much of the retained blood, yet the patients observe that menstruation is accompanied by less discomfort when the intra-uterine stem is inserted; also that the flow increases in quantity, and that they consequently feel greatly relieved. I have had patients who, after wearing supporters for months and years with permanent improvement in their condition, allowed me to remove them for a time, by way of experiment; but the pains soon returned and the patients came back with requests that the supporters be reintroduced. Other patients have journeyed long distances to consult me, bringing back their stem pessaries which other gynecologists would not introduce, and, after observing them for years, I have been convinced that their trouble during menstruation did not return. It would not be an easy matter to offer an explanation of the action of stem pessaries in these cases, but the following hypotheses are among those advanced: According to Schultze, endometritis and retention of the secretion are often the direct cause of posterior parametritis. This author states that uterine catarrh is by no means always associated with a profuse secretion, but that the latter may be small in quantity, vitreous and tenacious. It is therefore possible that small quantities of this thick, adherent secretion, unnoticed by the patient, do not pass away until the menstrual flow begins, and cannot be expelled without the peculiar bearing-down pains which so resemble those of labor. The stem pessary would then not only facilitate the flow of the menstrual fluid, but also prevent a stagnation of the secretion or, indeed, by causing slight hyperemia of the mucous membrane, even render the secretion more fluid and more easily discharged.

The second indication for the use of the stem pessary is the persistence of sterility after disappearance of the inflammatory symptoms. We know from experience that women sometimes come to the gynecologist on account of sterility, perhaps of many years' duration, are examined by the sound to ascertain the extent of anteflexion, and conceive in a few days after the application; possibly some obstacle to conception was removed by passage of the instrument. Others, again, who have suffered from profuse discharges, may conceive after cauterization of the diseased mucous membrane, because the fluid which destroyed the spermatozoids was no longer secreted. I have met with numerous examples of this kind, although the possibility of mere coincidence cannot be excluded. There are also many patients in whom sterility is evidently attributable to the anteflexion, and conception occurs either while the stem remains *in situ* or very soon after its removal. We must not conclude this to be *post hoc ergo propter hoc;* nevertheless, a method is entirely worthy of our attention which has proved its efficacy in numerous instances, and that, too, after various other methods of treatment were unsuccessfully employed, even though we do not understand its rationale in isolated cases. The action of the stem may be purely mechanical, as in the relief afforded in dysmenorrhœa, in facilitating the entrance of spermatozoids and subsequent conception; perhaps, also, it may be an irritant to the relaxed, torpid uterus and thus bring about a more complete development of the menstrual decidua, which is a better soil than the diseased mucous membrane for the development of the ovule. Again, the maturation and discharge of the ovules is favored by the permanent congestion which is produced by the supporter.

In the choice of a suitable instrument, I have long since abandoned a rigid stem, unyielding, with others which are fastened outside of the uterus. I only use one made of whalebone, 2 or 3 millimeters ($\frac{2}{26}$–$\frac{3}{26}$ in.) in thickness, and having on the lower extremity a horn plate two or two and a half centimeters ($\frac{4}{5}$–1 in.) in diameter. This material is very light, quite smooth, and the whole bone is somewhat flexible; it should be one or one and a half centimetres ($\frac{2}{5}$–$\frac{3}{5}$ in.) shorter than the uterine cavity, so that the point will not injure the fundus. The bulb upon the

end of the stem is vertical to the long axis of the latter and rests upon the posterior vaginal wall without causing any discomfort, which is more than can be said of the shield-shaped appendices sometimes attached to the shaft of the instrument. The use of cotton tampons to retain the instrument is superfluous.

The latter is introduced in the following manner: The bowels are thoroughly evacuated, the bladder emptied and the patient placed in the dorso-coccygeal or lateral position. The sound is introduced to measure the length and breath of the uterine cavity, and a stem is selected having a bulb corresponding in length, thickness and breadth. When the uterine cavity is large, a speculum may be employed, the stem passed through the external os while grasped by the forceps, and then held in place by a piece of cotton until the speculum has been withdrawn over it; then the index finger of the right hand is placed against the button and the stem pushed into the uterus, in a direction corresponding to the long axis of the cavity, until the button lies directly against the lips of the uterus. The patient should then arise, walk about the room, and, by stooping and other movements, satisfy the physician that the instrument has been properly retained.

When, however, the internal os is small and the cervical canal narrow, I usually introduce the sound to straighten the organ, and then pass the stem by its side until this reaches above the internal os. The index finger of the left hand is next pressed against the button while the sound is being slowly removed with the right hand. If the stem were not held in this manner, it would slip out with the sound. Resistance is generally felt at the internal os as the head of the sound is withdrawn, which must be gradually overcome by twisting the sound, always using gentle traction.

During the first few days after the introduction of the stem, the patient must remain quiet, not walk much, nor ride over rough roads, and, in particular, refrain from dancing or jumping. The instrument must never be inserted either just before or after menstruation; and when pain or discomfort is felt, even though it be transient, an examination is necessary to ascertain whether the stem has become displaced, and, if so, it must be pushed up

to its proper height in the uterus. If the uterine walls are sensitive or painful, the instrument should be removed for a short time and, after the symptoms have disappeared, be reintroduced.

With proper care and suitable choice of cases, the application of the intra-uterine stem is attended with no danger; but carelessness on the part of physician or patient may be the cause of great and long-continued suffering. The bad symptoms which may follow the use of this instrument are a profuse discharge, hemorrhage, colicky pains, parametric exudations, under circumstances also peritonitis. Of at least 50 cases treated in this way, in but two have I seen parametritis which I could attribute to the instrument. In both it had been worn a long time, and in one I was not asked to see the patient until after she had contracted the parametritis; recovery followed removal of the pessary. In the other I found the posterior uterine wall somewhat painful, as the patient had worn the supporter for months. I was about to remove it when she begged me to allow it to remain on account of her sterility, which had caused her much sorrow. She told me she had often had such pains, but they would spontaneously disappear. I granted her request, but was sorry for it afterward, as in a few weeks she came to me with a parametric exudation which disappeared only after protracted use of Franzensbad and Elster waters. While using the flexible regulators, I frequently saw slight grades of inflammation, but these invariably responded to treatment. The first thing to be done here is to remove the instrument; then put the patient in bed; have the bowels freely evacuated; place compresses upon the abdomen, and order rectal injections containing 10 or 15 drops of tincture of opium.

It is necessary again to allude to the fact that I employ the intra-uterine stem much less frequently than formerly, chiefly because I have learned to substitute for it in retroversion and retroflexion the Hodge and Schultze pessaries, and, again, because I recognize the fact that anteversion and anteflexion are most frequently due to extrauterine causes, and that as long as the latter are in force, intrauterine treatment of this kind is out of place. For this view, I am indebted, to B. S. Schultze and I hereby gladly acknowledge it.

To illustrate how much less frequently I adopt the method just

described, I will quote from the cases under my care at Rostock and at Dresden. At Rostock, of 1350 patients I treated 25 by the stem pessary, a proportion of 1 : 54, while at Dresden, of 5656 patients 26, or 1 : 218 : that is relatively not one-fourth as many.

Chrobak* adopted this method about 35 times in 4000 cases of flexion of the uterus and of amenorrhœa with torpidity of the organ. In one case only did a suppurative parametritis occur; in the others there was at most only a slight inflammation in which the result was really brilliant. Chrobak records a permanent cure of the flexion in only one case, but very often observed improvement in the removal of the dysmenorrhœa or amenorrhœa, migraine and other symptoms, an improvement, however, which continued only as long as the supporter was worn. He does not report his success in curing the sterility. In the monograph upon the subject which I published in 1872, the history of 5 patients out of 25 who had conceived after this treatment is recorded ; one, indeed, having become pregnant while the supporter was *in situ*. Of 26 patients treated at Dresden for dysmenorrhœa and sterility, none of whom had become pregnant, although married for many years, and subject to all kinds of treatment, three became pregnant after using the pessary.

When the instrument repeatedly slips out of position without making any other trouble, it may sometimes be retained by placing a rubber ring around the vaginal portion, or by applying a similar ring of thin rubber having a perforated diaphragm. I never attempt to secure the supporter by fastening it with a cord to an extrauterine pessary. On several occasions I have found a small but painful laceration of the vaginal wall caused by the button slipping down and pressing upon the soft tissues, the ulceration disappearing with the removal of the stem.

If the supporter causes no discomfort, I do not remove it until several months after the dysmenorrhœa has disappeared, or if the patient has become pregnant, when it may remain until about the middle of gestation ; or when her general condition has become permanently improved after using the pessary for years, or, finally, when its surface becomes roughened. The

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* *Loc. cit.*, p. 229.

majority of my patients wear it for about a year, and several have kept the supporter in the uterus for many years without having had it once removed. It is entirely unnecessary and even dangerous to remove it at each menstrual period; a putrid discharge would be the only indication for its frequent removal. The decomposing secretion may be prevented by injections of boracic acid solutions or other antiseptic fluids.

Historical.—It appears that Moeller first recommended treating uterine flexions by means of a flexible metal staff about 1803, and in 1808 Osiander replaced a retroflexed uterus with his dilator. About 1828 Amussat expressed the opinion that flexions might be cured by the use of a small straight ivory stem which was to be passed into the uterus. In 1848 Simpson and Kiwisch simultaneously, and in 1853 Valleix began the same plan, the last stimulated by the former pursued it further. Valleix's large list of cases containing brilliant successes but also marked failures, in some a fatal result occurred, produced the first reaction against this practice. In consequence of the the fatal cases Broca and Cruveilhier reported to the Academy of Medicine in Paris, a commission, under the chairmanship of Depaul, was appointed to report upon this method of treatment. The verdict was to the effect that the various intrauterine pessaries were useless, and at the same time dangerous and were therefore to be discarded. A similar decision was rendered by the Gynecological Section of the Congress of Scientists in Vienna, in 1856: "In the interest of woman and humanity, all teachers should endeavor to banish this practice from the profession." Notwithstanding this opposition, the method gradually came into more extensive use until 1868, when another such unfortunate decision was rendered in Dresden. At the present day, however, there are many who consider this method indispensable for certain cases. Its advocates are found in Germany, England, France, Russia, Sweden and America, though, as with all new methods and remedies, it is used less frequently than formerly, and only in carefully selected cases.

5. *Retroversions and Retroflexions.*

Definition.—When the fundus of the uterus is displaced upward and backward to such a degree that the axis of the body of the organ forms an obtuse angle with the axis of the pelvic inlet, we speak of it as being a *retroversion.* If a bend or angle coexists upon the anterior surface of the uterus, there is a *retroversion with anteflexion.* If the organ is bent upon its posterior surface the condition is called retroflexion. The degree of dislocation, determined by the relative height of the fundus compared with the level of the os uteri, may be slight when the former is higher than the latter; moderate, when both are at the same level; or great, when the fundus is below the level of the external os. A more exact classification has been suggested by Schultze, viz., to name each position by the lumbar, sacral or coccygeal vertebra in front of which the fundus of the uterus is found, and at the same time to designate the position of the vaginal portion or the uterine os by certain fixed points in the true pelvis.

Historical.—In the work of Cornarius,* entitled "de morbis muliebribus," II, p. 365, we read as follows: Si vero ad sedem convertantur uteri secessus excrementa impediuntur et dolores occupant lumbos et imum ventrem et intestinum rectum ac podicen, so it is very probable that the anterior and posterior curvatures of the uterus were known to the Hippocratic physicians. Also in a passage in the Harmoniæ gynæciorum,† II, p. 104, Cap. V, de matricis inclinatione is thus spoken of: Si vero in priora et sursum facta est inclinatio, tensionem supra pectinem sentiet et urina impeditur. Si vero recto se plus jussum et retro inclinaverit stercora cum vetositate exeunt et cum ingenti difficultate mulier sedet, vel maxime si ad anum facta fuerit inclinatio. This passage was evidently written by Ætius, whom Leonidas, of Prague, believed to have first known retroflexions and retroversions ‡ Still it is probable that the old writers under the named inclinations referred only to the pregnant uterus. It is said that

* Hippocrates, "Opera omnia," Basel, 1546.

† Basel, 1556; "Cleopatra and Moschion."

‡ *Neue Zeitschrift für Geburtskunde*, XXIX, p. 219–246.

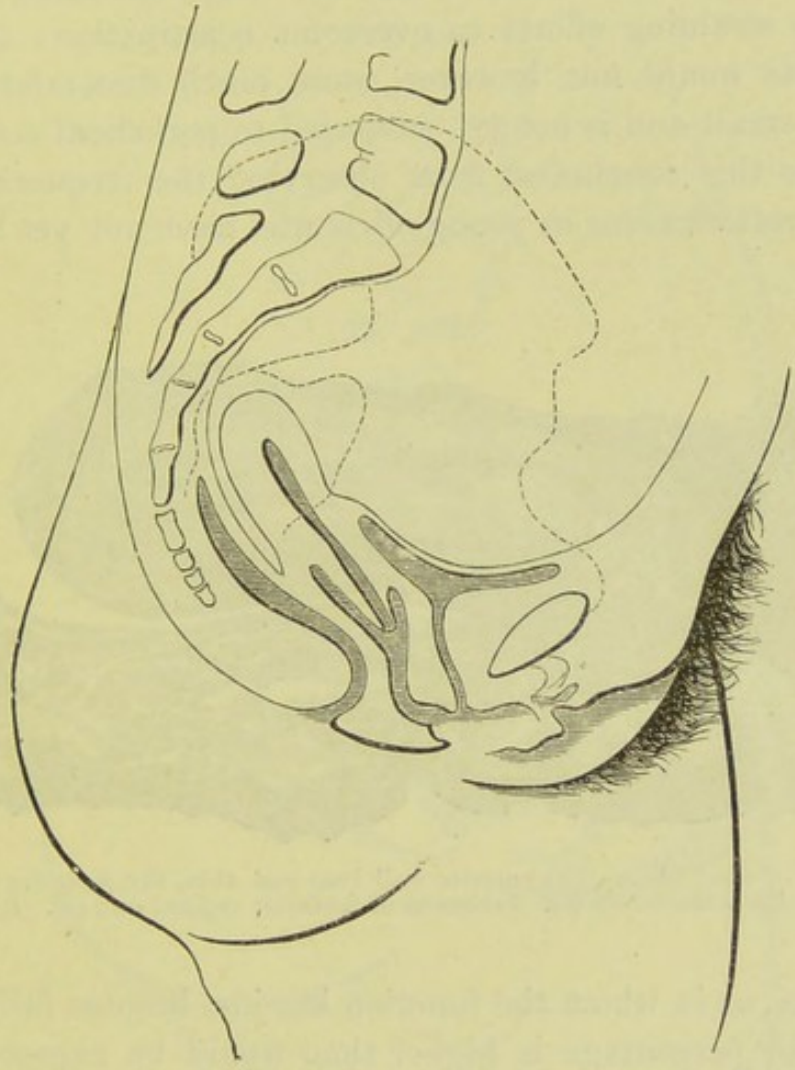
Kulm and his pupil Reinick first demonstrated retroversion of the gravid uterus in the dead subject in 1732. The versions and flexions of the non-gravid uterus, however, remained unrecognized until a much later period, Saxtorph, in 1775, and P. Frank, in 1786, having accidentally found them in the cadaver. Schweighäuser, in 1817, published his observations upon a number of cases of retroflexion in the non-gravid. At first anteflexion was known as pronatio, and retroflexion as supinatio. Treatises upon these displacements were written by W. S. Schmidt, of Vienna, in 1820; by Sommer, of Giessen, in 1850; by Rockwitz, of Marburg, in 1857; by Duncan, of Edinburgh, in 1854; by E. Martin (Berlin, 1866, ii aufl., 1870), and V. Hueter (Marburg, 1870). In the last named work there is a very complete bibliography. Congenital retroflexion was first found by Saxtorph in 1775, next by T. S. Lee in 1849, and then by myself in 1873, and C. Ruge (in 2 cases), Berlin, 1877.

The frequency of retropositions: If we attempt to determine this by studies upon the dead subject, we must include only the cases in which the position was permanent; such are doubtless those in which the fundus of the uterus is more or less adherent to the anterior wall of the rectum, and so I found in more than 600 cadavers 4.3 per cent. to have had retroversion, and 5.7 per cent. retroflexion, a total of 10 per cent. of retropositions. This is a low average, as it includes none of the most frequent of all retropositions, *i. e.*, those in which the fundus is not posteriorly adherent. It is therefore at once apparent that retropositions are very frequent. B. S. Schultze found an average of 10 per cent. of retroversions, and 17.2 per cent. of retroflexions in his own practice, or more than twice the above percentage. Previous to 1880, I had observed 609 retropositions in 3061 clinical and polyclinic patients, a total of 19 per cent., but during the last four years the proportion has been much higher. On the other hand, in Dresden, I observed 16 per cent. only in 5665 private patients, which differs from Schultze's statistics. Moeller's statement of 20 per cent. of retropositions is nearly the same as mine.

Ætiology.—Posterior displacements of the uterus may be congenital, so that their origin is probably connected with incomplete development of the anterior or posterior uterine wall. In Ruge's

very instructive case, the anterior wall just above the internal os was only 0.1 centimeter ($\frac{1}{25}$ in.) thick, the posterior wall 0.5 centimeter* ($\frac{1}{5}$ in.) in thickness. In another case, Ruge found a thinner anterior wall, but, excepting the congenital origin, there was no apparent cause for the retroflexion in either case. I have

FIG. 41.



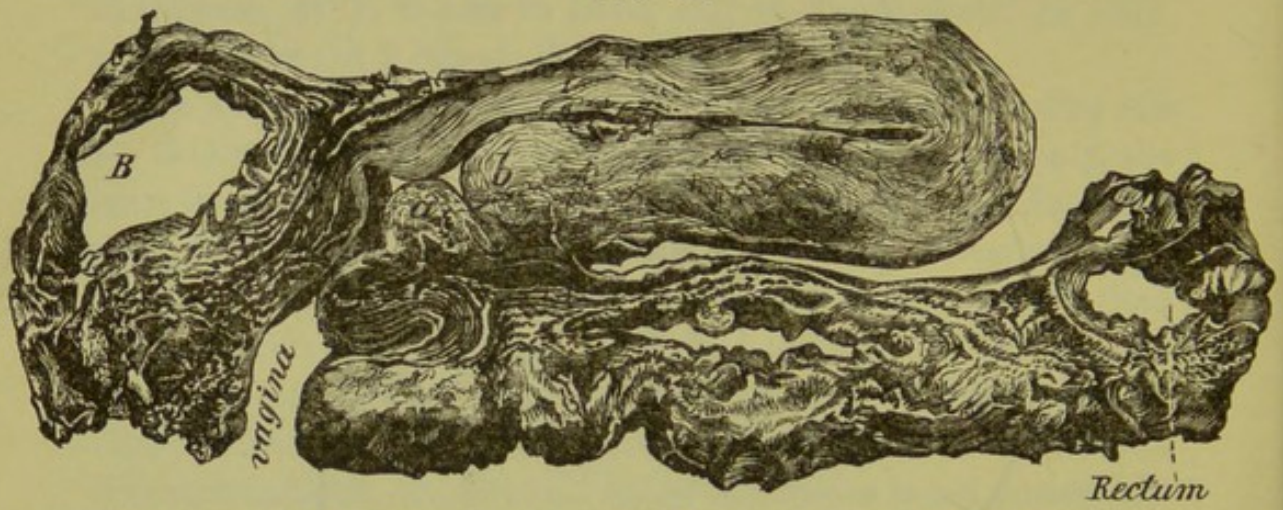
Retroversion of the Uterus due to Arrested Development. Puerile variety.—*B. S. Schultze.*

seen 4 cases of congenital retroflexion, in the last two of which there was a thinning of the anterior wall, though comparatively slight, of 0.3 to 0.5 centimeter ($\frac{3}{25}$ to $\frac{5}{25}$ in.). In one instance I made the important discovery that the rectum entered the pelvis to the right instead of the left and posterior to the uterus, so that

* *Zeitschrift für Gebh. u. Gynäkol.*, II, 1878.

when the bladder was filled, the uterus was pushed backward and to the left. When alluding to this case in my Atlas, in plate i, page 122, I added the statement that it seemed to me that retroflexions occurred quite frequently during infancy, when the cervix is large and the body of the uterus smaller, softer and more pliable, from the powerful, long-continued pressure, such as constant over-distention of the bladder, abdominal pressure in severe straining efforts to overcome constipation; such displacements would not, however, cause much discomfort, as the uterus is small and is not yet subjected to periodical congestion. I came to this conclusion from observing the frequency, 8 per cent., of retroflexions in young girls who have not yet begun to

FIG. 42.

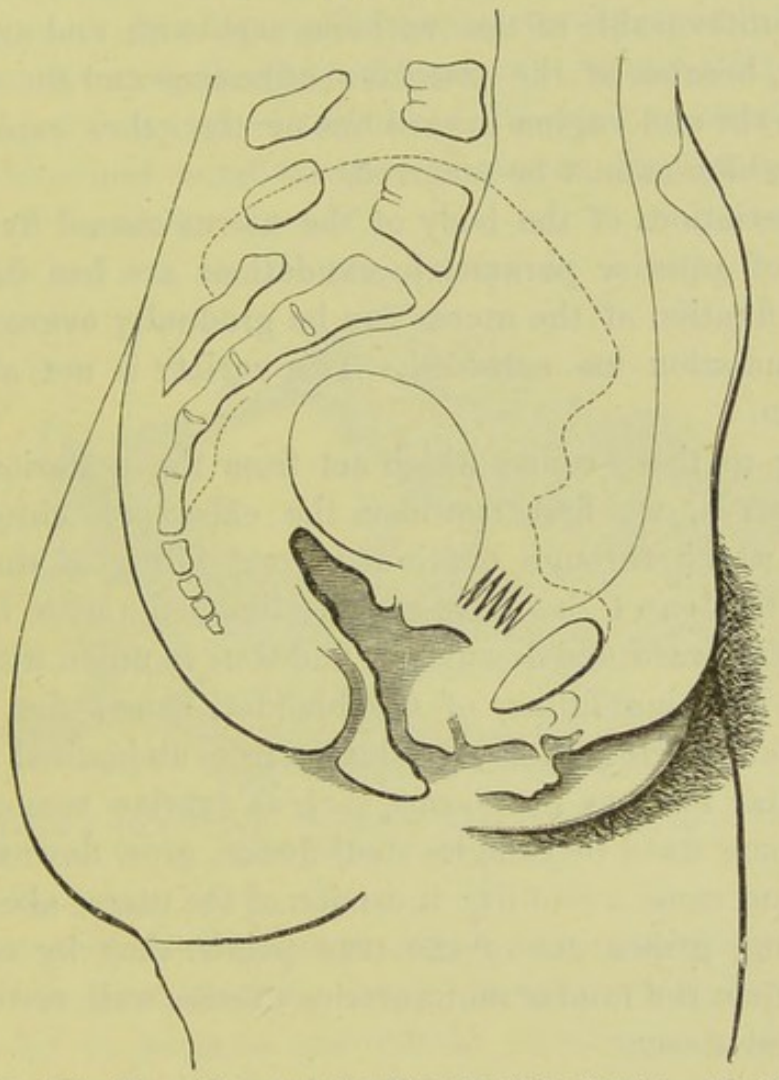


Retroversion of the Uterus. The anterior wall long and thin, the posterior wall thickened below the posterior lip (*b*). Inversion of posterior vaginal wall (*a*). B, bladder.

menstruate, or in whom the function has just become fully developed. This percentage is higher than would be expected from the infrequency of congenital retroflexions. B. S. Schultze attributes puerile retroflexion chiefly to congenital shortness of the anterior vaginal wall; whence it follows that distention of the bladder which would but slightly displace the uterus under normal conditions, completely retroverts it in such a case as has just been described. He further adds that a similar effect is produced by senile atrophy of the genitals, which is often associated with shortness of the vagina, while the capacity of the bladder remains unchanged.

I had previously alluded to the fact that concentric hypertrophy of the wall of the bladder as well as a constantly greatly distended bladder which in one case had lifted the peritoneum from the anterior uterine wall almost to the fundus, must eventually force the uterus into a retroverted position.* At the same place in the book quoted, I have described another source of

FIG. 43.



Retroflexion of the Uterus from Anterior Fixation of the Cervix.—*After B. S. Schultze.*

retroposition found in the anterior pelvic wall, as follows: When instrumental deliveries, such as extraction with forceps before complete dilatation of the os, or *accouchement forcé* in placenta prævia, have lacerated the vaginal vault and cervix, and the

* Atlas, p. 124 and 125, and plate xix, Fig. 3.

anterior lip has become distorted from cicatrization, so that the vaginal portion is drawn up against the anterior pelvic wall, the bladder will gradually force the body of the uterus backward. The inflammatory processes which almost invariably follow such injuries confine the patient in bed where she lies in the dorsal position, and this favors the drawing of the cervix to the anterior pelvic wall, and promotes the formation of adhesions between the uterine fundus and the rectum. These are among the most unfavorable of the varieties met with and are usually incurable, because of the extensive adhesions and the distortion of the cervix and vagina toward one or the other ramus of the ischium, which cannot be removed.

Retrodeviations of the body of the uterus caused by the contractions of anterior parametric exudations are less dangerous. Here the fixation of the uterus can be gradually overcome after the inflammation has subsided. This variety is not altogether uncommon.

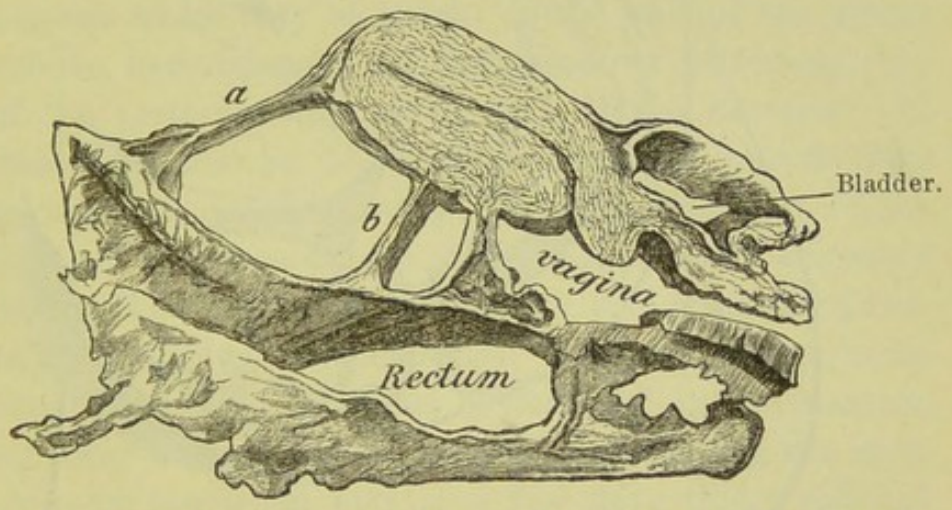
Passing to those causes which act from the posterior surface of the uterus, we first consider the effects of chronic constipation, which through continued great filling of the rectum produces tension of the sacro-uterine ligaments with forcing of the cervix forward and downward, and thus in union with always frequent returning fulness of the bladder, causes first a retroversion, which changes to a retroflexion from abdominal pressure. In a similar manner neoplasms, such as ovarian tumors which have become fixed in Douglas's cul-de-sac, grow downward and forward and cause a roof-like inversion of the uterus above them; after having grown out of the true pelvis, they by continued pressure upon the fundus and anterior uterine wall, retrovert the body of the uterus.

But the most frequent predisposing and direct causes are pregnancy, labor and the puerperal state. The relaxation, elongation and traction upon the sacro-uterine ligaments, in the unyielding deeply forced mouth of the womb, the not inconsiderable lesions of the cervical canal and lips of the uterus occurring even in normal labor, the frequent inflammatory processes which lead to contraction of the muscular wall in parts, the weight of the uterus at the time when women usually get

up (more than 400 grams), all these causes, and yet various others acting with them, as the frequent troubles in defecation and urination, produce relaxation of those most important ligaments, the sacro-uterine. This tendency is greatly increased by miscarriages, and by neglect of or attempts to conceal the puerperal condition. The number of abortions which I have observed in such patients, 9 per cent., is quite considerable.

10.9 per cent. of all posterior displacements occur in nulliparæ and the unmarried, of which 4.4 per cent. are in sterile women. We here notice a very considerable difference as compared with anteversions and anteflexions. Moreover, they are found in

FIG. 44.



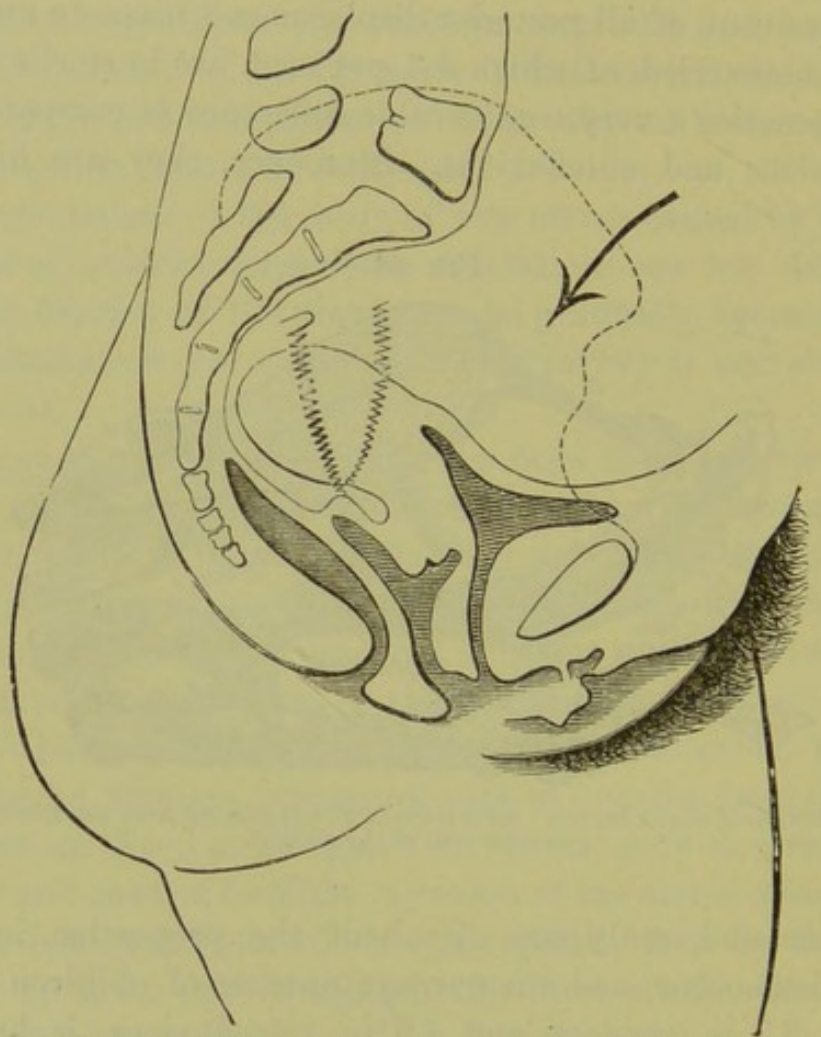
Retroflexion of slight degree. Adhesions (*a* and *b*) passing from the fundus and posterior wall to the rectum.

primiparæ and multiparæ in about the proportion in which anteflexions occur, and the average number of children of such patients, 3.7 in versions and 4.0 in retroflexions, is but little below the average of the women of Saxony and other countries.

26 per cent. of all posterior deviations are associated with chlorosis and anemia. These conditions are in many instances caused by the catarrh, menorrhagia, pain and inflammation which are present; but, on the other hand, chlorosis and anemia tend to relax the supports of the uterus, cause disappearance of the adipose tissue and produce constipation, and even make the uterus more relaxed and flexible.

Again, masturbation predisposes to these displacements by relaxing the uterus and increasing the loss of nutritive fluids. Hildebrandt reports finding 7 retroflexions in 12 girls who were greatly addicted to this vice. The same author considers impotence of the husband to be a cause, in so far as it predisposes to relaxation of the uterine supports. But when he reports 14

FIG. 45.



Relaxation of the Sacro-Uterine Ligaments. Retroflexion of the Uterus.—*After B. S. Schultze.*

retroflexions occurring in 20 women with impotent husbands, I consider this frequency a simple coincidence, for I could find as many women with impotent husbands, and not a single case of retroflexion among them. With regard to puerperal retroflexions, I found many apparently due to protracted, exhausting labors in young primiparæ or to rapidly repeated labors. Doubt-

less the displacement may also result from exhausting hemorrhages during the third stage of labor or soon after, or from protracted nursing in weakly mothers. We found 12 per cent. of reclinations in women with pelvic exudation, but only 4.2 per cent. in those in whom there was no exudation, in a total of 200 puerperal women.

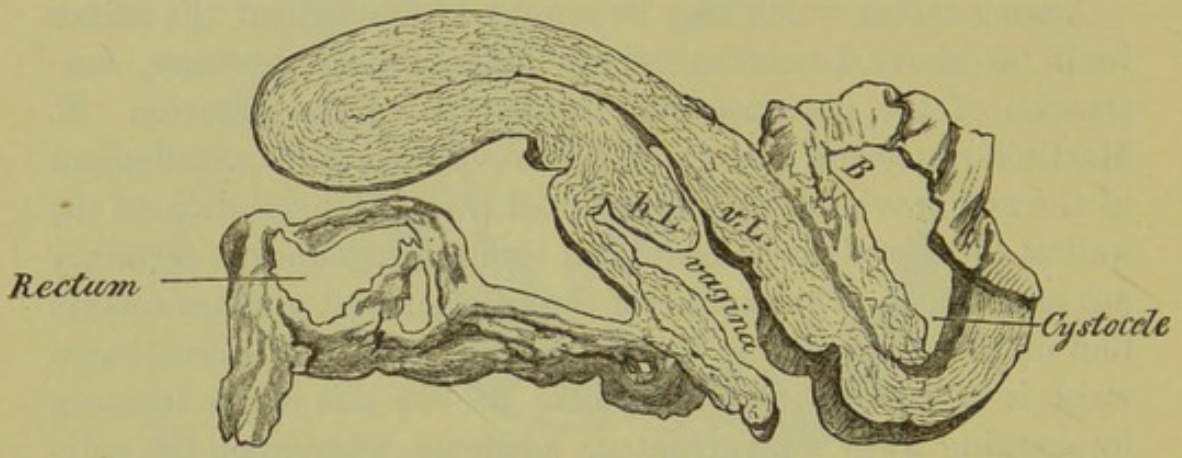
B. S. Schultze has described another variety of retroversion, which might be more exactly termed "retroposition with elevation of the uterus;" these are cases in which the cervix is fixed high up and posteriorly, from excessive shortening of one sacro-uterine ligament with simultaneous retroversion of the rigid uterus, the fundus being above the true pelvis. With subsidence of the chronic metritis the cervix being fixed, anteflexion may occur; if the fixation be overcome, anteversion may result.

Among causes which may be sought in the wall of the uterus itself (as above, hemorrhages) are inflammatory processes, contraction of the posterior wall, elongation of the anterior. E. Martin's statement that in 338 retroversions and retroflexions of the non-gravid uterus 230 resulted from sub-involution of the wall at the site of the placenta of a former pregnancy is certainly not established. That tumors of the anterior wall produce relaxation of the sacro-uterine ligaments and force the uterus backward is beyond question. Schultze proved this in one instance by scraping away a myxomatous adenoma, whereupon the anterior wall became shortened, and in a few days the retroflexed organ was anteflexed.

Anatomical Changes in the Uterine Walls.—Backward dislocation of the body of the uterus causes, primarily, a shortening of the anterior vaginal vault and a deepening of the posterior. Upon section of the retroverted uterus, we constantly find the anterior, now the upper, wall longer and thinner than the lower. In some instances the posterior wall is twice the thickness of the anterior. The uterine cavity is by no means always distended nor is the mucous membrane swollen nor the peritoneal covering of the uterus changed. Sometimes the peritoneum may pass lower down the anterior wall, almost to the level of the external os. In old retropositions we find thickening, flabbiness and formation of cysts in the cervical mucous mem-

brane, dilatation of the entire uterine cavity and roughness of the peritoneum due to perimetritis. In retroflexions the thinning of the anterior wall is progressive, the anterior lip becoming so completely effaced that it ceases to project into the vagina, while the posterior lip appears to be thicker and larger, as in Fig. 46. At the angle which corresponds to the internal os, the uterine mucous membrane is not thickened nor changed, with the exception of the presence of occasional follicular cysts. In retroflexions the posterior wall is thicker than the anterior. From the cases which I have examined I conclude that it is always the anterior wall which is elongated and thinned; even in retroflexions of a high grade there is seldom any diminution in the

FIG. 46.



Puerperal Retroflexion. Cystocele of the second degree. The anterior wall of the uterus elongated, the entire posterior wall thickened. B, bladder.

thickness of the posterior wall (see Figs. 42, 44 and 46). This does not agree with the descriptions given by other pathological anatomists. Klob states that the posterior wall of the retroflexed uterus is firm and thick, while the cervical portion is often much relaxed, a statement which I could not verify in the majority of cases, and that the submucous layer of connective tissue at the angle in the region of the posterior curve of the internal os is relaxed and soft and, in some instances, even swollen into ridges or folds. Klebs and Virchow regard the changes of the posterior wall as a consequence of the angulation. The former states: "The muscular fibres on the concave side of the angle disappear, and the uterine wall at that point consists of a

whitish connective tissue which usually contains large vascular channels." In the very numerous anatomical examinations made by me, however, I have not in a single instance found such a condition. Klebs further remarks that the changes at the angle, which weaken the resistance of the wall, may result from the formation of a great number of the Nabothian follicles, which cause an atrophy of the muscular structure in the region of the internal os, thus agreeing with Rokitansky's view, which attributes flexions to disappearance of the submucous stratum; but the anatomical facts are certainly against this view. Many gynecologists, among whom are Scanzoni, Tilt and Hodge, assert that there is fatty degeneration or atrophy of the tissues at the angle, but Robin and Virchow, with whom I fully agree, were unable to demonstrate such a change in the muscular tissue. In young patients Virchow found the connective tissue, vessels and muscular bundles at the angle perfectly intact, while the mucous membrane soon became hypertrophied, pale and firm, so that the entire internal os was surrounded by small cystic follicles, at a time when the remaining mucous membrane of the cervix and body was unchanged.* I have often found these follicles, but, as my numerous sections and illustrations show, not exactly at but below the internal os. Beigel examined three cases of the severer forms of flexion and was unable to discover any muscular elements, but found the elastic fibres undergoing fatty degeneration and the vessels obliterated. I confess to having been much astonished at this statement, never myself being able to see anything of the kind. In my opinion all the changes which I have described indicate that they are not causes but simply effects of the dislocation, and herein I am able to confirm Schultze's statement, viz., that in retro-deviations the most frequent causes are to be sought externally to the uterine walls.

Associated with the uterine displacement, there is a tension of the broad ligaments which become rotated about their transverse axes, their outer extremities passing to the pelvic wall on each side. The infundibulo-pelvic ligament is even more distorted, and if sufficiently yielding, one or both ovaries may be pulled

* "Gesammelte Abhandl.," 1862, p. 826.

down into Douglas's cul-de-sac. This displacement is of great significance in the symptomatology of retroversions and retroflexions.

Displacement of the cervix forward will cause traction upon, bending or compression of the ureters, consequent retention of urine and dilatation of these ducts and of the pelves of the kidneys.

Adhesions between the fundus and the posterior pelvic wall or rectum are not usually present; that they may, however, become frequent complications is attested by numerous preparations in my possession, as the plates in my Atlas show.

When we consider the great frequency of retrodeviations of the uterus, we will not be surprised to find that they are associated with a variety of complications. This will be illustrated by the results of twenty-four autopsies, in which I found one double parovarian cyst, four myomata, four ovarian cysts, one senile hematometra and, of greater significance, three varicoceles of one or the other broad ligament. In one case the varicocele was as large as a hen's egg and was connected with a small tumor of the right ovary, but did not seem to be caused by the latter. This tumor of the broad ligament appears to me to have considerable significance, as it might be confounded with dilatation of the ureters, or because menstrual disorders might ensue and hematocele result from the phlebectasis.

The symptoms of an acute retroversion or retroflexion, it will thus be seen, are very similar to those of descent and prolapse of the uterus. The pressure upon the bladder and rectum and the sacral and lumbar pains will be greater according to the larger size of the organ, the more fixed its displacement, and the greater the force by which it was produced. It is usually the subinvoluted puerperal uterus which is pressed into and remains fixed in the pelvis; we must, therefore, expect to see great weakness, general abdominal pain or severe hemorrhage in such a case. In the non-puerperal uterus the prominent symptoms of acute retroversion, such as weakness in the lower limbs and inability to walk, are decided.

The condition is, however, usually of chronic origin. If the displacement has occurred during infancy, the symptoms will

manifest themselves about the time of puberty or with each recurrence of menstruation. In such patients the menses, as in parous women, are more profuse and longer continued, and they return at shorter intervals than in healthy persons; at times they may even be menorrhagic. In the primary, congenital forms, occurring in virgins, the flow is but little if at all increased; but, as a rule, it soon becomes profuse, the passive hyperemia of the uterine walls leading to swelling of the mucous membrane and dilatation of the veins. From the stasis result catarrh, follicular distention, retention of secretion and polypus-like prominences upon the mucous membrane; furthermore, through dislocation of the ovaries, the uterine congestion is rendered more frequent and protracted. The dislocated ovaries are predisposed to inflammatory processes from changed anatomical relations, disturbed circulation and from the pressure to which they are subjected by the uterus and rectum; they also become painful, very sensitive, attacks of pains shooting in all directions occurring during menstruation and defecation. Discharge of blood is frequently prevented in retroflexion of the uterus, so that the menstrual pains which are so generally present are to be considered as due to the obstructed flow; they are less severe when the flow is profuse but may return like labor-pains and sometimes become so severe that convulsive symptoms follow. It can, however, easily be shown that some of the discomfort must be referred to the inflammatory processes in the surrounding tissues.

With regard to conception and fertility in women suffering from retrodeviations of the uterus, there is a marked difference between these displacements and antedeviations, as in the former the number of sterile is smaller, the proportion of births greater, and abortions are less frequent than in anteversions and anteflexions. In antedeviations 28 per cent. were sterile; the proportion of births was 2.6 per cent., and abortions occurred in 22 per cent.; in retropositions 10 per cent. were sterile; there were 3.7 to 4.0 per cent. of births, and abortions occurred in 9.4 per cent. only. Schultze states that "conception may indeed occur even more frequently in the retroflexed than in the normal uterus, because this condition favors early cessation of pregnancy." Secondary sterility very often results from the catarrh, hemorrhage, perimetritis and

dislocation of the tubes and ovaries which follow retroflexion. In 250 polyclinical patients with retrodeviations, in whom the number of births was carefully noted, there were 736 births at term and 68 abortions; 30 had aborted once, 14 twice, and 6 thrice or oftener. According to the number of labors, the proportion of retropositions of the uterus was in primiparæ, 20.9 per cent.; pluriparæ, 54.8 per cent.; and multiparæ, 24.3 per cent. The proportion in the antepositions was in primiparæ, 22.1 per cent.; pluriparæ, 55.4 per cent.; and in multiparæ, 22.5 per cent. The differences between these series were so small as to be unworthy of further consideration.

A very common symptom is hypersecretion of the uterine mucous membrane. This is of a serous, mucous, purulent or putrid character; there are erosions and ulcerated spots especially on the posterior lip, and occasional traces of blood greatly distress the patient. In nulliparæ the discharge is usually slight, while in the relaxed, puerperal and, perhaps, retroflexed uterus it may be quite abundant. Hildebrandt evacuated by aspiration several grams of thick mucus from the uterine cavity. The hyperemia, erosions and ulcerations cause great sensitiveness of the uterine walls, so that many patients recognize every movement of the uterus. Even intelligent patients have attributed the sensations to the movement of a child or of some animal, as a tapeworm. From these sensations, together with the swelling, tension and pain in the breasts, which are not uncommon in retrodeviation, the patients think that they are pregnant, and it is often difficult to persuade them of their error. Some of these symptoms are due to displacement of the hypersensitive uterus, from distention of the bladder or rectum, and others are dependent upon the above-mentioned ovarian and tubal dislocations, or perhaps are to be attributed to meteorism and motion of the intestinal contents. Again, in perhaps a much larger proportion of instances than we just now are prepared to admit, small myomata develop within the uterine walls and, either as causes or as effects of the dislocation, share in producing these sensations.

When the vaginal portion is in the median line and thrown forward, the bladder is compressed in the region of its internal orifice; when the portion is not fixed, but is lower down, or at

the side, there are no vesical disorders. Only 15 per cent. of our patients complained of such disturbances. Infiltration and occasional insufficiency of the detrusor muscle may be caused by distortion of the peritoneal covering of the uterus or by inflammatory affections between it and the uterus. Hildebrandt believed that compression or bending of the ureters by a retroposition would cause dilatation of these tubes with hydronephrosis, and that in this way round or cylindrical tumors as large as a child's head were produced above Poupart's ligament on one or the other side, the contents of which might disappear when the patient was recumbent, and form again when she was erect. As the urine thus retained could not flow away, the tenesmus was not relieved by evacuation of the bladder. I have never seen anything like this either in the dead or living subject; true, I believe that such a condition is possible, but it must be extremely rare. Schultze also considered obstruction to the passage of urine infrequent in retroflexion, while catarrh of the upper urinary passages, or even nephritis, was quite common.

Disorders of defecation are, however, more frequent. They manifest themselves as rectal tenesmus and a feeling as though some obstruction was present in the bowel. Anxiety preceding defecation and constipation are common. Convulsive manifestations, syncope, flatulence, distention, excessive peristalsis and such gastric disorders as pressure, eructation, anorexia and cardialgia form part of the symptoms.

The nerve plexus on the posterior pelvic wall is occasionally subjected to pressure by the retroflexed uterus. A paralytic weakness of the lower extremities, found in 5.6 per cent. of cases, may be a direct effect of this pressure. Olshausen stated that rapid improvement in locomotion often followed treatment by the sound, and E. Martin likewise asserted that the symptoms disappeared as soon as the uterus was elevated. These symptoms consist of pain and fatigue in the lower limbs on the slightest exertion, or in a feeling as though a felt sole was placed under the foot; they are certainly not always and probably never due to direct pressure upon the nerves, for the latter are well protected, and, further, a compression exerted by the uterus is hardly possible. It seems to me that the pains are partly reflex, due to

the coccygodynia and pain in the back, and partly to retroperitoneal inflammations which have extended to the nerves. In one instance E. Leyden ascertained a neuritis to be the cause of the disordered sensation and motility.

In old retrodeviations the constitution of the patient is perceptibly affected; she is probably anemic and pale, has dark rings about the eyes, and suffers with migraine and hysterical attacks. The most severe symptoms are the globus and clavus hystericus, the cold hands and feet, great excitability upon disturbance or noise of various kinds, pressing pain and weakness in the eyes, burning of the lips, cheeks and point of the tongue. Notwithstanding these annoyances, many patients look well, and indeed appear to be in the best of health, it being one of their greatest trials that their friends think them perfectly well when they are themselves feeling most miserably. This is one reason why they sometimes avoid society, fearing their complaints are not believed, and this makes them melancholic. I have lost several such patients from suicide, and the number of those who fear insanity or really show signs of mental disorder is not inconsiderable. Schultze has called particular attention to this point. Observant patients declare that as soon as the uterus is brought into its normal position and fixed there by some instrument, the pressure in the head and the disturbed thoughts instantly disappear, and that they become conscious of a new retroflexion by the return of these symptoms.

In every case, therefore, of general nervousness, hysteria and chlorosis, a thorough examination of the pelvic organs must be made and, as Schultze has said, the same course should be taken with patients who are sent to asylums for nervous and mental diseases.

Diagnosis.—As a rule, the position and shape of the uterus may be accurately ascertained by bimanual examination through the vagina, rectum and abdominal wall, the patient being in the dorsal position and the bladder and rectum empty. When the orifice in the hymen is very narrow, the examination may be made through the rectum. The beginner should at first press his hand gradually backward between the recti muscles above the umbilicus until he plainly feels the pulsation of the aorta. The left

hand is now carried down to the point of bifurcation, which is just below the umbilicus, and thence downward along the vertebræ to the promontory of the sacrum. This hand is now laid flat over the pelvic inlet while, with the right, the position of the vaginal portion, the condition of the os uteri, the length of the lips and their comparative thickness, the direction of the external os, and the dimensions, tension and relations of the vaginal vaults are ascertained. The whole uterus should now be lifted up against the hand which is over the pelvic inlet, and the fundus will press against the abdominal wall, so that when it lies in the normal position or is anteflexed, it may be raised by the fingers. In retrodeviation, however, this is impossible. If one hand is now passed along the posterior wall of the uterus, while the other presses the abdominal walls inward and toward the cul-de-sac, the body of the uterus may be palpated, grasped from behind and drawn over upon the anterior vaginal wall.

Thus it will be seen that, in very many simple cases, neither the sound nor other methods of examination are essential. When the vagina is firm and narrow, the index and middle fingers of the right hand must be passed into the rectum. As long, therefore, as no complications are present, the introduction of the sound is not essential to the diagnosis of the position but only for measuring the length and breadth of the uterine cavity. The sound is necessary when tumors in the pelvis have displaced the uterus, or when its position cannot be accurately determined without the use of an anesthetic; it should then be carefully introduced in the supposed direction of the uterine cavity and with its concavity directed backward.

The retroverted or retroflexed uterus may be confounded with any of the tumors which may be behind that organ. An accurate history of each case will usually exclude a number of these neoplasms, but still in many instances we will be obliged to employ anesthesia, and pass two fingers or half the hand into the rectum to aid in the diagnosis. In retroversions and retroflexions a tumor will be felt which is globular, somewhat compressible, non-fluctuating and often quite painful; it will not usually fill Douglas's cul-de-sac; motion of the tumor is transmitted to the vaginal portion, and, as a rule, an ovary as large as an almond

or a plum may be distinctly felt upon the right or left side, and its ligament traced to the uterus. It often seems as though the posterior wall of the uterus were thickened or contained a tumor, but reposition will usually remove this impression.

If it be desirable to demonstrate the position of the empty uterus to the young physician who has been unable to satisfactorily make out the retrodeviation, his right hand may be placed under the instructor's left, and the fundus elevated from within so that it can be felt; or the vaginal portion may be engaged in a Cusco's speculum, and the sound introduced, at first with the concavity directed to the side, and then turned posteriorly and the handle elevated when the internal os has been reached. After the sound has been introduced, any adhesions of the fundus posterior may be demonstrated by withdrawing the speculum, turning the sound about its long axis, and thus elevating the fundus against the abdominal walls until the hand can be passed to its posterior surface. If the uterus can be easily fixed over the anterior vaginal vault, and does not immediately return into retroposition, we conclude that no adhesions are present, or at least that they are long and yielding. But when the hand cannot be passed behind the uterus, and the organ falls back directly after being released, we may rest assured that the adhesions are short, firm and unyielding. The diagnosis may be made more certain by following Schultze's suggestion to dilate the uterine cavity with laminaria tents until it becomes wide enough to introduce the finger to the fundus. The posterior wall is then palpated by the one hand in the rectum while the index finger within the uterine cavity draws the organ away from the rectum. To prevent repetition, the differential diagnosis of retroflexion is fully referred to in the chapter on the diagnosis of ovarian tumors.

The **prognosis** will depend upon the causes, complications, duration and degree of the retroflexion, and the age and constitutional condition of the patient. After the menopause retroflexions do not usually require treatment, or, at most, only when the vagina is wide and relaxed, and the displacement is the real cause of the discomfort. The symptoms usually improve with the cessation of menstrual congestion, the uterus growing smaller,

thinner, and its sensibility is diminished; furthermore, a mechanical treatment is more difficult on account of senile stenosis of the vagina and the thinness of its walls. For the same or similar reasons, the instruments which are most suitable cannot always be employed in young girls, or if congenital or cicatricial stenosis of the vagina be present.

With regard to the causes and varieties of retrodeviation, the puerperal forms are certainly the most favorable; in more than two-thirds of all cases, complete cure can be secured, even when adhesions have formed, provided they are not too numerous. Retrodeviation from cicatricial distortion of the vaginal portion or from extensive perimetritic adhesions is incurable.

I have often found retroflexions become worse after repeated pregnancies and labors, so that a larger instrument was required to retain the uterus in position. On the other hand, B. S. Schultze observed retropositions to be permanently cured by early reposition and retention of the puerperal uterus by a pessary.

The condition of the vaginal mucous membrane influences the prognosis to the extent that there are patients in whom this membrane is so sensitive that the introduction of any instrument is liable to cause an inflammation, so that mechanical treatment is greatly interfered with. Small and painful ovarian tumors may likewise temporarily hinder instrumental treatment. A certain amount of resolution on the part of the patient is essential to perfect recovery. The idea of wearing an instrument for a long time is repulsive to many women, and this repugnance is often increased by the influence of their friends and husbands; the sooner, however, that this feeling is overcome, the better. Many will complain and come to the physician from time to time with the request that the instrument be temporarily removed by way of experiment, but, as a rule, even in favorable cases, the pessary must be worn for years.

Treatment.—The prophylactic treatment calculated to prevent either the development or recurrence of retropositions will depend upon the various causes, and especially upon the puerperal processes.

As young girls are often affected with these displacements, it

devolves upon the family physician to carefully watch over them at the time when menstruation first appears. All anomalies of the function, such as pain, irregularity in the intervals, profuseness and too frequent recurrence, should receive immediate attention. Mental and physical rest should be enjoined during the flow, and playing the piano for hours, singing and hard study are objectionable, but above all, exhausting exercise, gymnastics and dancing should be avoided.

Young wives who have miscarried must consider themselves as being in the puerperal state, and invariably remain in bed for nine days, instead of simply observing the precautions usually advised during menstruation.

At all times women and girls should attend to regular evacuation of the bladder and rectum, for this will do much to prevent retrodeviation.

If symptoms of displacement have already appeared, young girls should be made to understand the necessity of genital exploration. If no displacement is found, so much the better; otherwise, at least no time will have been lost in inappropriate and superfluous treatment.

When, after a retrodeviation has been diagnosticated, it is seen that the uterus may be returned to its normal position, this should be done at once; for, as the inflammatory complications are usually the effects and not the causes of the displacement, the normal position of the uterus is the best protection against them. Parametritic exudation or perimetritis will require, if present, suitable treatment before beginning the mechanical cure of the retroposition. Such cases are, however, exceptional, and in the great majority of retroversions and retroflexions induced by relaxation of Douglas's folds, I seldom resort to any long preparatory course of injections, baths and internal medication, but begin the instrumental treatment as early as possible.

The retroflexed uterus may usually be replaced bimanually and without instruments, through the rectum or vagina and the abdominal wall. This manner of reposition should at least be first tried in every case. When thick and tense abdominal walls make it impossible to grasp the fundus, or when the latter cannot

be raised along the promontory of the sacrum by changing the hands, I use the sound to perform reposition, and consider its careful application easy and without danger. B. S. Schultze never employs the sound for reposition. I find, however, that under the circumstances just mentioned, replacement of the uterus may be effected by the sound much more easily and quickly and without complications than if the patient is first chloroformed and the hand is used. I therefore anesthetize the patient only when it has been found impossible to replace the uterus by the sound, or when the introduction of a pessary causes much suffering, as, for example, in young girls, on account of narrowness of the introitus. Admitting the sound in the hands of the inexperienced to be a dangerous instrument for reposition of the uterus, it is still questionable whether an anesthetic is not equally dangerous. Patients in the country and smaller cities will often object to an anesthetic for this purpose; furthermore, in view of the very great frequency of the complaint, not only specialists but physicians in general practice should be able to treat the affection at the right time and in the proper manner. As, however, I meet in practice with large numbers of cases in which bimanual reposition without narcosis is impossible or attended with great suffering, and in which I can replace the uterus in a minute without any complaint from the patient, I do not consider it questionable to recommend the use of that instrument, under certain conditions, to even less experienced practitioners.

When the uterus has been replaced, the question arises as to its remaining in place. In acute cases the methodical application of cold, in the form of injections or pieces of ice in the vagina, may be tried; in this way the tone of the relaxed sacro-uterine ligaments may be restored. The application of electricity, by placing one pole in connection with a sound introduced into the uterus, while the other is placed on the symphysis at the insertion of one of the round ligaments, has been thoroughly practiced, but without favorable result, even, indeed, with harmful effect. Hildebrandt saw it followed by parametritis in every instance. Courty has designed his *tuteur galvanique utérin*, a rod about 6 or 7 centimeters (2.4 to 2.8 in.)

in length, the lower part of which is made of copper and the upper of zinc, and which is inserted into the uterus as far as the copper ball on the lower extremity, but it possesses no advantages over the ordinary electrode. Courty allowed his instrument to remain *in situ* for six or seven hours, repeating the introduction three times each month, and used it in conjunction with ergot, full baths and douches.

Cold douches to the sacral region, tepid baths, ergot and tonics internally are of service in mild cases.

The restoration of the uterine ligaments may be materially assisted by curing the uterine catarrh by means of injections made after dilatation, or by painting the internal surface with a solution of corrosive sublimate.

Manual laceration of any peritoneal adhesions which may prevent complete reposition of the uterus has been recommended by B. S. Schultze. After thorough evacuation of the bladder and rectum, the patient should be placed fully under the influence of chloroform, brought to the edge of the operating table and placed in the dorso-coccygeal posture. The index and middle fingers of the left hand are next passed into the rectum above the sacro-uterine ligaments, the elbow of the operator being supported by his knee, while the foot is placed on a chair. The thumb of the same hand is then passed into the vagina and made to lift the uterus so that the fundus may be grasped through the abdominal walls. These adhesions can now be palpated, and, when they are superficial, are said to offer but slight opposition to the temporary reposition of the uterus, because the wall of the rectum will follow the uterus; but soon after manual support is removed, the contraction of the rectal wall will draw the uterus into its former position. Single, thin, string-like adhesions may be ruptured much in the same way that the placenta is detached from the uterine wall, viz., by rubbing or sliding movements from the outside; but firmer, longer and more rigid bands must be grasped and separated by the hand through the rectum. When the tubes or ovaries are adherent to the posterior uterine wall, it is said that they may be loosened by gradually increasing this pressure, which is to be repeated at intervals of eight or ten days. In some cases Schultze employed this method after intro-

ducing the finger into the dilated uterus; in others he steadied the vaginal portion by forceps and introduced into the uterus a sound with a tip 12 to 15 millimeters ($\frac{1}{2}$ to $\frac{3}{5}$ in.) in circumference; this was then placed in charge of an assistant, so that the operator could palpate the uterus from the abdominal walls and rectum. He then separates the adhesions and puts the patient to bed for several days. As a prophylactic measure, an ice-bag over the uterus is ordered until it becomes evident that neither pain nor elevation of temperature will occur. He further states that he has never seen peritonitis follow this operation, and that Erich, of Baltimore, performed the operation seven times for peritoneal adhesions, omitting the cold applications, with an equally favorable result.

I have never attempted this, but I know of a patient upon whom the operation was performed by a gynecologist of known experience, not Schultze, after which she fell into a very deep and protracted collapse; nor was the complete liberation of the uterus accomplished. It is, therefore, not an entirely safe method, so that a laparotomy might just as well be resorted to, because we would thus avoid hemorrhage from lacerated vessels, and a small incision would suffice. The danger of hemorrhage from lacerated vessels appears to me to be worthy of consideration, as it might lead to even more extensive adhesions than had previously existed.

In some cases in which the adhesions, though firm, were not short, I believe that by the use of pessaries which elevated the fundus and kept the uterus in a vertical position, after a time some stretching of those adhesions was accomplished.

It was formerly held that complete reposition fully met the principal indications, and I was accustomed to repeat the reposition only after the uterus had again become retroflexed, leaving the sound in position for a few minutes only. At the present day, however, this practice has passed into deserved oblivion, and instruments to produce retention are inserted directly after reposition has been performed. All such appliances are intended to fix the cervix in its normal position near the sacrum, thus replacing the action of the sacro-uterine ligaments. For this

purpose we use sometimes the simple ring, sometimes the Hodge, sometimes the Schultze pessary.

Mayer's ring can only be of service in recent retroflexion with a narrow vagina, as it fixes the vaginal portion in the middle of the pelvic cavity and checks its forward descent. But it by no means prevents a recurrence of the retroflexion, and therefore rarely suffices to produce complete retention. G. Braun's modified Hodge pessary, made of hard rubber and having an oval S shape, was introduced in 1864.* It was originally supposed to perform direct reposition, but one was soon convinced that without manipulation this was hardly possible.

These instruments are intended to distend the posterior vaginal vault backward and upward, thereby shortening the sacro-uterine ligaments and aiding their action upon the posterior wall of the uterus so as to shorten it. Instruments of this kind usually found in the shops will not accomplish the object, as their curve is too slight.† They should be curved to such a degree that, when placed flat upon the table, the broader posterior portion should be from 3 to 4 centimeters (1.2 to 1.6 in.) above the horizontal; then, when the sacro-uterine ligaments are relaxed and no posterior parametritis or acute perimetritis is present, in very many instances, they fully accomplish their purpose. It surprised me that Schultze has not alluded to this alteration in form; I make frequent use of it and find that young physicians can more readily learn to select a suitable instrument in this way than to construct for each patient, according to Schultze's method, a figure-of-eight or a sleigh-runner pessary. Furthermore, at the request of patients, who stated that their husbands complained of the latter interfering with cohabitation, I have repeatedly substituted the former for the figure-of-eight pessary. But if pain results in the posterior vaginal wall and sacrum, the pessary must of course be changed, and no instrument is so suitable in such a condition as Schultze's figure-of-eight or the sleigh-runner pessary. Schultze has them made of malleable copper wire,

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* *Wiener Med. Wochenschr.*, 27–31.

† *Vide* "Pathologie der Weibl. Sexualorgane," by the Author, p. 136.

having a thickness of 7 to 10 millimeters ($\frac{3}{13}$ to $\frac{5}{13}$ in.), and covered with rubber; the figure-of-eight pessaries are then formed of rings, 8½ to 10 centimeters (3.4 to 4 in.) in diameter, while those measuring 10½, 12 or 14 centimeters (4 to 6 in.) can be made into the sleigh-runner shape.

The figure-of-eight pessaries are especially adapted to cases in which the vagina is not too much relaxed and the pelvic floor remains in its normal condition. The smaller ring surrounds the vaginal portion, which must fit tightly into it, and is pushed upward and backward by the larger ring resting beneath and anteriorly upon the pelvic floor. Schultze formerly attached to the pessary a projecting part, which was directed toward the vulva, to facilitate its removal by the patient; afterwards he thought this handle superfluous and changed the model. The patient could not perform reposition, and the introduction of the instrument was of no service to her; apart from this, every pessary which projects through the vulva is objectionable, because by keeping this open it allows air to enter the vagina. He therefore changed the model to its present shape.

When the vaginal portion persists in slipping to one side, Schultze separates the two arms of his pessary in such a way that the higher one protects that side toward which the dislocation occurs; for this reason the arms will alternate from time to time. If the dislocation has resulted from abnormal posterior fixation of the cervix, due to inequality in the length of the sacro-uterine ligaments, the pessary is changed into an extra-median form, one part corresponding to fixation of the portion at the right side and the other to that on the left.

Even after accurate fixation by a well-fitting instrument, new retroflexion will frequently recur, either from wasting or contraction of the posterior uterine wall, of its peritoneal covering or of one of the broad ligaments. Under such conditions the vaginal portion must be fixed posteriorly and as high as possible by means of a very long figure-of-eight pessary. If this proves insufficient, Schultze recommends the introduction of an intra-uterine supporter through the small ring, without, however, connecting it with the pessary. The supporter is intended to efface the bend or angle at the internal os.

When the pelvic floor has become too relaxed to support the figure-of-eight pessary and to restore it to its proper position after defecation, the sleigh-runner pessary, introduced by Vulliet for retention of the prolapsed uterus, must be substituted. This instrument consists of a posterior, longer portion which rests upon the pelvic floor and reaches for a variable distance up the posterior pelvic wall, and of an anterior, shorter portion, the extremity of which is directed backward and retains the vaginal portion in the posterior part of the pelvic cavity. The larger the vagina, the broader must be the pessary; a transverse widening of the anterior portion of the pessary will at the same time retain a coexisting prolapse of the anterior wall. Schultze introduces this pessary diagonally from the right to the left, the anterior end of the left arm passing first into the vulva, thus turning the instrument about a plane perpendicular to its upper surface. The pressure may cause excoriation of the mucous membrane in the region of the spine of the ischium or the sacro-spinous ligament, in which case a smaller pessary is indicated.

When the figure-of-eight or the sleigh-runner pessary fits well, it may remain *in situ* for a year or more, injections being made only after the menstrual flow or when other discharge occurs; but it should not be retained much longer without change. A harmless and durable pessary of any required shape may be made of hard rubber or of aluminium.

If pregnancy occurs, the pessary should be left *in situ* till about the middle of gestation, after which the uterus will not become wedged in the true pelvis. In Schultze's opinion no phase of uterine life is so favorable for permanent cure of retroflexion as the puerperal state. He places an ice bag upon the abdomen and injects cold water into the rectum for the first few days of the puerperium; this treatment is assisted by ergot internally or subcutaneously, and he has had the satisfaction, in many instances, of knowing that there was no return of the retroflexion. Again, treatment begun a few weeks after delivery or after an abortion is said to be frequently followed by permanent recovery.

As soon as the uterus is replaced by a suitable pessary, all the symptoms above described disappear. Uterine catarrh, as a complication, often requires special treatment; whether this be un-

dertaken before the reposition and retention are attempted will depend upon the general condition of the uterus and the patient; if there are inflammatory symptoms, the reposition should precede the treatment of the catarrh. Baths are of no permanent service as long as the displacement exists, though they may be useful afterwards.

Recurring vesical catarrh may be cured by irrigation of the bladder with a 1 : 1000 solution of salicylic acid, a 2 : 100 solution of carbolic acid, or a 3 : 100 solution of boric acid.

If, on account of adhesions, the retrodeviation cannot be reduced, such symptoms as endometritis, perimetritis, exudations, hemorrhage, anemia and neuralgia must be treated separately or together. The physician must not neglect to soften and distend the cicatrices and adhesions by the use of warm compresses, warm injections into the vagina and rectum and baths of sand and peat.

As a matter of course, that panacea of modern gynecology, laparotomy, has naturally enough been recommended, to bring about union of the uterus to the anterior abdominal wall, and by no less an authority than P. Müller. It is probably justifiable in connection with ovariotomy, and it may require consideration in case of large and firm adhesions. The remarks made concerning laparotomy for irreducible prolapse of the uterus are of equal force here.

Elliott has recently recommended tampons in the treatment of retroversion with adhesions. While the patient is in the lateral or knee-elbow posture, the posterior vaginal vault is packed with cotton tampons saturated with glycerin, so that the uterus is pressed forward as far as possible. The tampons are renewed frequently and are said to moderate the pain in chronic inflammatory processes; when the displacement is slight, the patient may even go about.

In conclusion, we have to consider the most recent surgical treatment of retroflexion, viz., the shortening of one or both of the round ligaments. Alquié divided the round ligaments in order to draw the uterus down for an operation, and Aran conceived the idea that this might be of value in retroflexion. Later, W. A. Freund studied the operation on the dead subject; but

W. Alexander tried the operation for retroflexion and prolapse in 1884. He reported 49 cases, 22 of his own and 27 of other operators; the operation has also been frequently done by surgeons in Germany. Gardener performs the operation in the following manner: After shaving the parts, the external ring is marked with the finger-nail, the skin, superficial fascia, and adipose tissue divided by an incision 6 or 8 centimeters (2.4 to 3.2 in.) long, and the fan-shaped insertion of the round ligament exposed. From the insertion the ligament itself can be traced and grasped in a clamp. The vaginal portion is now brought into its normal position by an assistant, while the operator draws the ligament out for a distance of 8 to 10 centimeters (3.2 to 4 in.), and, after passing a ball of gauze underneath, it is tied by a cord. Sutures of kangaroo tendon are now passed around and through the ligament, and the latter attached to the skin, which is united after introducing a drainage-tube under the ligament. Lister's dressing is applied. The patient is not allowed to arise until the twenty-first day, and she must wear a pessary for some time afterward.

The results of this operation, as hitherto published, are by no means favorable, indeed, not even encouraging. In most instances in which a favorable result was reported, the patients were not long enough under observation. The principal objection to this operation will always be that it simply replaces one anomaly by another, the abnormal shortness of the round ligaments producing an abnormal fixation of the uterus in anteversion, or eventually anteflexion. It remains questionable whether this will not finally produce as much discomfort as the retroflexion. Moreover, in this operation no notice is taken of the real cause of the retroflexion, viz., the relaxation of the sacro-uterine ligaments, for, if they are relaxed, the vaginal portion will not remain in its normal position without a pessary. Acknowledging the operation to be perfectly safe, it may be asked what is its value if it does not obviate the necessity of wearing a pessary? In my opinion it will in a short time become obsolete.*

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* *Glasgow Medical Journal*, November, 1884; *Lancet*, June 7th, 1884, p. 1030; *Centralblatt f. Gynäcol.*, 1885, pp. 109–111, etc.

6. *Lateral Version and Flexion of the Uterus.*

Lateral curvatures and angulations of the uterus are, as a rule, associated with torsion of the organ, being caused either by parametritic exudation, or by perimetritis, or by ovarian tumors. They are quite common, and their diagnosis is usually easy. The prognosis and treatment are so completely dependent upon the above-named causes, which will be considered in another chapter, that it is not necessary to consider them now.

7. *Torsion of the Uterus.—Twisting of the Uterus upon its Long Axis.*

This does not occur as an isolated dislocation but as a complication of anterior and posterior versions and flexions. By torsion is understood a turning of the whole organ about its long axis. The chief causes of the disorder are parametritic exudations, especially those in which contraction causes drawing upon the uterus at different points. The torsion is greater as the attachment to the uterus is more external, the length being the same. The significance of torsion lies in the fact that, when the os is directed sharply to the right or left, it indicates the existence of a posterior parametritis. The diminished mobility of the organ is evident from the fact that every attempt to engage the vaginal portion within the speculum is more difficult and painful than usual. The degree of torsion may be learned by introducing the sound and observing the extent to which the handle is turned to either side.

Schultze recommends that the patient be placed in the knee-elbow position; the vaginal portion and the diagonal position of the os are controlled by using a duck-bill speculum; while in this position the vaginal portion is held by a tenaculum-forceps and the direction of the canal ascertained by passing the sound. The remarks previously made upon the treatment of lateral dislocations apply equally to the treatment of torsion.

8. *Inversion of the Uterus.*

Inversion of the uterus implies a sinking of its walls into the cavity, so that, as the dislocation increases, the external wall becomes the internal and *vice versa*, the highest point becoming

the lowest, and the arching contour of the fundus changing to a pocket. We recognize the existence of several degrees of inversion, so that, if only one part sinks in, causing merely a simple depression, the condition is known as *impressio uteri;* when the fundus has descended to the external os, it is then an *incomplete inversion;* should the entire body of the uterus pass through the external os, however, so that the latter appears as a border or rim in the vaginal vault, the condition is known as a *complete inversion.* If one or both sides of the vagina be inverted at the same time as the fundus, we speak of it as *inversion of the uterus with prolapse,* a complication likely to arise in all degrees of inversion, but which is most common in those of puerperal origin.

Ætiology.—Inversion of the uterus is the result of a number of simultaneous predisposing causes, without which the accident is impossible. The inversion may be acute or chronic. The first essential is a dilatation of the uterine cavity; the second, relaxation, or thinness, and diminished resistance of the uterine walls at various points. These conditions coexisting, the inversion may result from force exerted upon the organ in any direction, the acute or chronic course of the case depending upon the intensity of the force, the pliability of the uterus and the extent of the dilatation.

Puerperal inversions are, beyond question, the most frequent. I have considered these in detail in another work ("Pathology of Childbed"), and will therefore confine my remarks to the non-puerperal forms. About two-thirds of all cases of puerperal inversions are chronic. Similar to these are the inversions caused by tumors, especially myomata of the uterus, either polypoid or those sessile growths which lie near the fundus. These tumors first dilate the uterine cavity, next the internal os and cervical canal, and then cause descent of that portion of the wall from which they grow, partly by their own weight and in part by the action of the other portions of the uterine walls. The uterine wall is thinned at the point of insertion, the muscular tissue wasted or, as Schultze has shown in illustration, it may be funnel-shaped. This will explain why C. Braun saw inversion occur on two occasions after the removal of an intrauterine tumor.

Sarcomata and other tumors of the uterus produce the same effect as myomata, though far less frequently. About one-eighth of all inversions are probably caused by myomata, according to Karafiáth, Ollive, Schavnik and Werth.

Polk has reported an inversion of the virgin uterus, but it is doubtful whether the diagnosis was really correct. I am not aware of any recorded case in which inversion had been observed to follow traction used in extracting a polypus, in the same way as it may be caused by traction on the umbilical cord. This is improbable, as in such cases the polyp is seldom larger than a hen's egg and the pedicle usually thin. One of my own patients had made numerous unsuccessful attempts to extract a polyp in this manner, but finally desisted in her efforts; there was no appearance of an inversion.

The anatomical changes observed in the inverted uterus and parts adjacent relate to the inverted portion and depend upon the extent of the inversion and the degree of constriction. The swelling, œdema and tendency to hemorrhage in the uterine mucous membrane increase according to the degree of constriction. Upon examination through the speculum, this membrane appears of a raspberry-red color and shows ecchymoses at different parts. If the constriction is increased, gangrene may result. Murray has recently published a case of spontaneous amputation of the inverted uterus, and Clemensen had under his care a patient who recovered after gangrenous separation of the inverted portion. Erosions and ulcerations upon the inverted portion may cause adhesions to the cervix of the uterus or to the vaginal vault, though but few instances of this complication have been observed.

The tubes, ovaries and loops of intestine sometimes descend into the pocket formed by the inversion, but, in non-puerperal inversion, the abdominal ends of the tubes and the ovaries remain outside; the latter are, however, generally swollen and hyperemic. The round ligaments, tubes, broad ligaments and sacro-uterine ligaments all appear to radiate from the depression. If there is much irritation or dragging, adhesions are formed in the newly-formed peritoneal pocket; this appears to be a rather uncommon occurrence, or, at least, the adhesions thus

formed cannot be extensive, as we have reports of so many cases in which complete reposition was effected after inversion of many years. The causes of death in fatal cases are shock, hemorrhage, septicemia and peritonitis. Olshausen's view, that in some instances of inversion death resulted from the entrance of air into the vessels, has, so far as I am aware, not been confirmed by post-mortem examinations; apart from this the occurrence seems rather improbable, as the inversion of the organ so compresses and bends the veins that it would be difficult for air to find entrance to any distant part.

The **symptoms** of acute puerperal inversion are minutely described in my "Pathology of Childbed." After the first grave symptoms have passed, the hemorrhages and the sero-sanguinolent discharge remain to claim our attention, the latter sometimes being very slight. For example, I had one patient laboring under inversion who was very pale, and yet capable of much more exertion than might be expected, suffering no pain whatever.

Some of the symptoms will depend upon the cause, *e. g.*, myomata, or sarcomata; among these are pain, tension, pressure, bearing down and hemorrhage. Spontaneous reinversion has been observed in three instances, after the removal of such tumors, by Abarbanell, Schwartz and Schultze. Old inversions which were not due to tumors have also been spontaneously reduced, cases having been reported by Thatcher, Meigs, Baudelocque and Bruntzel. Long continuance of the inversion does not always endanger life, as proved by cases in which the uterus was inverted for 20, 30 and 40 years, described by Denman, d'Outrepont, Lisfranc, White and Tate.

Diagnosis.—Careful study of the history will often reveal the fact that the inversion occurred suddenly during the puerperal state and was attended at the time by threatening symptoms, while, in other instances, the real beginning is difficult to ascertain. Very careful examination only will effectually prevent the unfortunate mistaking this condition for a uterine polypus. After thoroughly evacuating the bladder and rectum, the physician will be able through the abdominal walls to palpate the pocket, which is situated somewhat below the pelvic inlet and in the middle of the pelvis; it can sometimes even be felt from the rec-

tum. Upon vaginal examination, the character of the tumor will be recognized by its firmness, elasticity, raspberry-red color, smooth and possibly bleeding surface, and by finding one or both of the orifices of the Fallopian tubes. If the diagnosis yet remains unsatisfactory, the sound must be used; it can be passed but a short distance into the cervix, and this only when the inverted body of the uterus still remains in the vagina. The cervical cavity is deepest anteriorly, as the uterus is covered with peritoneum down to the vagina and is more pliable behind, while anteriorly the connective tissue of the pelvic cavity hinders the inversion. As W. A. Freund and Schultze have shown, the place of flexion in the anterior wall may be so prominent, either from a tumor or exudation upon it, that it may be mistaken for the fundus of the uterus.

Strong traction upon the tumor will sometimes confirm the diagnosis by forcing the os to move with the tumor, the inversion thereby becoming more complete. Attention should also be paid to the sensitiveness of the tumor when it is titillated or "scratched," which symptom is wanting in polypi.

Treatment.—The main indication under all circumstances is to effect reposition. Even though danger the most threatening has been averted the possibility of complete recovery should not be too readily promised. In one of our two cases, for instance, we had made attempts at reposition at intervals which lasted for more than two years, and finally success crowned our efforts.

In non-puerperal inversion, the cause, if it be a myoma or sarcoma, must first be removed. In these operations it should not be forgotten that there are deep funnel-shaped depressions in circumscribed portions of the uterine walls, which may be continuous with the pedicle of the tumor, and when the latter is divided, as happened in one of Schultze's cases, the uterine wall may be incised and the peritoneal cavity opened. An injection of chlorinated water was probably thrown into the abdominal cavity in his case, and the patient had peritonitis, but finally recovered. After removal of the tumor, it is well to wait awhile to see whether spontaneous reduction will occur; should this not take place, artificial reposition must be attempted; this may be performed by manual or by instrumental means. The methods

and instruments devised for this purpose are very numerous, as every author who has been so fortunate as to reduce an old inversion considers his method or his instrument the best, and believes, furthermore, that it is suitable to nearly all cases; each operator, however, has had experience with but one, two or, at most, three cases, and this number will scarcely warrant the formation of a definite opinion upon any topic. In the majority of cases in which reposition was effected after the condition had existed for years, not one but a number of methods have been employed, and it is difficult to decide which was productive of the best results, the more so as one is readily disposed to regard as effective that last used.

Bimanual reposition is accomplished as follows: The patient having been chloroformed, one hand is placed upon the abdomen over the depression in the uterus, and the other is passed into the vagina; grasping the body of the uterus, compression is made upon it, with the object of reducing its size. At the same time, the organ may be moved up and down in order to loosen the constriction. When the rim of inversion is narrow, the lowest part of the uterus is not forced up at first, but the whole body of the organ is pressed against the border of the inversion, thus attempting to primarily replace the cervix.

In order to guard against laceration or separation of the body of the uterus from the vaginal vault, W. A. Freund, as he pressed the body upward, steadied the vaginal portion by wide silk braid. Recognizing the great force which can be thus exerted, I consider unsafe this mode of holding the uterus fixed. In Freund's case reposition did not occur while these attempts were being made, but only after a tampon had been placed *in situ* and during the uterine contractions consequent upon the internal and subcutaneous administration of ergot. Kiwisch and Sims supposed they had caused reposition by pressing the whole body of the uterus upward, and then pressing inward in the region of one of the tubes. Tate, of Cincinnati, reduced an old inversion by fixing the rim of the inversion with the fingers passed into the bladder and rectum, while he used his thumbs to make pressure upon the inverted body. This method would appear very rational to me if it were not quite probable that the hooking of the wall of the bladder over

the rim of the inversion and the unavoidable distortion of the urethra must be followed by injurious consequences.

When all these manual attempts have been repeatedly and energetically tried without avail, it has been suggested to make longitudinal incisions into the inverted body, so that the hemorrhage and division of the circular fibres may facilitate the reduction. I tried this without success, however, in my first case.

If manual reposition fails, the vagina and the surface of the uterus should be disinfected with a 2 to 5 per cent. carbolic solution and the colpeurynter applied. In many cases this alone will cause reduction, by producing uniform pressure upon the fundus and expanding the vagina in all directions. Instead of this instrument, tampons may be used in the manner already described; they should be saturated with glycerin and iodide of potassium, or with vaseline and tannin. Ice water is thrown into the colpeurynter, and when there is pain an ice bag should be placed upon the lower part of the abdomen. It is important in using the colpeurynter that the pressure exerted by it be gradually increased; in my own case reposition followed its use, the inverted portion having first been strongly kneaded by the hand. Thus I believe that the favorable issue in this case was not due to the colpeurynter alone, but also to the vigorous preliminary massage of the uterus, as was evidently true of the cases reported by Toloschinow, Rogers and Simpson.

He who has labored for years with such a case has recognized the pressure which the inverted uterus will withstand, and will condemn as unreliable and dangerous all the sound-shaped instruments with knob, plate or cup-like attachments, because they act upon too small a portion of the inverted body and slip far too readily from its smooth surface.

Laparotomy has been the final resort in those instances in which all other means had proved unsuccessful. Thomas in two instances secured complete recovery by laparotomy combined with instrumental dilatation of the funnel-shaped inversion. The practitioner who lacks perseverance and has a predilection for laparotomy will certainly adopt this measure, but even a successful result is no evidence that the operation was indicated, for, as was

shown in the case of my patient, reposition per vaginam may sometimes succeed after years of effort, and then the recovery is complete, while laparotomy may be followed by such unpleasant consequences as abdominal hernia, etc. Should reduction prove impossible after laparotomy, it has been suggested to castrate the patient, thus putting an end to menstruation and the chief sources of discomfort. I do not accept this opinion, as the simple fact that the inversion cannot always be reduced by laparotomy speaks against this proposition; furthermore, inability to reduce the inversion after laparotomy is by no means evidence that reposition by the vagina will not succeed. The ovaries should, therefore, be allowed to remain, as inversions even of forty years' standing have been finally successfully reduced. Inasmuch as many women suffer but little discomfort from the inversion, one must take especial care to allow sufficient time to elapse between the various attempts at replacement, that they may fully recover from the last before another is made.

What has been said respecting laparotomy is equally applicable to the operation for removing the inverted uterus below the external os. In several cases reported in recent literature, spontaneous amputation of the inverted uterus occurred. If inversion were of very frequent occurrence, with the more favorable results from vaginal extirpation of the uterus, we would certainly already have a long list of cases, in which, without spending much time in attempts at reposition, the uterus would have been extirpated. Even in the past the inverted uterus has been frequently enough considered irreducible, and partial extirpation performed. Borham reports that of 5 cases in which the ligature had been applied 4 died. In a few cases the uterus has been mistaken for a polyp and cut off by the scissors. In Lee's case death occurred within twenty-four hours. The uterus has been several times successfully extirpated by McClintock and Sims, the écraseur being employed, but more frequently this operation has terminated fatally, as in the cases of Wilson, Aran and Veit. Of 27 cases, in which a simple ligature had been applied and excision made below it, 22 are said to have recovered! The result was most favorable when excision was performed some time after the application of the ligature.

Recently C. Braun has used the galvano-cautery instead of the ligature, and several times with success.

To prevent slipping of the cervical portion after excision of the uterus, Hegar and Kaltenbach suggested fixing this part by passing wire sutures through it; they then amputated the inverted portion and carefully sewed up the stump to prevent communication with the peritoneal cavity.

As the ovaries are allowed to remain in the ordinary operation of uterine extirpation for chronic inversion, so dangerous symptoms may ultimately arise. This fact should serve as a warning not too rashly to attempt ablation of the body of the uterus. I hold that even after years of fruitless attempts at reduction, an inversion should not be positively considered irreducible; furthermore, that to view such endeavors as absolutely hopeless, and the condition of the patient to be so dangerous as to require partial extirpation of the uterus, is to finally place the matter purely in the discretion of the gynecologist.

9. *Hernia of the Uterus.—Hysterocele.*

In view of the possibility of the uterus becoming dislocated into any of the canals passing from the false and true pelves, into which the bowel may be forced, such terms as inguinal, crural and ischiatic uterine hernia and uterine hernia of the obdurator foramen, etc., have originated; as a matter of fact, however, only inguinal and crural herniæ of the uterus have been found.

Inguinal hernia of the uterus is often associated with arrested development of that organ, such as uterus bicornis or didelphys. In such cases the existence of a peritoneal vaginal process is to be regarded as a predisposition to hernia, and the dislocation of the corresponding ovary into this process sometimes as the primary, and the inguinal hysterocele as the secondary result. Such a hernia may, however, have an acute origin, though the arrest of development coexists as a predisposition. For example, I have treated an inguinal hernia of the gravid uterus, the right uterine horn being incarcerated, which originated suddenly during the fourth month of gestation.* Olshausen in a case of uterus

* See Eisenhardt, *Archiv f. Gynäkol.*, XXVI.

bicornis found inguinal hernia of the deformed left uterine horn.* Leopold treated a patient for inguinal hernia of the left horn of a rudimentary uterus and vagina.† Rectorzik and Scanzoni have published cases of extra-abdominal uterine pregnancy which belong to this class.‡

Crural hysterocele may originate from adhesion of the uterus to the omentum or intestine, the former being dragged down into an existing crural hernia; or, secondly, in very large crural herniæ the peritoneum of the corresponding broad ligament may finally form a part of the hernial sac, and draw the uterus down with it. It is not essential in the latter case that the uterus be connected by adhesions with any of the other contents of the sac.

Uterine hernia may be recognized by careful palpation of the contents of the hernial sac; after reposition of the intestine or even before reposition, one or more globular, hard and sensitive bodies are to be felt. If more than one such body be present they are probably the uterus and the ovaries, as in Bylicki's case.§ These bodies are recognized as genital organs by their size, consistence and surface, their connections with one another, and because other similar bodies are not found between the loops of intestine. If the vagina is open, the fact of its displaced condition and the possibility, by bimanual examination, of tracing the uterus into the hernial sac will at once establish the diagnosis. When the vagina is closed, it will be necessary to ascertain the size, form and position of the uterus and its connection with the hernia by examination per rectum.

Treatment.—After the uterus has been lodged for a long time in the hernial sac, its reduction may be impossible because of swelling; therefore, speedy reposition and the application of a suitable truss are indicated as soon as uterine hernia has been diagnosticated. If reposition cannot be accomplished, herniotomy is unavoidable; this operation has been successfully performed by Madurovicz. Should the uterus be pregnant abortion must be induced; this was done by Scanzoni with a favorable result, but in my case it would have been impos-

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* *Archiv f. Gynäk.*, I, 41.
† *Archiv*, XIV, 378.
‡ "Beiträge," VII, 167.
§ *Centralblatt f. Gynäk.*, II, 611.

sible, for the fœtus was too large to pass through the inguinal canal. If the fœtus is viable interference must be deferred until the end of gestation, and then laparo-hysterotomy should be performed, as the hernial canal will not permit the passage of the fœtus at term. When the puerperal uterus is reducible, it must be replaced, having first been sutured as in Sänger's method; if irreducible, it must be amputated as in Porro's method, above an elastic ligature, and the stump fastened in the abdominal incision. This method enabled me to save my patient. The same course is to be followed when, as in Leopold's case, hematometra of a closed uterine horn is found in an inguinal hernia.

CHAPTER III.

NEOPLASMS OF THE UTERUS.

Introductory Remarks on the Uterine Mucous Membrane.

It was formerly taught that the lips of the uterus and the lower third of the cervix were covered by stratified pavement epithelium, and that there were papillæ in the mucous membrane below the plicæ palmatæ, which were continuous over the entire vaginal portion, and which terminated in a small but well-marked ridge at the external os. The short tubes and gland-like depressions between the furrows of the plicæ were described as the cervical glands. The ovula of Naboth were supposed to originate in plugging up of the glands and retention of their thick secretion, thus causing prominences in the lumen of the cervical canal. The epithelium of the glands and of the larger portion of the surface of the cervix was said to be ciliated. The mucous membrane lining the body of the uterus was described as being smooth or satin-like and thickly beset with tubular glands, lined with ciliated epithelium, pursuing a winding course and not rarely ending in subdivisions. Between the glands were found connective-tissue cells and muscular fasciculi, which were in connection with those of the submucous and muscular layers.

It has recently been determined by the investigations of Herr Overlach, pursued under the direction of Professor Kupfer, that

the epithelium of the vaginal portion is stratified and contains numerous papillæ, through each of which pass one or two vascular loops. It is composed of very large spinous cells, the spines of which consist of anastomoses of cellular protoplasm. The cortical layer of these cells encloses in a peculiar manner a cavity which is traversed by a fine network, and which contains the nucleus; Overlach satisfactorily demonstrated the existence of these cavities by filling them with finely pulverized cinnabar. The small cylindrical cells found between these large cells are likewise connected with one another by protoplasmic anastomoses.

The epithelium of the cervical mucous membrane, as described by Overlach, is seldom typically cylindrical, but as a rule consists of large club- or bottle-shaped cells, having their nuclei at the base, so that this appears broad. The body then gradually diminishes in size toward the surface, where it ends in another globular or club-shaped head, from which arise the ciliæ. The cells all have thin bases horizontal to the body and display variations in size greater than do any other in the human body; the club- and bottle-shape is also peculiar to them. In the virgin uterus at puberty the boundary of the large ciliated epithelium and the striated pavement epithelium of the vaginal portion coincides with the sharply defined border of the external os.*

Two forms of papillæ of the cervix may be recognized, viz., the thread-like and the warty or fungus-shaped. Those of the first variety are attached at an acute angle to the plicæ palmatæ, and have flat, cylindrical or cuboidal epithelium. Both above and below the plicæ palmatæ, which gradually become smaller and finally disappear about 5 millimeters ($\frac{1}{5}$ in.) above the external os, the thread-like variety changes to a few, isolated, flat, broad, fungous-shaped papillæ, which are covered by the large ciliated epithelium of the cervix. The matrix in these varieties of papillæ, consists of small globular cells containing large nuclei, and embedded in a very thin layer of protoplasm.

The glands of the cervix lie close together, are tubular or acinous in shape in the lower portions, and are sometimes found projecting into those parts of the mucous membrane which

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* See illustrations in the Appendix to Carcinoma of the Uterus.

are covered with stratified pavement epithelium, but their orifices are always on the level of the ciliated epithelium. Overlach was unable to find any glands in the part of the vaginal portion which is covered with stratified epithelium, and expressed the opinion that the so-called ovula of Naboth were portions of the acinous glands of the cervix, and not closed mucous crypts. In the space between the plicæ the glands were replaced by branching depressions or cavities, which should not receive the name of glands, as the characteristic excretory duct is wanting. The upper portion of the cervix is the richest in glands ; it extends from the extremity of the plicæ to the internal os. Here are found the *glandulæ cervicales*—large acinous glands with broad, short excretory ducts, large cavities, and with many large globular diverticula. The interior is lined with the club-shaped epithelium of the cervical cavity, as just described, having ciliæ which are longer and coarser than in the cervical canal. Scattered among the first named are the *glandulæ utriculares*, which will be described hereafter ; they may be differentiated by their cells of equal length containing central nuclei, while in the cervical glands longer and shorter cells intermingle, and project unequally into the lumen.

The utricular glands were found by Overlach to lie in the substance of the plicæ, and not in the mucous membrane upon which they are placed ; he had frequently observed the summits of the plicæ to be distended with blood-corpuscles, which condition materially assists the sudden rapid swelling and emptying of the cervix, as described by Henle. This cavernous-like tissue extends beneath the epithelial covering of the mucous membrane.

The mucous membrane of the body of the uterus shows ciliated epithelium with the cylindrical type of cell ; individual cells, however, vary much in form and size. Their large nuclei are not found at a uniform distance from the bases of the cells, but are scattered about in all portions, which fact will serve to explain the differences in shape and the deviation from the cylindrical form.

The glands of the mucous membrane of the body, the utricular glands, are long, narrow tubes, invariably lined with a flat, cylindrical or prismatic, ciliated epithelium ; they are partly straight,

partly convoluted or spiral, ending in either a blind sac or in one or more diverticula. Sometimes the tube forms at its orifice two divisions which then show similar modifications. In the lateral regions of the body, where the mucous membrane is thinner macroscopically than on the anterior and posterior walls, the utricular glands are smaller and shorter. The relatively large globular or oval nuclei of the prismatic ciliated cells lining these glands are invariably central. The latter are most numerous in the fundus and body, but also occur in all portions of the cervix, as far down as the border of the external os, while the acinous glands are peculiar to the cervix, and even here are not found in all parts, as for example, between the plicæ.

The normal secretion of the uterine mucous membrane is more profuse in the cervix than in the body, but it is only slight even in the former during health—so slight that it is not perceptible, and serves only to prevent irritation and adhesion of the mucous surfaces. The character of this secretion during menstruation will be considered elsewhere. It is exceedingly difficult to obtain the unmixed uterine secretion, as none penetrates between the lips, and the cervical mucous membrane is always covered with the thick, transparent, colorless, tenacious secretion of the cervical glands. This fluid is always of an alkaline reaction, and becomes thinner when mixed with the acid vaginal secretions as well as just before the appearance of the menstrual flow, and then also in the healthy its discharge occurs. In infants the cervical canal and also the uterine cavity may be filled with this thick, ropy fluid. Microscopical examination reveals a homogeneous, glassy mucus containing cellular débris. Scanzoni and Kölliker state that they have found great numbers of fusiform mucous corpuscles in it, partly unchanged and partly broken down, some containing cavities, so that one might suppose he saw the vacuoles in the spinous cells discovered by Overlach. Their description was written in 1853, however, at a time when spinous cells were entirely unknown. The trichomonas vaginalis has never been observed in the cervical discharge, but in hypersecretion of the cervix only a few short and thin fermentation fungi with rounded processes have been found; the subject requires further investigation. Küstner unsuccessfully endeavored to collect the normal

uterine secretion by means of a glass tube perforated at one extremity, which was passed into the uterus; he obtained merely a sanguinolent or a lymphoid discharge.* According to C. Ruge, even the diseased uterine mucous membrane furnishes only a very slight secretion.†

I. Benign Neoplasms of the Uterine Mucous Membrane.

1. *Adenomata of the Uterus.*

(a) *Glandular Polypi of the Cervix.*

Pathological Anatomy.—When retention of secretion occurs in the superficial portions of a normal or of an enlarged and dilated cervical gland, it soon makes a prominence upon the mucous surface, and by formation of a pedicle, becomes a polypus. The latter is usually made up of several glands which have become diseased from the tension or catarrh, and the polyp, therefore, has a rough and nodulated surface. The smaller glands may rupture and, by adhesions in various directions, give the polypus a divided or compound appearance; sometimes a number of such polypi project from the external os, as in Fig. 47. Their composition is identical with that of the normal or of the catarrhal cervical mucous membrane, and therefore requires no further description. Their surface is sometimes red and bleeds easily, or, again, it may be pale and firm, depending upon the vascularity of the pedicle.

Fig. 47.



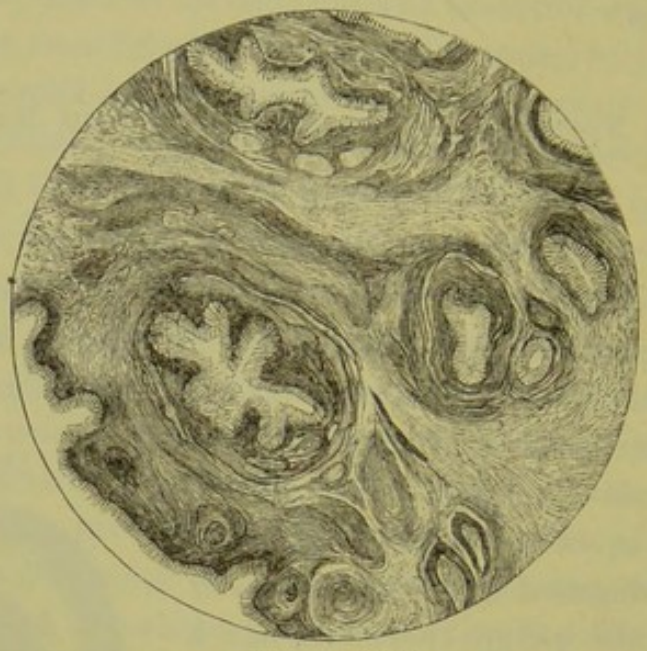
Ackermann has described as having a somewhat peculiar form, a glandular polyp of the anterior lip, extirpated by me. It consisted of a polypoid elongation of the whole anterior lip, which was mainly composed of cavities lined with beautifully marked, characteristic, cylindrical epithelium, around which there was a slight amount of connective tissue, very little muscular interacinous substance and large vessels. It is, therefore, to be re-

* "Beiträge zur Lehre von der Endometritis," Jena, 1883, p. 47.

† Schröder, VIII Aufl., p. 120.

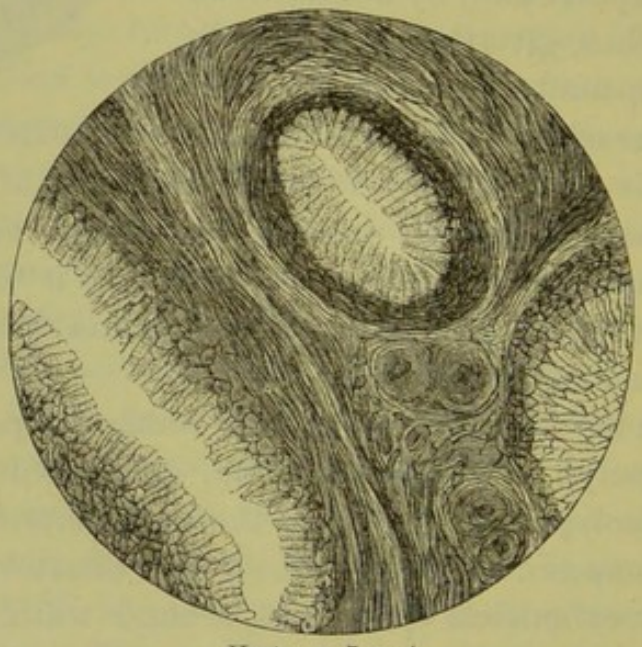
garded as a typical *adenoma of the cervix* (see Figs. 48 and 49). The name by which Schroeder designated this condition, follicular hypertrophy of the lips, is not very appropriate, because there

FIG. 48.



Hartn., p. 4, o. 2.

FIG. 49.



Hartn., p. 7, o. 4.
Polypous Adenoma of the Cervix of the Uterus.

is no such hypertrophy, but a neoplasm of the cervical glands, which, growing downward, may elongate the lip to the vaginal orifice.

The surface of such tumors resembles a catarrhal mucous membrane or a tonsil, and sometimes furnishes a glassy secretion from the glandular orifices. In my first case, there was a small polyp near the large one on the anterior lip.

When some of the occluded diverticula rupture, a papillary proliferation may originate in their lining membrane. On the other hand, I have never seen proliferation of the connective tissue cause increased firmness in such tumors or cornification of the cylindrical epithelium lead to an epidermis-like surface. For this reason, Simon's case * should not be placed in this class; he described it himself as a wing-like elongation, and, as such, it evidently proceeded from the remaining substance of the anterior lip, and not from the glands.

The **symptoms** of glandular polypi of the cervix and lip are increased secretion of a mucous or purulent nature, irregular hemorrhages and profuse and protracted menstruation. As the tumors frequently occur in old women, they distress the patient by the bloody discharges, continuing long after the menstrual flow has ceased. Furthermore, they often cause tension and bearing down and a feeling as though some object was descending in the pelvis. I have repeatedly seen nausea and vomiting occur from the irritation of such tumors, symptoms which disappeared with their removal.

Glandular enlargements of the anterior lip cause more severe hemorrhages, pain, hypersecretion and distortion, as the neoplasms frequently protrude through the vulva. The sterility which is a common symptom is evidently caused by the catarrh and the mechanical obstacle to the entrance and movements of the spermatozoids. Small cervical adenomata, however, cause no discomfort whatever and are usually discovered by accident.

The diagnosis is easy when the polypi which protrude through the external os are hard, but is more difficult when they are small and soft. In the speculum, they may usually be recognized by their dark red color and disposition to bleed. Those which cause elongation of one or the other lip are generally prolapsed into the vagina. It is necessary to determine that the pedicle

* Msschrft., XXIII, p. 241.

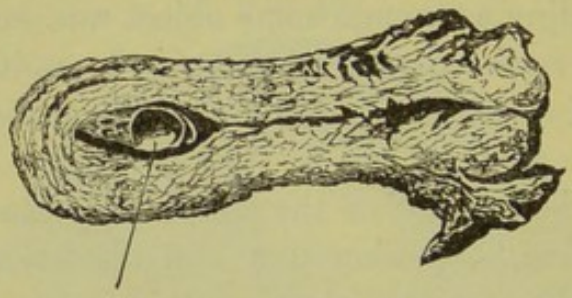
really proceeds from the lip and is not simply surrounded by it. Microscopical examination is required to confirm the diagnosis, enabling us, by the absence of any pearly or atypical structural increase, to differentiate between a papillary cancroid and a simple glandular tumor.

The **prognosis** is favorable, for with the removal of the neoplasm the disease is radically cured at that location, but as upon other mucous membranes, *e. g.*, that of the nose, similar polypoid growths may occur on adjacent parts. They may appear not only during menstrual life but also after the menopause. It will be shown, when we come to consider malignant growths, that the latter may be developed from glandular elongation of the anterior lip.

(*b*) *Adenomata of the Body of the Uterus.*

Retention cysts originate from catarrh of the mucous membrane of the body of the uterus as they do in the cervix; as soon as they have acquired a certain size, they force out the mucous

Fig 50.



A Cyst Developing a Pedicle.

membrane and develop a pedicle. This process can be beautifully seen in a preparation in my collection (Fig. 50) in, which near the large cyst several smaller ones can be noticed. When a number of such prominences lie near together, causing a circumscribed projection of the mucous membrane, the condition is called a "molluscum." When the retention cysts of the uterine mucous membrane are very numerous, adjacent cysts may adhere, thus again causing gradual obliteration of the uterine cavity, as is shown in Fig. 51. If the tumors grow from one wall to the other they are often flattened or shaped like a cock's comb, as long as the uterine cavity is not greatly dilated; when the cavity has

become gradually dilated, they become more nearly globular. They are rarely larger than a walnut; their surface is rough, usually dark red in color, their contents dark or light colored and mucous or colloid in consistence. The lining membrane of the cavity consists of typical cylindrical epithelium. In young subjects the uterine wall is thicker than normal, probably from the catarrh which is generally present, whilst in old women there is little or no thickening.

In many instances the process is not confined to a simple hyperplasia and dilatation of the glands in the polyp, but there are constriction, multiplication and new formation of the glandular

Fig. 51.

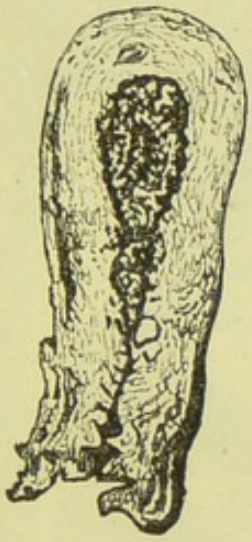
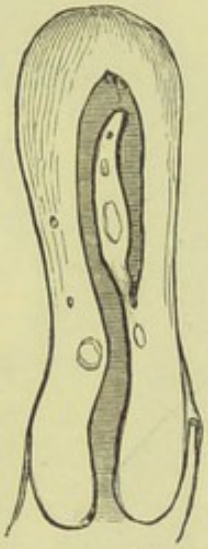


Fig. 52.



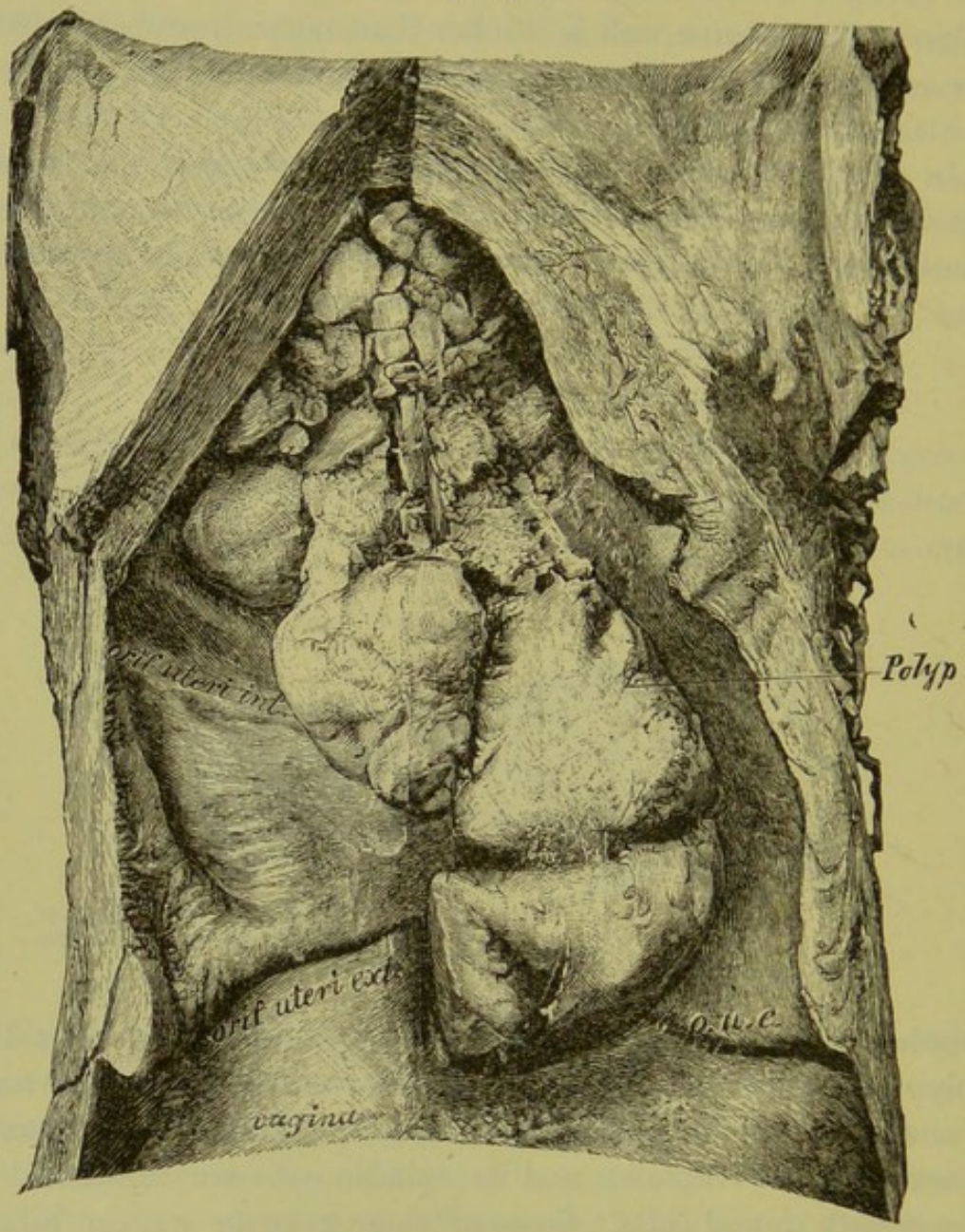
Flat Adenoma of the Body of the Uterus arising above the internal os.

tubules, which are lined by cylindrical epithelium, so that the polyp contains a mass of grape-like thin-walled cysts. The neoplasm is then no longer circumscribed, but diffuse; the stroma is dense and very vascular, and its spindle cells are infiltrated in places with round cells. Some of these growths appear larger than others and project from the internal os, as is shown in Fig. 53, which represents a case of diffuse papillary adenoma of the body of the uterus combined with polypoid adenoma. Similar cases have been reported by Duncan, Slavjansky, K. Schroeder and Gusserow.

Ætiology of Polypoid Growths of the Uterine Mucous Mem-

brane.—These neoplasms are quite frequently found in the cadaver, occurring in our experience in almost 10 per cent. of all female subjects, and as frequently in the cervix as in the body,

Fig. 53.



Diffuse Papillary Adenoma of the Body of the Uterus with Polypi.

but not usually in both at the same time. In 17 per cent. of all cases they occur in groups. In one-seventh of all cases they are associated with uterine myomata, and are then usually found on that portion of the wall in which the myoma is located. This

fact indicates a similarity in origin, as they likewise occur with about equal frequency. The region about the internal os is chiefly liable to the disease, as the glands are more numerous there. They generally appear in patients advanced in years, 70 per cent. of all cases occurring after the menopause, between the fiftieth and seventieth years. They are much less frequently observed in the living subject, as has been remarked by Ch. West, but he simply infers that no attention is paid to them. It appears more probable to me that many of these are never diagnosticated at all, or they may be broken off during the examination. They seldom cause enough discomfort to the patient to demand treatment by the physician solely on their account, and it is also true that after the menopause women less frequently require the aid of the gynecologist.

Gonorrhœal infection is a prolific source of these growths, as are also all catarrhal affections of the genital mucous membrane; they are common in individuals who are subject to hereditary scrofula. Menstrual disorders predispose to their formation. Such growths may also be developed from patches of decidual membrane which have remained attached to the uterus, as has been proven by Küstner, and he has consequently named them "deciduomata."

Symptoms.—In young patients the chief symptoms are abdominal and sacral pain, painful spasmodic contractions, nausea, profuse watery discharges, and irregular, frequent and severe hemorrhages. In aged women in whom senile involution has often led to atresia of the internal and the external os, the hypersecretion of the mucous membrane dilates the cervical and uterine cavities. The brittle walls of the vessels admit of the addition of blood to the mucous contents, and in this way a hematometra may arise, which, while rarely attaining to great dimensions, causes much distress, tension within the uterus, and disorders of the bladder, stomach and intestines. (See Chapter V, on Hematometra.)

Many of these tumors may appear to be recurrent after one has removed a similar tumor, while in reality they were growing in the uterus at the time the first was extirpated, as shown in Fig. 53. The hemorrhages, the albuminous and purulent discharge

and the severe labor-like pains may undermine the constitution of the patient, and, therefore, adenoma lies at least on the boundary between benign and malignant tumors of the uterus.

Prognosis.—The prognosis of circumscribed mucous polypi of the body of the uterus is good, for they generally remain small; their thin walls are easily ruptured, thus diminishing their size; they are often discharged spontaneously, and, when they have once passed the external os, cause no more discomfort. Indeed, many patients have no knowledge of their existence until the appearance of a slightly bloody discharge causes them some anxiety, and leads to the discovery of the tumor.

The prognosis in case of diffuse, flat or polypoid adenomata is, on the other hand, doubtful, as their recurrence and the profuse discharge which they cause suggest malignant growth, and there is no doubt that in many cases they do pass into such.

The differential diagnosis between adenomata of the mucous membrane of the cervix and of the body of the uterus rests upon the seat of their insertion above the internal os, when that is dilated, which is not always easy, while the intrauterine attachment is often dense at the internal os (see Fig. 52). The microscopical examination will reveal a cervical origin when acinous glands are found along with the tubular, or, which is of more importance, when we are able to demonstrate epithelial cells having irregularly located nuclei. They are sometimes recognized during the menstrual flow as a cause of profuse hemorrhage, because the menstrual relaxation often produces such dilatation of the internal os that the tumor is more easily felt. They differ from polypoid myomata in that they are soft and easily torn away, their uneven surface bleeding when touched. Nevertheless, in one case during a hemorrhage, I mistook a fibrous polyp for an adenoma, as its mucous membrane was softened and relaxed, and only a small segment of the tumor could be grasped.

Treatment.—The removal of these tumors is absolutely necessary in all cases, excepting, perhaps, in very old persons and when small cervical adenomata cause no discomfort. But, as a rule, all of these neoplasms must be speedily extirpated. As the pedicle

contains vessels having strongly contractile walls, they may often be removed by the scissors without much resulting hemorrhage. If the pedicle becomes paler when it is elongated, from which we infer that it contains tolerably large vessels, or if the pedicle is thick, it is advisable to first surround it close to its insertion with carbolized silk, then draw down the anterior lip with forceps, and remove the polypus with the scissors. If but little or no hemorrhage occurs, a pad of salicylated cotton is then pressed against the wounded surface. If profuse hemorrhage follows simple division by the scissors, the anterior lip must be drawn down by a tenaculum and the hemorrhage stopped by acupressure, or the cervix should be packed with cotton, which is prevented from slipping out by placing a large salicylated cotton tampon in the vagina.

Large cysts of the lips may be incised or a portion of their wall removed, and when the hemorrhage is severe sutures must be used. The most important detail in these small operations on the cervix is that the entire tumor be removed, and this, on account of its softness and liability to tear, is by no means easy. It is, therefore, in many instances advisable to remove them by the Paquelin or galvano-cautery, after which the adjacent mucous membrane should be cauterized.

It will often be necessary to dilate the uterine cavity by laminaria or tupelo tents before it becomes possible to reach the tumor or to surround the pedicle. When the patient is not anemic, the operation may be rapidly performed by incising the two commissures as far as the vaginal vault, everting the lips, dilating the internal os by a thick metal sound, and drawing down the tumor by a Muzeux's forceps. The galvano-cautery will often render good service. When small flat tumors can be felt in the uterus after the removal of the largest one, the whole cavity must be curetted in the manner to be described under the subject of uterine catarrh. The incisions of the commissures must be carefully united by silk or silkworm-gut after all the tumors have been extirpated. Injections or tampons of solution of subsulphate of iron may be placed in the cavity if the hemorrhage is severe and the patient anemic. The tampons should remain in the uterus for from twelve to twenty-four hours.

After-Treatment.—An ice-bag should be placed upon the abdomen and the bladder and rectum regularly evacuated. The patient ought to remain in bed for a few days and, if there is a tendency to recurrence, this must be combated by early and methodical injections of a 2 to 3 per cent. carbolized solution, or a 1 : 2000 solution of corrosive sublimate. When recurrence takes place after these precautions the operation must be repeated, and if there be yet another recurrence, the whole uterine mucous membrane being occupied with the growth, vaginal extirpation of the entire uterus would be indicated. This operation would be preferable to the supravaginal amputation of the uterus, because the most common origin of the neoplasm is in the region of the internal os, a portion of the uterus which it is difficult to remove by the supravaginal operation.

II. Malignant Neoplasms of the Uterus.

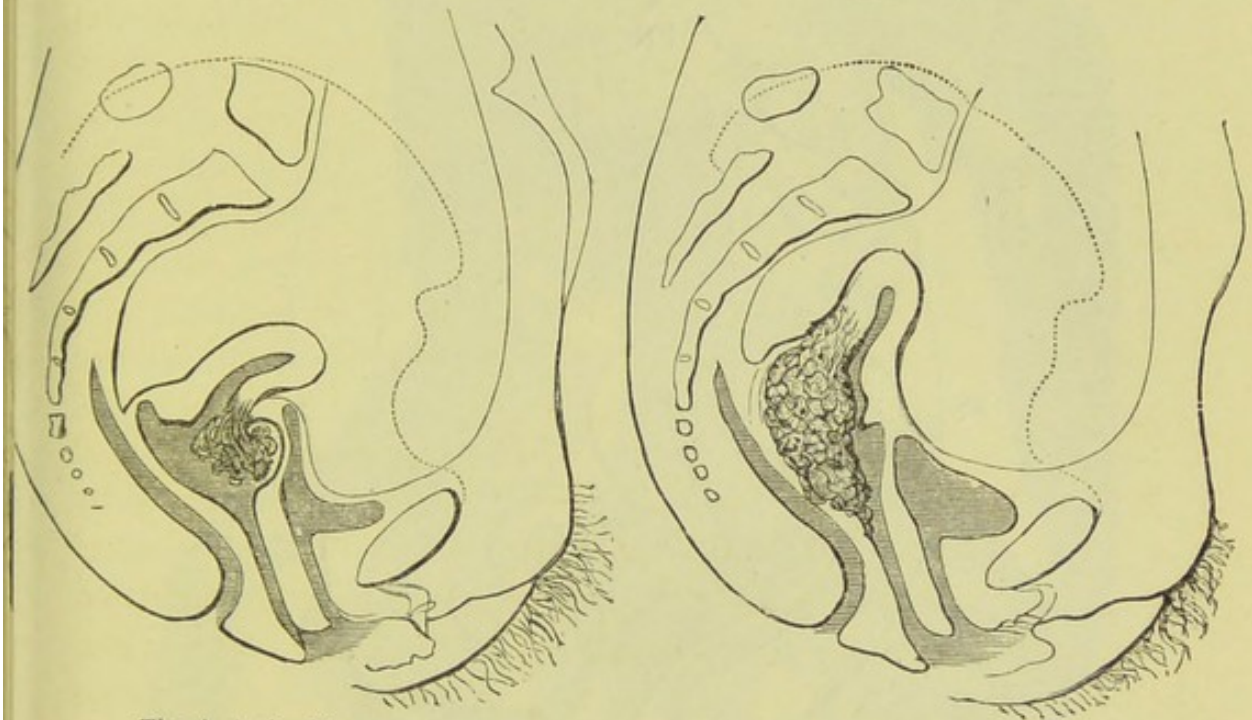
1. *Cancer of the Uterus.*

Historical.—Carcinoma of the uterus was certainly known to the physicians of ancient times, even though the anatomical relations of the vagina and uterus were not clearly demonstrated until a later date (about the middle of the sixteenth century, by Gabriel Fallopius). Carcinoma was known to the ancients as *σκίρος* and *καρκῖνος*. The term cancer is said to have originated with Celsus. Galen described scleroma uteri as a hard tumor which originated in phlegmon of the organ, and which might be of long duration; also the scirrhus as *durities renitens, tumens, inæqualis, verrucosus.* Celsus differentiated the origin of the *ulcus* from a tubercle or furuncle, and the development of *thymia* from the ulceration; he stated that omnis cancer non solum id corrumpit quod occupavit, sed etiam serpit. It is difficult to prove Cleopatra's statement that in carcinoma the blood sometimes passes away with the urine, can be taken as evidence of vesico-vaginal fistula. Moschion describes the uremia which is associated with cancer of the womb. Paul of Ægina recognized scleroma of the uterus, mentioned by Galen, as a variety of uterine cancer.

Pathological Anatomy.—There is still much difference of

opinion in regard to the tissue in which cancer is developed, but at present it is usually classified with those tumors in whose formation connective tissue, vessels, and especially epithelium are concerned; carcinomata are, therefore, epithelial tumors. It is in the uterus, as elsewhere, primarily a disease of the mucous membrane. The essential characteristic of carcinomata is the atypical proliferation of epithelial elements; the term carcinoma should be applied to a growth only when it manifests uncircumscribed development and extension to adjacent tissues.

Fig. 54. Fig. 55.



The Anterior Lip. The Posterior Lip and Vagina.

Cancroid Papillary Tumor of the Lips of the Uterus.

All known forms of cancer occur in the uterus, and show a most characteristic development.

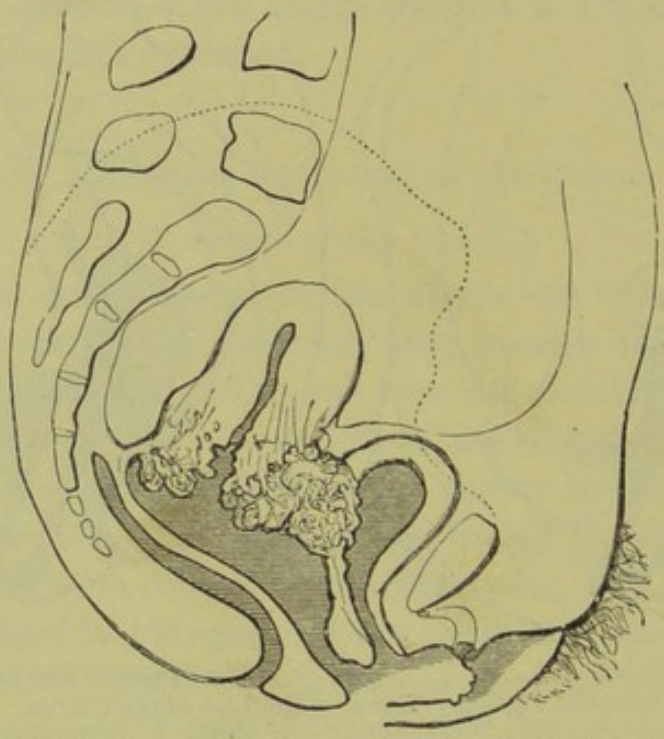
1. The *Cancroid*, a cancroid papillary tumor. This form originates in the external covering of one or both lips, as far as the limits of the pavement epithelium. It grows toward and soon involves the vagina, while the cervical mucous membrane remains unaffected. The lips are thickened and completely fill the vaginal vault; the os uteri is difficult to find. The neoplasm sometimes grows like a fungus from one lip, but rarely from both.

By its similarity in appearance to the surface of a cauliflower it has been named the cauliflower growth (Figs. 54, 55 and 56).

For a long time the upper limit is the cylindrical epithelium of the cervix, which shows, at most, a slightly catarrhal condition; from the vagina it extends into the peri-uterine connective tissue and into the wall of the cervix.

2. Carcinoma or cancroid ulcer of the cervix begins in the deeper strata of the mucous membrane of the vaginal portion or cervix, at first in the form of nodules, the superficial layers of the mucous membrane remaining, as yet, almost unchanged.

FIG. 56.

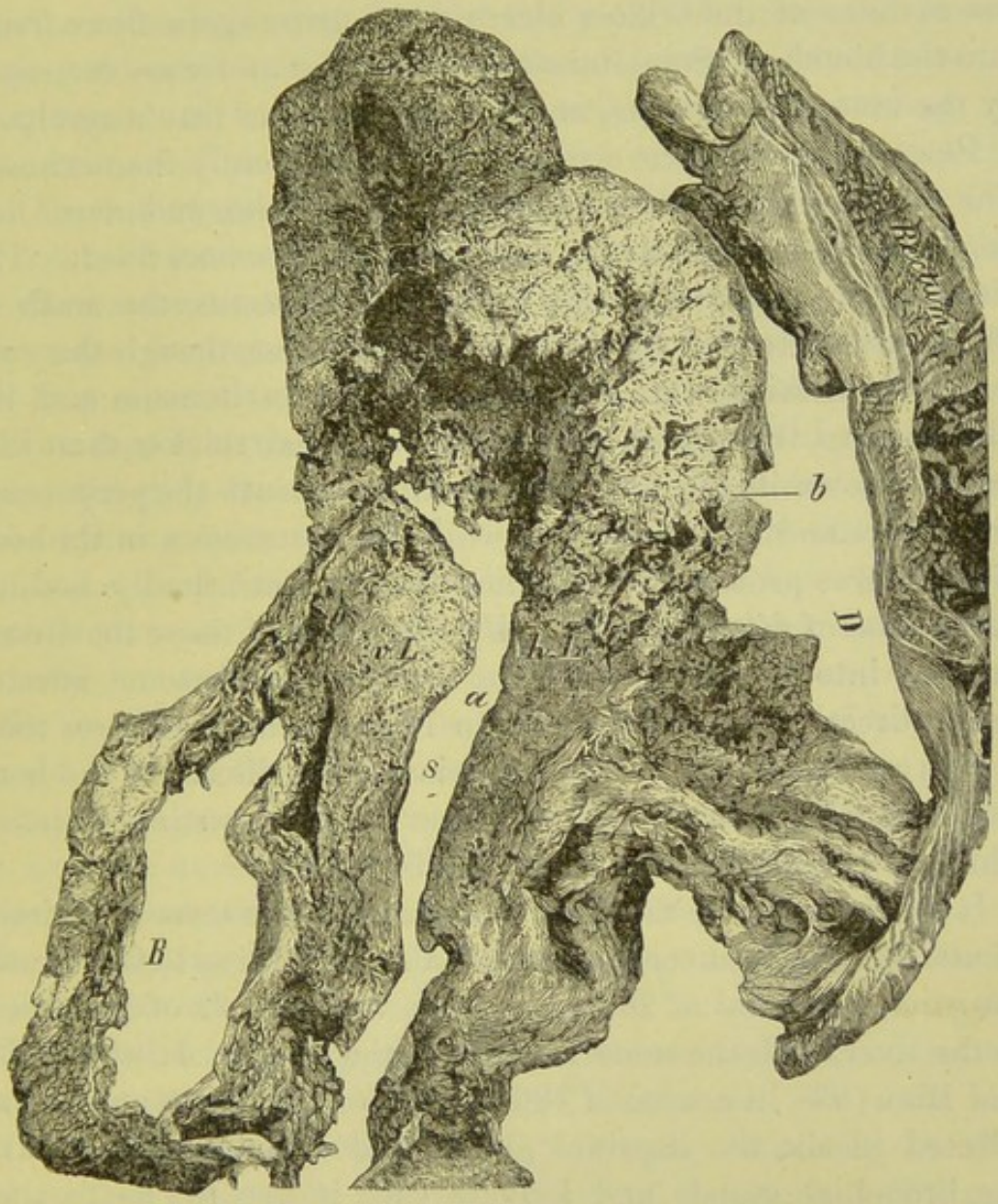


Flat Cancroid of Both Lips, which has extended to the Vagina and Bladder.

These nodules generally project toward the lips or into the cervical canal, or, more rarely, toward the internal os and uterine cavity. As they approach the surface ulcerations rapidly occur. (Fig. 57.) Subsequent study alone can determine whether these nodules are developed from the connective tissue, as maintained by Ruge and Veit, or from the deep portions of the glands (Klebs), or in the intra-papillary depressions in the rete Malpighi of the lips by a growing inward of the epithelium into the connective tissue substratum (Waldeyer), or from papillomata or

the epithelium of newly-formed glands (Ruge and Veit), or from newly-formed utricular glands (Breisky-Eppinger and J. Veit). In all cases the various forms of cancer of the vaginal portion are found to interchange. It usually extends to the vaginal

FIG. 57.



Cancroid Ulcer of the Cervix Uteri.—*a*, external os; *v. L.*, anterior lip; *h. L.*, posterior lip; *b*, perforation into Douglas's cul-de-sac; *B.*, bladder; *S.*, vagina.

vault, as found in 80 per cent. of all cases. From the vagina it first passes to the bladder, the muscular tissue of which becomes infiltrated and the mucous membrane inflamed. The organ is perforated by ulceration from the vagina. Less frequently

nodules are developed in or under the mucous membrane of the bladder, and vesico-vaginal fistula results. When nodules occur near the orifices of the ureters, the latter are occluded or narrowed, and infiltration near the ends of these canals leads to dilatation higher up, and finally to hydronephrosis; the walls of the ureters offer considerable resistance, however, to the growth. As soon as the nodules at the orifices ulcerate, the urine again flows freely into the bladder. Sometimes the walls of the ureter are destroyed by the ulcerative process, and a uretero-vaginal fistula results.

Recto-vaginal fistulæ occur much less frequently than urinary. The growth extends from the walls of the vagina and uterus into the pelvic connective tissue, and the uterus becomes fixed. The disease also passes into the cavity of the uterus, the walls of which are destroyed by the ulcerative process, though the subserous infiltration, the destruction of the peritoneum and the adhesions to the rectum cause them to appear thicker than normal, as shown in Fig. 57. The portions beneath the peritoneum grow more and more adherent, while the destruction in the body of the uterus proceeds from below upward, until finally nothing but a mass of débris remains. By continuity of tissue the disease extends into the tubes, and the ovaries may become affected either directly or by metastasis; in 18 per cent. of all cases these organs are diseased. While extension of the disease to the bony pelvis is rare, I have met with one very interesting instance, which is described in my Atlas, pp. 144 to 146.

It is a remarkable fact that metastasis of the several varieties of utero-vaginal cancer is exceptional. According to Gusserow's statistics, in a total of 283 cases there were but 22 of metastasis to the liver, and the same number to the lungs. Kiwisch (73) and Blau (93), in a total of 166 cases, found the bones and pleuræ affected in six, the inguinal glands and stomach each in five, the bronchial glands and kidneys each in five, the mediastinal glands and heart each in three, the brain, skin, mesenteric glands and supra-renal bodies each in two, and the gall-bladder, dura mater, vulva, muscles and mammæ each in one.

Ætiology.—Females are nearly three times more frequently affected with carcinoma than males. Next to cancer of the stomach, that of the uterus is the most common, about one-fourth

of all fatal cases of this disease being those of uterine cancer. Gurlt found in 11,140 women with tumors 1399 benign and 5029 doubtful and malignant genital tumors; of the latter 3521 were uterine tumors, and of this number 3449 were carcinoma of the uterus and vagina.

Cancer of the womb occurs most frequently in elderly persons. Most cases occur during the first five years following the menopause. About 3.5 per cent. of all female patients have cancer.

In regard to hereditary predisposition, which according to some authors is present in 7.6 to 13 per cent., from my experience I am doubtful as to this frequency; I have noted about 6.3 per cent. of such cases, but in many instances the diagnosis of the disease was uncertain. English physicians have called attention to the frequency of tuberculosis in the families of women who have cancer, and my experience confirms this observation.

With regard to the fertility of women affected with cancer my experience may be thus stated: The large majority of women with uterine cancer are married; of my patients only 1.7 per cent. were unmarried, and two-thirds of these 1.7 per cent. had given birth to one or more children. Von Winiwarter established the same fact as to mammary carcinoma. Women with cancer of the womb are very rarely entirely sterile—only 1.7 per cent. instead of about 20 per cent.

On the contrary, they have as a rule been unusually fruitful; the average number of children of my 130 cases was 5.6; Gusserow confirms this. Particularly is the number of multiparæ twice as great as usual; we found the average number of children of our multiparæ 8.2.

Difficult labors, *i. e.*, protracted or instrumental deliveries, are very frequently part of the history of these cases.

The premature interruption of pregnancy, especially in the first months, frequently precedes cancer of the uterus; 29.2 per cent. of my patients had aborted at least once, and the number of abortions in proportion to the whole number of births was 8.7 per cent. A summary of these statistics proves that pregnancy and labor alone do not cause a predisposition to cancer of the uterus; multiparæ show no greater tendency than others, while such a termination is apparent after numerous difficult labors.

My experience agrees with that of v. Winiwarter respecting other varieties of carcinoma. Hofmeier found only 4.8 per cent. of nulliparæ in 812 patients with carcinoma. Further, he found the average number of deliveries to be 5.2. Funk found 69 sterile women in a total of 925 having cancer. It has been shown that married women are more often afflicted with cancer of the uterus than widows and single women. The proportion of hereditary cases, according to Schroeder, is probably 78 to 948. Prostitutes are not especially liable to cancer of the uterus.

Many authors have stated that great and prolonged mental anxiety, trouble, sorrow, etc., might account for the greater frequency of cancer among the poor than among the rich (Schroeder). In conclusion I will state that, after having in several cases seen a parametritic exudation and subsequent rapid development of papillary cancroid follow gonorrhœal infection, it seems plausible that such specific diseases favor the development of carcinoma.

As is well known, Cohnheim attributed the origin of cancer of the uterus and of all other tumors to irregularities in the embryonic development, *e. g.*, an excessive proliferation of certain kinds of cells at a very early stage. For the production of the tumor in such cases the influence of the nervous system is unnecessary, as the only essential lies in a plentiful vascular supply. In 86 per cent. of tumors of all kinds, no history of traumatism was proved, and, as a matter of fact, traumatism would not develop a tumor, but would probably be followed by hypertrophy and inflammation. The localities at which such growths occur more frequently are the various orifices in the body, due to frequent irregularity in the inversion of the germinal folds. Therefore, in the female genital apparatus, the much maltreated vulva is not the favorite site for cancer, but rather those points at which the pavement epithelium of the uro-genital sinus meets the cylindrical epithelium of the ducts of Müller, *i. e.*, at the external os.

Gusserow considered this hypothesis of Cohnheim to be a welcome acquisition, as it at length furnished newer and more anatomical methods in our efforts to ascertain the causes of the development of tumors; furthermore, we thereby obtain a clearer understanding as to their probable ætiology than has been derived from any theory hitherto advanced.

I opposed Cohnheim's theory as early as 1879, principally because the vaginal portion and not the vulva is the most maltreated part of the genital apparatus, and cancer of the former is ten times as frequent as cancer of the latter.

There is a very great difference in the fertility between patients with myomatous disease and those with carcinomatous; also in the time at which these two varieties of tumors develop, the former appearing much earlier in life than the latter. The fact thatthe number of single and sterile women among those suffering with cancer is remarkably small is not in harmony with Cohnheim's theory.

The influence of traumatism upon the origin of uterine carcinoma may have been greater than Cohnheim concluded, 14 per cent., in view of the fact that the number of multiparæ and of those who have aborted or have been delivered with instruments is so great.

Other gynecologists have opposed Cohnheim's hypothesis. For example, K. Schroeder has recently justly stated that nothing was to be gained by it. If, as Cohnheim himself asserts, many individuals die within whom the germs of neoplasms lie undeveloped, the hypothesis will not explain why those germs should develop into tumors in others.

Symptoms.—The first symptom in five-sixths of all cases of cervical cancer is hemorrhage. This may precede or be associated with profuse, glairy, muco-purulent discharges, with a feeling of pressure and a constant desire to urinate. Sometimes an early symptom is violent itching of the vulva, without any trace of diabetes. Hemorrhage may exceptionally be wanting, even in the later stages of carcinoma, but it is as a rule the most constant symptom, sometimes appearing as menorrhagia, at others as metrorrhagia. It gradually becomes profuse or it may be so from the beginning, even should the patient have passed the menopause.

The discharge from a papillary cancroid before it has become ulcerated is profuse, tenacious, albuminous, finally purulent, containing dead tissue, brownish, reddish and putrid. It will often cease for a time, and then reappear in larger quantity than before, and with offensive odor.

Pain is another almost constant symptom. It is first sacral, later in the region of the kidneys and in the hypogastrium, then in one or both thighs, next in the gastric region, and finally in the head, the neck, in all the limbs; in about 5 or 6 per cent. of cases it is entirely absent. The pain is usually described as being tense, boring, pressing, tearing, lancinating, gnawing or burning. Some patients experience the most pain during defecation or evacuation of the urine, others during vomiting or coughing. Some are never free from it, either during the day or the night. The suffering may be like labor pains if the free passage of decomposing discharges or of masses of dead tissue is prevented. In the early stages the pain is caused by pressure upon the nerves from tension in the uterine walls; but when ulceration occurs, from the terminal nerves being exposed. Again, pain results from pressure upon the nerves in the true pelvis, from compression of the ureters and infiltration of the walls of the bladder. When there is catarrh of the bladder, with disease of the mucous membrane, agonizing pain is felt before, during and after urination; the distress of the patient is increased by the corroding discharge, especially when there are urinary or fecal fistulæ or excoriations of the vulva, perineum or thighs. At times the severity of the suffering diminishes, notwithstanding the progress of the disease, *e. g.*, after profuse hemorrhages, which lessen the hyperesthesia, or when the ends of exposed nerves have been destroyed by ulceration, or when breaking down of single nodules in the tissue may lessen the tension upon the ureters, and thus permit easier evacuation of the urine.

The symptoms referred to the urinary passages during the earlier stages are dysuria, constant desire to urinate, the symptoms of vesical catarrh, the passage of blood and pus in the urine; at a quite early stage there may be lessened discharge of urine from diminished secretion. Another very early symptom is the apparently causeless vomiting, with occasional headache, which appears when the walls of the bladder are affected, and when there is pressure upon the ureters, either at their orifices or higher up in their course. In the former, along with the headache and diminished excretion, there is violent pain upon urination, and frequently catarrh of the bladder. When the

neoplasm has extended to the introitus of the vagina, so that the finger cannot be introduced, the patient makes the greatest effort to evacuate a few drops of urine. The dilatation of the ureters rapidly increases with thickening of the walls of the bladder and dilatation of its cavity; hydronephrosis results and uremic symptoms, such as stupor, followed by convulsions, temporary œdema, anuria and death supervene.

The rectum is less frequently affected than the bladder. The constipation which is so common is less a result of direct compression than of hemorrhage, the want of exercise, the irritating, disagreeable and putrid discharges, the pain and resulting anorexia, and the infiltration into and around the rectal walls, which occurs in about 22 per cent. of recorded cases. In the later stages of the disease, when the neighboring organs are involved, we often find the uterus and rectum adherent and imbedded in a rigid mass which causes dilatation of the sigmoid flexure by retention of scybala, as the passage of fecal matter has become almost impossible.

The fact that septicemia is an uncommon complication of cancer of the womb will be understood when we remember that the infiltration of the adjoining tissues and the inflammation which follows tend to inclose the diseased tissue and thus form a barrier to the absorption of putrid material.

Notable œdema of one or both lower extremities appears as a sequence of compression thrombosis of the larger venous trunks lying in the pelvis and upon the venter of the ilium. In rare instances the carcinomatous process extends to the bones, and may cause luxation of the head of the femur, so that the patient can no longer lie upon the affected side or upon her back, but is compelled to maintain a sitting posture.

Great tension of the abdominal walls and moderate fulness of the abdomen are usually present; there is some ascites, and the increased abdominal pressure is manifested by distention of the epigastric veins. As a rule, the inguinal and retro-peritoneal glands of one or both sides are enlarged. The hemorrhoidal veins likewise become dilated, and the distress of the patient is increased by the pain and irritation which result from the consequent eczema, furuncles, erosions and ulcerations. In isolated

cases there occur anomalies of sensation and motility in the lower extremities. The patient notices a certain weakness in the limbs, she tires easily and has pain in the anterior portion of the thigh shooting down into the foot, or sometimes she may suffer from attacks of sciatica. The latter may be so severe as to constitute the leading symptom, which was the fact in one of my recent cases.

The patients are rapidly exhausted by the hemorrhages, discharges, pain, anorexia and loss of sleep; they become emaciated, the pallid face is wrinkled, the skin has a tawny, icterode hue, the expression is an agonized one, the conjunctivæ pale, and the sunken eyes seem to read in the face of the physician, the confirmation of her fears; even the tyro will recognize in this complexus of symptoms the gravity of the case. Still more distressing than the pains are the numerous symptoms of gastric disturbance. There are an unusually bitter or sweet taste and dryness in the mouth, and a loathing for solid food; there is complaint of nausea, vomiting, of a feeling of pressure and distention, pyrosis and flatulence.

The circulatory and respiratory organs are involved to a remarkably slight degree. Fever rarely accompanies the thrombosis, and the pulse is usually strong in spite of the great loss of strength; it is only after development of uremia that the first change in its frequency and tension is observed. The occurrence of metastases to the lungs induces characteristic symptoms. In the great majority of cases, the mind remains clear even to the hour of death, and the patient observes everything that transpires about her, with a painful consciousness which is increased by the fear of approaching dissolution. Fortunate, indeed, are those who pass away in the stupor of early-occurring uremia.

Exhaustion is the most common cause of death. We are often unable to understand how these patients, who are reduced to skin and bone, who take only a minimum of food, who have vomited persistently for weeks, and who cannot sleep on account of pain, are thus enabled to prolong their miserable existence. This must apparently be largely due to the use of narcotics which lessen the activity and retrograde metamorphosis of the various organs.

In any case, opiates as a means of sustenance under such conditions, are of incalculable value to the patient.

Cancerous patients frequently succumb to intercurrent attacks of acute disease, *e. g.*, peritonitis (in 25 per cent.), either from perforation of the wall of the uterus, from extensive infiltration about the site of adhesions, or from putrefactive discharges through the tubes, as in Gusserow's case. Nevertheless pneumonia, pleuritis, pulmonary embolism, dysentery, amyloid degeneration of the abdominal glands are only occasional causes of death. Uremia is a more frequent fatal complication, occurring in 45 per cent. of cases.

Spontaneous recovery from cancer has been reported, and the piecemeal exfoliation of the diseased tissue, which frequently occurs, passing away in the discharges, may be regarded as an approach to this favorable termination. Positive evidence, however, that cancer of the uterus has disappeared by gangrene or ulcerative processes has hitherto not been furnished.

The duration of the disease is variable, and, dating from the time at which the physician is called upon, the case may last from a few months to three or four years. From 22 cases Gusserow obtained an average of twelve months; Lebert gives an average of sixteen, West seventeen, and Lever twenty months. Seifert's average for medullary carcinoma is eigtheen months, for epithelial thirty-six. The longest duration which I have ever observed—in a recurrent papillary cancroid—was three years and eight months. A. Martin records the shortest duration observed by him as nine weeks; the longest, with repeated operations, as five years.

Diagnosis.—It is evident from the pathology of carcinoma that in its earlier stages the disease can be recognized only by the aid of the microscope; this will reveal the characteristic atypical epithelial proliferation in the tissues, and the consequent destruction of the latter. Pieces should, therefore, be excised from suspicious prominences, nodules and indurations, and subjected to careful examination. Spiegelberg states that simple induration of the cervix, and carcinomatous disease may be differentiated by dilatation with sponge tents or laminaria; the induration and thickening from carcinoma will remain upon

dilatation, because the elasticity of the tissues has been destroyed by the infiltration of the cancer cells, while simple indurations rapidly disappear under the use of the tents. Based upon my own experience, I join with Gusserow in opposing this conclusion. In doubtful cases the results of dilatation cannot be relied upon as establishing the diagnosis, for a cancroid of the cervix may be rapidly and easily dilated either by tents or labor pains, while the converse is often true of simple indurations of the connective tissue.

Cancroid is often mistaken for other diseases. I shall refer merely to the following six affections which resemble it: 1. Conditions which follow premature labor or abortion with incomplete discharge of the ovum are mistaken for cancer on account of the putrid and irritating discharge of pieces of tissue, the protracted hemorrhages and severe pain, and the coëxisting erosions of the lips of the cervix. This mistake may be avioded by subjecting the discharges and fragments of tissue to a microscopical examination, and by the demonstration of villi. Furthermore, in the majority of cases, an accurate history would reveal the true nature of the trouble. Notwithstanding this statement, I have been consulted in one such case in which the physician in attendance had not only given a diagnosis of cancer, but in which he had communicated it to the patient's husband, to convince him of the necessity of an operation. 2. A patient in the eighth month of pregnancy was sent to my clinic on account of a supposed carcinoma of the vaginal portion. No such disease was present, but there was a large development of pointed condylomata of the vaginal vault, of the vaginal portion and of the vagina, which were partially removed before confinement, and the remainder after it. In this instance, also, a microscopical examination would have revealed the absence of atypical epithelial growth, and have prevented error. 3. I once mistook a sloughing intraparietal myoma for a primary carcinoma of the body of the uterus. The great resistance of the tumor, when, after dilatation of the cervix, I attempted to scrape it away, aroused my suspicions, and having cut away some portions of it with the scissors I soon convinced myself that I had to deal with a myoma, a conviction which was confirmed by a microscopical

examination. 4. Partially gangrenous syphilitic ulcerations of the vaginal portion are often very difficult to differentiate from carcinoma, indeed, so difficult that experienced specialists in venereal diseases have sent their patients to obtain my opinion. Without resorting to excision, an attempt to influence the disease by mercurials and preparations of iodine and sulphur will reveal its true nature. It is evident that in all such cases we must not neglect a careful examination of the condition of the neighboring organs, the bladder, the vagina, the rectum, the pelvic connective tissue and the inguinal glands, and also as to the presence of œdema, ascites, etc. 5. Simple erosions and varicose ulcers of the lips have been mistaken for cancer. Excision and careful examination of pieces of the diseased tissue are necessary. 6. Finally, papillary cancroid has been mistaken for prolapse of the uterus.

In the later stages of cervical carcinoma, the diagnosis is readily made by the following symptoms: The irregular hemorrhages, the putrid discharges, the ulcerations, the breaking off of portions of the diseased tissue, the glandular enlargement, the extension of the disease to the adjacent structures, the loss of strength and the cachexia.

The prognosis is affected by the duration and course of the disease, as will appear from what has been said. It is very unfavorable because the majority of cases come under treatment at too late a date to admit of a radical cure. Cancer of the vaginal portion, when recognized early and while it is possible to isolate it from the surrounding tissues, may be extirpated as at other portions of the body, and, indeed, so completely that a permanent cure is effected, and no recurrence of the disease need be feared. This fact has been well established by the experiences of Simpson, C. Mayer, E. Martin, Gruenewaldt, Hegar, Scharlau, A. Martin, Schroeder and the author. If the patients come under treatment late in the course of the disease, operative measures will restore many to comparative comfort for years.

The Treatment of Carcinoma.

1. *General Medical Treatment and Operative Measures other than Total Extirpation.*

Formerly when carcinoma of the vaginal portion occurred, it was at once energetically cauterized with pyroligneous acid, fuming nitric acid, the actual cautery, solution of mercuric nitrate, bromine, chromic acid, corrosive sublimate or chloride of zinc. Each gynecologist thus believed that he had obtained good results from one or the other of these agents. More recently, however, we have come to the conclusion that none of them suffices to root out the disease when it has once invaded the tissues, and, therefore, the removal of all suspicious portions of the cervix by the knife has come to be regarded with increased favor.

The operation may be performed with the knife, scissors or the actual cautery. If the disease is confined to a single lip, the incision should be made first in the lower and then in the upper surface, similarly to that in wedge-shaped excision of the lips; all indurated tissue must be removed and the base of the wound made perfectly smooth. If the sutures are carefully introduced, union by first intention may be secured. If there is the slightest suspicion that portions of diseased tissue remain in the wound, they must be destroyed by the actual cautery and the cauterized surfaces carefully united.

When the process is confined to one or both lips, an excellent way of completely extirpating the diseased portions is by means of the Paquelin or galvano-cautery. In several instances I have secured perfect recovery in this way, in one case six years having passed since the operation. But when the tissues are diseased up to the region of the internal os, Schroeder's operation, that of supra-vaginal amputation of the cervix, is indicated. This operation may be performed upon one lip alone or upon both, and may include the entire vaginal portion. The vaginal portion is drawn down to the introitus of the vagina by Muzeux's forceps, and a loop of strong thread passed through each lateral vaginal vault, which serves to assist in drawing down the parts, compresses the uterine artery and its branches, and finally makes a firm uniting suture of the vault. The vaginal wall is next divided transversely, beginning at the anterior lip and carrying the incision at

least 1 centimeter ($\frac{2}{3}$ in.) beyond the neoplasm; the vaginal wall is now dissected from the bladder, and the latter separated for some distance from its connection with the anterior wall of the cervix, bleeding arteries being at once ligated. The Muzeux's forceps is then raised so that the posterior vaginal vault is exposed, and this portion of the vagina is divided transversely in a similar manner. The peritoneum is then dissected from the uterus above the incision, which is a difficult task and one liable to lead to its injury; this, however, is not a very serious matter if strict antiseptic precautions are observed. The two transverse dissections are next united by lateral incisions, and the cervix loosened from all its connections by passing the finger or handle of the scalpel around until the separation is carried above the neoplasm; during this stage of the operation it may be necessary to ligate several of the uterine vessels. The anterior cervical wall is now incised up to the internal os, and the anterior vaginal wall united with the healthy mucous membrane at the margin of the transverse wound in the anterior wall of the uterus, so that the sutures between the bladder and vagina pass through the entire thickness of the uterine wall into its cavity. The knotted sutures are used to fix the uterus while the posterior uterine wall is cut through and the posterior vaginal wall united to the stump in a manner similar to that just described; the remainder of the wound is then united by deep sutures.

When it is possible, by means of this supra-vaginal extirpation of the cervix, to remove the cancroid tumor and the cervical cancer below the internal os, the operation answers all the indications, but when the disease has already extended to the body of the uterus, it is no longer of value. In such cases the lives of some may be saved by the total extirpation of the uterus.

History of Total Extirpation of the Uterus.

It has been asserted that Soranus, A. D. 100, Aëtius and Paul of Ægina had considered the possibility of total extirpation, and that the operation was performed by some of the surgeons of the time, but all such assertions are doubtful. Andreas Crucé, 1560, was the first who removed the carcinomatus uterus by an operation; Osiander, 1808, and Lisfranc removed parts of the organ.

In 1810, the Imperial and Royal Joseph Academy of Vienna, offered a prize for theses upon this subject, and, in 1814, the prize was awarded to Gutberlet, who suggested a method by which the uterus should be removed through the abdominal walls. In 1825, K. M. Langenbeck first performed this operation, the patient dying of peritonitis. The same operator had removed a carcinomatous uterus through the vagina in 1813, the patient living 30 years after the operation. In 1822, Sauter operated from the vagina; he injured the bladder, from which accident the patient recovered, but died four months later. Blundell repeated this operation in 1828; the patient lived one year and then died from a recurrence of the disease. In 1830, Recamier and Delpech performed the vaginal operation; the patient recovered; but following this there were so many fatal operations that total extirpation was almost forgotten for the next forty years, until, in 1878, after Lister's method of treating wounds had inspired confidence, W. A. Freund successfully removed the entire uterus by abdominal section.

After having carefully disinfected the vaginal ulcerations, Freund opened the abdominal cavity by an incision extending from three finger-breadths below the umbilicus to the pubic symphysis, and then lifted out the intestines; these were protected during the operation by being covered with a moistened towel. He then, with the hand, separated the adhesions which fixed the uterus, passed a large lance-pointed needle, carrying a strong cord, through the body of the uterus, and drew it upward. The uterine appendages being now exposed to view and rendered tense by traction upon the uterus, he ligated them in three portions, viz, from the Fallopian tube to the ovarian ligament, from the latter to the round ligament, and from that point through the vaginal vault. The last ligature must include only a small portion of the vaginal vault, or it will not exert firm compression, and fatal hemorrhage from the uterine artery may ensue. After tightening these ligatures upon each side of the uterus, the peritoneum is incised just above the internal os, the bladder separated from the uterus by a blunt instrument, the posterior vaginal vault then opened from above, and the uterus, after cutting through the tissues between it and the ligatures, removed through the abdominal

incision. Next, the surfaces of the wound are carefully examined, and bleeding arteries ligated. The abdominal cavity is thoroughly disinfected from above by a carbolized solution, the ligatures drawn down through the vagina, a tampon saturated in a 10 per cent. solution of carbolized oil placed in the wound in the roof of the vagina,, and the edges of the uninjured peritoneum united by a series of button sutures. After replacing the intestines, the abdominal wound is closed by silver wire.

The chief dangers in this operation consist of the shock incident to the protracted exposure and cooling of the intestines, in the infection, peritonitis and pelvic inflammation, hemorrhages, and finally in injuries of the ureters and bladder.

To guard against shock, Wegner recommended performing the operation in a room heated to 86° F. To prevent septic peritonitis, all the carcinomatous tissue should be removed through the vagina before commencing the operation. In order to make the uterus more mobile and to facilitate its removal, the circular division of the vaginal portion from the vaginal vault—laparohysterectomy—was introduced by Rydygier; or, after evacuating the bladder and rectum, the uterus was pushed up within reach of the operator by placing a colpeurynter in the vagina.

As a means of avoiding hemorrhage, Kocks recommended that as the uterine artery does not ascend close to the uterus, but is about 1 cm. ($\frac{2}{5}$ in.) from it, the upper portion of each broad ligament be included in two ligatures, one for the tube and ovarian ligament, another for the round ligament, and that the rectum and bladder be separated from the uterus, and then a ligature passed around the uterine artery by means of a curved needle; this will prevent inclusion of the ureters.

K. Schroeder suggested that, instead of the two ligatures, a single one be placed external to the tubes and ovaries, thus permitting the removal of these organs with the uterus.

Bardenhauer guards against septic peritonitis by passing a drainage tube into the vagina from Douglas's cul-de-sac.

Very skillful operators, such as Billroth, Czerny, Olshausen and Bardenhauer, injured or ligated a ureter in performing Freund's operation; Spiegelberg and Oelschläger have even injured both.

When the recti muscles are rigid, Freund divides their tendons at the symphysis.

Credé, Jr., found there was still difficulty in operating upon the uterus on account of its low position in the pelvis, and therefore resected that portion of the anterior pelvic wall which corresponds to the symphysis as low as the obturator foramen, not removing the pubic arch, however, yet leaving a thin arch of bone to mark its position; eight days later he extirpated the uterus.

It will be seen that many attempts have been made to improve upon the laparohysterectomy by Freund's method, and though some operators have met with fair success, still, on the whole, we must consider the operation as abandoned, for it has been followed by such unsatisfactory results. According to C. von Rokitansky's statistics, of the 95 cases operated upon after Freund's method, 65 died under the operation, and of the remaining 30, not a single one escaped without a recurrence of the disease.

In 1879 Czerny advised substituting vaginal extirpation, and Billroth, Schede, Martin, Olshausen, Schroeder and others soon followed this practice.

The operation may be performed according to five different methods. The first consists in turning the uterus over and bringing it down through the opening made in the posterior vaginal vault; the second method, that of P. Müller, in longitudinal division of the uterus; the third, Olshausen's, in drawing down the uterus and extirpating without turning as in the first method; the fourth, that proposed by Fritsch of Breslau, in beginning the separation of the uterus on each side, at the broad ligaments.

1. Czerny's operation: After thorough disinfection of the vagina by a 5 per cent. carbolized solution and drawing the uterus down to the introitus by Muzeux's forceps, the vaginal vault is completely opened around the uterus, which is loosened from the bladder by the finger, and Douglas's cul-de-sac opened by a free incision; the uterus is then turned backward and brought through the vaginal incision either manually or by the help of a sound or Muzeux's forceps. The finger is now passed up in front of the uterus to serve as a guide while the operator opens the peritoneum on the anterior uterine wall, and ligates

the broad ligaments in from three to six portions upon each side so that the uterus may be excised between them. Should any vessels bleed during this part of the operation, they are to be immediately ligated.

2. The method suggested by Olshausen differs from the preceding in that the uterus is not turned backward, to be separated from its connections, and extirpated. He draws down the vaginal portion by Muzeux's forceps, and fixes it with several loops, one upon each side; he then disinfects by a carbolized solution, paints the vaginal portion with a ½ per cent. solution of corrosive sublimate, and makes a circular incision, dividing the entire vaginal wall 1 centimeter (⅔ in.) above the diseased tissues, and gradually separates the connections of the bladder and rectum by the finger. Bleeding vessels are ligated, and when the hemorrhage has ceased, the uterus is drawn further down until the tense broad ligaments can be distinctly felt. The peritoneum is opened by the blunt Cooper's scissors, and the wound dilated by the index finger. Douglas's cul-de-sac is opened in the same manner. A rubber ligature is now passed around the left broad ligament by means of an aneurism needle or similar instrument, tightly drawn, and tied in a double knot, after which the ligament is divided close to the uterus, and to the median line from the ligature. The right ligament is divided in the same manner. Bleeding vessels are usually closed by sutures.

3. Peter Müller facilitated the vaginal extirpation, with or without turning the uterus backward, by dividing longitudinally into halves the vaginal portion and the body of the uterus, bringing down one part at a time, and carefully ligating the broad ligament in sections. The hemorrhage from the surfaces of the wound is to be controlled by compression. It is slight, as a rule, as I know from personal experience. The division of the uterus by a blunt-pointed knife or the scissors occupies but a few minutes, and the uterine ligaments can be ligated with much greater certainty than in the preceding methods.

4. Fritsch * operates first upon the broad ligament, loosens the vaginal portion, first at the sides, controls the hemorrhages by

* *Centralblatt f. Gynäkol.*, 1883, p. 585.

sutures, draws the uterus to one side and separates its connections for a distance of 5 cm. to a point above the uterine artery; the other side is treated in the same way; the lateral incisions are united by anterior and posterior incisions into the vaginal walls, an elastic ligature placed in the incision, which is now circular, and the bladder and uterus separated by a blunt instrument. The uterus is now turned down anteriorly, and the fundus brought out by the finger, a tenaculum or forceps, while the lower portion is firmly held by the ligature. The ligatures are then applied from above downward, as in Freund's method.

The most difficult part of all these operations is opening the peritoneal cavity before and behind the uterus, because there is great danger of getting away from the uterus, and thus injuring the bladder or rectum.

5. From my experiments upon the cadaver, it appeared to me much easier to remove the uterus by means of spiral incisions, as in the following manner: After securing the cervical portion, the incision should begin in the anterior vaginal vault and be carried spirally around the cervix, ligating vessels when necessary, and exerting steady traction upon the uterus. The peritoneal cavity is easily penetrated in this way, and posteriorly, the entire supra-cervical portions of the broad ligament can be plainly seen and ligated in position. The advantages of this method are that the uterus is made very movable about its periphery, and is therefore much more easily drawn down; the boundaries of its peritoneal connections are more easily found, and even inexperienced operators have little trouble in opening the anterior and posterior cul-de-sacs.

All writers agree that when the tubes and ovaries are easily drawn down, they should be removed with the uterus. They cannot be of use to the patient, and it is possible that the germs of disease are lurking in them and may cause a recurrence.

Again, it is generally believed that the vaginal wound can be best closed by sutures, and that it is prudent to place a large drainage-tube in Douglas's cul-de-sac, so that any secretions from the wound may find an exit. But it has been objected that it is unnecessary to provide for any discharge of the secretions, except those immediately after the operation, as it is desirable that

the parts should unite as rapidly as possible. The serum which is poured out, often in large quantities, after every abdominal operation, is harmless in character as a rule, and an exit is as unnecessary as it is after an ordinary ovariotomy. For these reasons, a number of operators, among them Kaltenbach, Olshausen, Mickulicz, Teuffel, Tauffer and myself, have expressed themselves in favor of complete closure of the abdominal cavity. This question, however, needs further study. In any case, whether the opening be closed or left open, the vagina must be loosely packed with 10 per cent. iodoform gauze; the strips should be united, so that they may be easily removed by drawing continuously upon the end. Finally, a jute tampon is placed upon the vulva and kept in position by a T bandage.

The subsequent treatment is, in general, similar to that after ovariotomy. The patient should have but a small quantity of water, ice or wine, and these only when there seems to be danger of collapse; otherwise no food at all. Collapse must be combated with ether, cognac or champagne. The urine should be drawn off by the catheter three or four times daily. After removing the iodoform gauze on the third day, tepid injections of carbolic acid or of a 1 to 1000 solution of corrosive sublimate should be made several times a day. The bowels may be evacuated on the fifth, sixth or seventh day by an injection. After the ninth day, the patient may lie upon her side, and she may leave the bed at the end of the third week; the sutures must be removed at this time, the patient being in the latero-abdominal position.

Apart from septic infection of the peritoneum, the chief danger in vaginal extirpation is from hemorrhage. Billroth employs a clamp which is applied for a few minutes, until the fluids have been expressed from the tissues; the ligature is then placed in the furrow or groove made by the clamp. By using the Helferich snare-forceps a long silk thread may be employed for ligating.

The bladder has been injured in four instances in the vaginal operation; first in Czerny's case, in which death occurred in forty hours from septic infection; a second time, by Billroth, with a fatal issue in thirty hours from peritonitis and pelvic cellulitis; again, by Helferich, whose patient recovered, but died eighteen

months later from recurrence of the disease. Anderson also injured the bladder in one instance, but the wound closed and the patient recovered. The ureters lie so high that it is hardly possible to injure them in the vaginal operation; nevertheless, as Saenger states, this accident happened to K. Schroeder.

Roth, Laue and Helferich have had their operations complicated by prolapse of the intestine, Roth's patient dying from peritonitis.

Though with improvement in the technique of the operation the prognosis has become more favorable, still the mortality is great, and recurrences appear so soon that but little is gained for most of the patients who make a good recovery from the operation. The statistics of 122 operations performed previous to 1888 show that 88 recovered, 25 died from the operation, and 9 operations were unfinished. This gives a mortality of 27 per cent. from the operation *per se*.

Recurrence after this operation takes place very often in three or four months. A. Martin stated at Eisenach, in 1882, that he had seen but a single woman who had not had a recurrence in less than a year and a half. In his text-book, published a year and a half later, he states that he knows of but eight cases in which there was no recurrence after two years and a half; one woman escaped for five years, and he hoped that she was really cured.

Schroeder's results, as published by Hofmeier, are more favorable. Thus, of 105 operated upon by the vaginal or supra-vaginal method, 13 died, an average of 12.3 per cent.; of 34 total extirpations, 9 ended fatally, averaging 26 per cent. Of 47 patients who had survived the vaginal or supra-vaginal operation, 11 or 23.4 per cent., were still well at the end of two years, 47 per cent. had had a recurrence, and 30 per cent. had escaped further observation. Of 9 upon whom the vaginal operation was performed, 3, or 33 per cent., had no recurrence at the end of two years. Of 78 upon whom the radical operation was done, 24, or 31 per cent., remained well at the end of two years.

C. von Braun obtained still better results from the galvano-caustic method, as of his 136 cases but 10 died; 33 had remained without recurrence for one year, 26 over two years, 2 for twelve

years, and 1 for nineteen years and a half. Baker has also had excellent results from deep funnel-shaped excision and subsequent application of the actual cautery.

It cannot, therefore, be asserted that operation by the knife alone is preferable under all circumstances; Schroeder has recently operated by a combination of these methods, first using the knife to excise all diseased tissue as completely as possible, controlling the hemorrhage and passing wire sutures as necessary, and then thoroughly cauterizing the whole surface of the wound with the actual cautery; vessels which bleed subsequently are to be ligated with silk. He also hopes to be able to adopt this combination of knife and cautery in total extirpation.

It is very difficult to establish the exact indications for extirpation of the uterus. Two conditions are essential for the vaginal total extirpation: (1) The disease must have extended to the body of the uterus, and (2) it must be confined to the uterus, *i.e.*, the body and cervix must be freely movable, and no fixed condition of the organ or infiltration of adjacent parts be present. The rapid recurrence in so many cases is in itself evidence that the operation is often performed without due consideration of these conditions. An operation is not to be commended which is fatal in at least 25 per cent. of all cases. The contra-indications are considerable thickening of the cervix from the extension of the disease to the adjacent tissues and circumscribed nodules and indurations in the pelvic connective tissue or in Douglas's cul-de-sac; it is then too late for an operation.

When the radical operation is no longer of avail, we must resort to symptomatic treatment to meet such indications as relief of the pain, diminishing the foul discharges and sloughing, controlling the hemorrhage and regulating the digestion and nutrition.

Opium and its various preparations and derivatives, employed externally, internally and hypodermically, are indicated for the pain; in such diseases opium is an incomparable remedy.

The ichorous discharge and hemorrhage are diminished by scraping the carcinomatous growth with the curette, a practice which had been employed in other affections by Sédillot, Récamier and Volkmann, before it was suggested by Simon in this

disease. But too much force must not be exerted, as the uterus is easily ruptured or Douglas's cul-de-sac penetrated, and fatal peritonitis produced—results which might likewise follow the use of the Paquelin, the galvano-cautery or the hot iron. Von Rabenau suggested uniting the carcinomatous tissues by sutures to control the hemorrhage, and A. Martin has adopted this with good results in twelve cases; and I have also frequently sewed up the tissues after cauterization. It is obvious that the curette should no longer be used if the walls of the bladder or ureters have been infiltrated to such an extent that a lesion of either might be feared.

Routh, Wynn Williams and K. Schroeder have recommended that the granulating surface be cauterized, after scraping, with an alcoholic solution of bromine, 1 to 5, instead of the actual cautery. To prevent its irritating action upon the organs of respiration it is best applied upon pieces of cotton which are held against the surface of the wound by a tampon. This solution is very powerful, but its action is too superficial, and I see no reason for preferring it to the actual cautery.

Whenever the hemorrhage is profuse, styptic injections must be used, such as vinegar and water, dilute solution of sesquichloride of iron, 1 to 5, or tampons saturated in these solutions may be applied to the bleeding surface. Alum or tannin may be incorporated with cacao butter or sprinkled upon cotton and placed in the vagina. A prompt effect is produced by pouring diluted solution of sesquichloride of iron through a speculum directly upon the bleeding surface. Permanganate of potash in concentrated solution is of service in correcting the offensive odor. Iodoform has been employed in powder, in gauze and in suppositories, for the same purpose, but it cannot be used continuously, as its odor becomes intolerable to the patient and her attendants. Chinoidine sprinkled upon the ulcerations through the speculum is less objectionable; it removes the odor and improves the appearance of the ulcer, but it causes violent pain when brought in contact with wounds upon the surface of the body, and it must be ascertained whether its action is the same when applied to carcinoma of the cervix.

The uremic symptoms, nausea, anorexia, vomiting, headache

and distress in the stomach are at first treated with tonics, such as tincture of ignatia amara or compound tincture of cinchona, with mustard-plaster to the epigastrium, and later with ice internally and also upon the head. In persistent uremic vomiting I have used with advantage one-drop doses of tincture of iodine in water. Again, temporary improvement may be occasionally observed without the administration of any remedies.

Warm baths are very acceptable to many patients, while others fear them on account of subsequent hemorrhage.

Obstinate constipation is relieved as long as possible by injections of from one to one and a half quarts of tepid water; but the temperature of the water may be varied to suit the conditions. When these prove ineffectual, drastics should not be at once employed, but rather mild cathartics, such as magnesia, rhubarb, laxative Indian fruit, compound liquorice powder and cherry alder bark. These remedies may be frequently changed and given in combination.

The strength of the patient must be sustained chiefly by vegetables and nutritious, well-spiced soups and broths. The majority of patients soon refuse meats of all kinds, though many are refreshed and strengthened by game, *bouillon*, fresh meat-juice, oysters, sardines, caviar, ices and strong wines.

I will mention but two specifics, viz., condurango and Chian turpentine. The former is often of service in gastric and intestinal complications in the form of a decoction 15 : 175; it lessens the pressure, nausea and anorexia, but it will never cure a cancer. Chian turpentine has been warmly recommended from time to time, but little or nothing has been so far accomplished by its use in Germany. It was only a few weeks ago that its action was highly praised to me by colleagues in Odessa.

Cancer of the Body of the Uterus.

Pathological Anatomy.—Carcinoma of the body of the uterus, not involving the cervix, may be primary or secondary. Primary carcinoma begins either in the superficial epithelium or in the glands of the mucous membrane. In the first variety we find occasional isolated glands more or less involved, but it is chiefly the cells of epithelial carcinoma that infiltrate the uterine

mucous membrane and muscular tissues in irregular strands; the cells may be found in various stages of development, as small as the interglandular cells, or in round or cone-shaped masses as large as decidua cells. When degeneration of the carcinomatous tissues takes place, the interior of these masses is composed of débris, fat corpuscles, granular matter, colonies of micrococci and isolated groups of cells; the vessels are obliterated, and pigment deposits occupy their place; but in the deep tissues the vessels are tolerably well preserved. The other variety of primary carcinoma of the body is that which is known as adeno-carcinoma, due to change of type in those polypoid neoplasms developed from the glandular endometrium. This variety grows toward the cavity and develops new glandular tubules which, while covered at the periphery by cylindrical cells, have, according to Breisky, pavement cells and cancroid masses in their interior.

I am unable to state with certainty whether the so-called parenchymatous variety of uterine carcinoma occurs primarily in the body as it does in the neck of the uterus. Klebs* states with reference to it: "The point of origin of this neoplasm cannot be determined with certainty. The probability is that it arises from the vicinity of the internal os, at which point a predisposition to the development of deep-seated carcinomatous neoplasms exists, on account of the great number of ovula Nabothi. This hypothesis explains the uniform development of nodules in the substance of the body of the uterus and of the cervix. Those carcinomata are probably very rare which originate in the body of the uterus, *i. e.*, from the uterine glands." It seems to me that the region of the internal os is peculiarly liable to infiltrating carcinoma, because of the larger development of glands at this point. When the neoplasm has penetrated the wall of the uterus, it causes adhesions with the bladder or rectum (shown in Fig. 58), tubes or ovaries, becomes encapsulated, and may finally form a large, offensive, suppurating cavity.

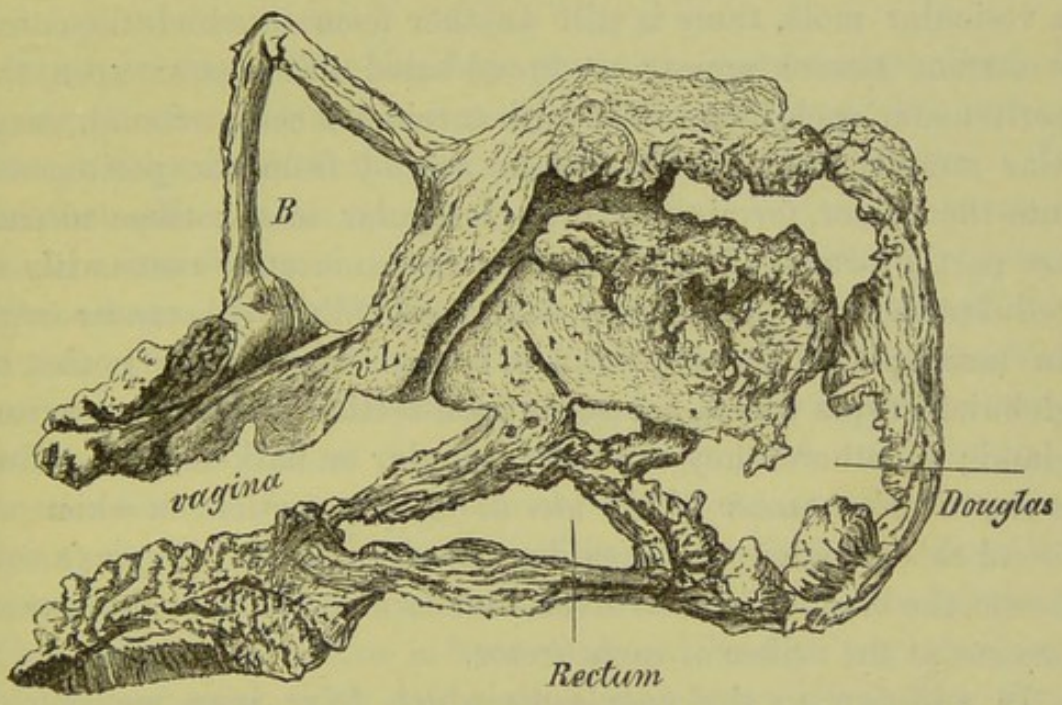
Secondary cancer of the body of the uterus is associated with carcinomatous disease of the bladder or rectum and, in all such cases, has extended beneath the peritoneum and throughout the

* II, 869.

pelvic connective tissue.* There are other cases in which it is possible the primary affection was ovarian cancer combined with cancer of the villi of the fundus of the uterus.† But much more frequently secondary cancer of the uterus is a cancer of Douglas's cul-de-sac, which thence extends to the posterior wall of the uterus, to the tubes and ovaries. In two instances only have I been able to study this variety on the cadaver.

In the first one examined the carcinomatous growth was found upon the peritoneum in the form of globular polypi attached to

FIG. 58.



Primary Cancer of the Body, with Retroflexion.—Origin from the posterior wall. Perforation into Douglas's cul-de-sac. B, bladder.

it by a very delicate pedicle. The stroma of these polypi was a striated, wavy connective tissue arranged in alveoli. The walls of the alveoli were of varying thickness, and inclosed an almost amorphous transparent substance, in which carcinomatous cells of medium size and having a large nucleus were distributed either irregularly or in the form of gland-like tubes. The cancer cells were located about the middle of the alveoli, the walls of the latter being entirely without epithelial covering. At intervals

* Freund, *Virchow's Archiv*, LXIV, 1. † Klob, p. 372.

larger cavities had been formed by the disappearance of the alveolar walls, and in these spaces the remnants of the walls could be seen. In the groups of cells were larger, shining bodies, degenerated cancer cells and dotted lines, results of the destructive process. The thin pedicle was formed of striated connective tissue, and was abundantly infiltrated with very small, transparent cells, together with isolated nests of perfectly developed cancer cells. The interspaces in the peritoneal connective tissue were also filled with masses of cancer cells.

In contradistinction to colloid cancer of the uterine peritoneum, which when recent has very much the same appearance as a vesicular mole, there is still another form in which the carcinomatous tissues appear as broad-based, flat tumors upon the peritoneum, each being filled with carcinoma cells. Small, irregular strands of connective tissue ascend from the peritoneum into the tumor, forming in it an irregular mesh; these meshes are partly formed of clear, structureless connective tissue without cellular elements, and partly completely filled with cancer cells. In many places the appearance is precisely similar to that of globular crypts which are seen upon section of a large cervical gland; in others, they are more tubular or flask-shaped. This is the *alveolar cancer of the uterus.* In the patient in whom we found this affection which evidently originated in Douglas's cul-de-sac, the bladder was involved, and carcinomatous nodules were present at the orifice of each ureter.*

In addition to the neoplasms which have been mentioned, other and similar primary growths are met with on the peritoneum, and especially in Douglas's cul-de-sac; these have been described by R. Schulz as proliferations of the endothelium of the peritoneal lymph vessels, and also by Waldeyer, as plexiform angio-sarcomata. They are usually associated with tumors of other organs, especially of the ovaries.

Ætiology.—That which has previously been said as to the ætiology of uterine cancer will apply to primary and secondary carcinoma of the body. They show, however, from this standpoint, some peculiarities: First, they are most common in very

* Plate xxiii *c*, and plate xix, Fig. 4.

old persons, and, second, they are more frequent than cervical carcinoma in virgins and nulliparæ, and, finally, they are extremely rare, which is rather remarkable when we consider the great number of uterine glands, and their frequent changes from recurring pregnancies. There are but three or four cases of carcinoma of the body of the uterus to one hundred of that of the cervix. Larger statistics are of little importance, for although the number of cases in which the diagnosis was certain has been increased by Freund's operation, still Gusserow was unable, only five years ago, to collect more than eighty, and this number is too small to warrant many definite conclusions in regard to the ætiology of the disease.

Symptoms.—The chief symptoms are hemorrhage, pain, offensive discharge and emaciation, as in carcinoma of the cervix, though they manifest themselves in a characteristic manner. In the first place, while the discharge of blood is very frequent, it is inconsiderable, and is only a mucus tinged with blood; profuse hemorrhages are rare, a fact which has an obvious explanation in the vascular arrangement of the inner layer of the uterus which has been described. The pains, too, are frequently not very severe, even when the disease has made great progress. One of their peculiarities is that they often occur in paroxysms at regular hours, to wit, when fragments of tissue are expelled from the uterus or when retention of the secretions excites its contractions. The discharge of friable masses of tissue through an intact cervix in connection with moderate hemorrhages gives very great diagnostic information.

Moreover, the diagnosis of primary cancer of the body of the uterus is not always easy. It must first be ascertained that the uterine walls are in a perfectly healthy condition up to the internal os; further, that there is no primary cancerous affection of Douglas's cul-de-sac and the adjacent organs; and fragments must be obtained from the discharge and a microscopical examination made. When no fragments are discharged, nothing but a tenacious muco-purulent flow occasionally mixed with blood being present, it is advisable, without loss of time, to pass a small Simon's spoon into the uterine cavity, and scrape out some of the mucous membrane, submit it to careful microscopical examina-

tion and thus remove all doubt as to the nature of the disease. The diagnosis of secondary carcinoma of the uterus will depend, first, upon existing carcinomatous disease of adjacent organs; secondly, upon the demonstration of the fact that the mucous membrane of the body and cervix are perfectly intact; and, thirdly, upon the recognition of the carcinomatous nodules in the walls of the uterus externally by rectal or vaginal examination. That a carcinoma which has involved the vagina, bladder, rectum and uterus did not originate in the last will be known from a history of the preceding disease of the former. As soon as ascites appears the trocar should be used, and the fluid obtained examined with the microscope. The presence of cancer cells confirms the diagnosis, but their absence is not negative proof, a fact often observed because there are as yet no ulcerations, but only a little blood in the ascitic fluid. If there still remains any doubt, the growth may be removed by a small exploratory incision through the abdominal walls.

Prognosis.—The prognosis is very unfavorable, the average duration of the disease being less than two years. The pain may be less severe in consequence of the diminished tension resulting from the rapid destruction of the uterine walls; the patient may be restored by an early excision of the carcinoma, but the number thus operated upon is still very small, and the recovery too transient to permit positive statements. Of 17 patients operated upon by Schroeder, 6 died, in 3 the disease recurred during the first year, 4 remained well for over 2 years, 2 for 5 years, and in 4 instances the final result was unknown.

Treatment.—As long as the diagnosis is uncertain, the affection of the interior surface should be treated as catarrh of the body of the uterus. When cancer is diagnosticated, the removal of the body of the uterus is indicated, subject to the same condition as previously stated in total vaginal extirpation of the uterus. When the disease has extended below the internal os, vaginal extirpation is indicated, or Freund's operation if the uterus is so large that its removal through the vagina would be very difficult. But excision of the carcinomatous uterus is applicable in only few instances, for the mortality is 33 per cent. from the operation, the disease recurs in almost 25 per cent. within the first year, and

only 25 per cent. remain well for two years. The results of the next 17 operations by the same or other operators* may make even this apparently favorable showing decidedly more unfavorable.

As a rule, the treatment is necessarily symptomatic, and here the indications are the same as in cancer of the cervix, viz., lessening the ichorous discharge, the hemorrhages and the pain, and supporting the strength. The pain and hemorrhage may be relieved by from time to time dilating the internal os, and scraping the endometrium. The débris should be washed away by copious injections; great care must be taken in using the spoon, for penetration of the uterine walls and fatal peritonitis may be the result if too much force is applied. For the same reason injections into the cavity of the uterus should not be made with great force, for the thin walls may be ruptured, or adhesions with adjacent organs broken, and escape of the ichorous fluid into the peritoneal cavity follow.

The treatment of secondary cancer of the body of the uterus must be symptomatic, for the diseased process is not limited to the uterus, but in most cases has involved many of the adjacent organs.

Appendix.

A series of tumors belonging to none of the above-described varieties will now be considered. These are constantly increasing in number; during the early stages of their development they seem to occupy the boundary between benign and malignant neoplasms, but, as a rule, they soon assume an extremely malignant character, and generally contain combinations of the various elements of tumors.

We have hitherto become acquainted with the following tumors of the vaginal portion and cervix: Cysts, papillomata, or pointed condylomata, wing-shaped elongations with hypertrophy of the mucous membrane of the lips, corneous thickening of the epithelium and atrophy of the mucous glands (Simon); further, adenomata and glandular polypi (Ackermann), and finally carcinomata.

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* See Czerny, "Cancer of Cervix."

We have still to add to this list myomata, sarcomata and myxomata, which occur isolated or in groups upon the vaginal portion, but are, as a rule, very rare.

Finally, we may mention the few cases of enchondroma of the vaginal portion which have hitherto been reported; of these there are two well-authenticated ones. The first was reported by Thiede in 1877.* The patient, who was about forty-five years old, had a spongy lobulated tumor originating from the cervical mucous membrane; it caused profuse hemorrhages and was excised but soon returned, and the patient died from hemorrhage and albuminuria. The tumor was pedunculated, warty and rough upon the surface, and evidently belonged to the papillomata; upon section, islands of cartilage could be seen by the naked eye, lying in the connective tissue stroma, which also contained very abundant colossal vessels. Microscopical examination showed it to be hyaline cartilage with a typical matrix containing cells in all stages of development; in some places, instead of the hyaline matrix, there was a stroma with indistinct striæ, scattered granules and cells of an irregular angular form containing masses of granules, in short, a condition of softening and cystic formation. Thiede could not prove a sarcomatous degeneration. The second case was observed by Rein, who called the disease *Myxoma enchondromatodes arborescens colli uteri*† The patient was twenty-one years of age. This tumor was also soft and lobulated, and was completely excised, but there was a rapid recurrence, and the patient died after a second operation was performed. The tissue of the tumor was whitish in color, and, upon section, very similar to a medullary carcinoma; it was separated into sections by a network of fibres of varying thickness; some portions of the section were softer and almost like the tissue of the umbilical cord and these showed, microscopically, fusiform and stellate cells with many anastomosing appendages; the intercellular substance was partly transparent and partly granular, *myxoma hyalinum*. In this tissue there were small islands, showing all the characteristic forms of hyaline cartilage.

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* *Zeitschrift f. Geburt.*, etc., Stuttgart, 1877.

† *Archiv f. Gynäkol.*, IV, 1880.

Rein thought the case described by Spiegelberg as *sarcoma colli uteri hydropicum papillare* one of myxoma, but Spiegelberg disputed this upon the ground of his examination of the fresh preparation, which conclusively proved the lymphatic character of the intercellular substance,* and on the ground of a second case observed by him.† When he reported his first, with an illustration, he called attention to its resemblance to cystic mole, and proved that the cysts were only apparent, there being simply an œdema of the matrix. In the second, Professor Marchand found lobulated soft masses of a translucent reddish-yellow color; some bright, cyst-like spaces could be seen at the bulbous ends. The superficial epithelium was everywhere stratified, the upper lamellæ consisting of cylindrical cells with indistinct ciliæ, interspersed with pavement epithelium. In the peripheral sections of the tumor the intercellular substance was most abundant, very soft, and the tissues infiltrated with lymphatic fluid. This had caused the formation of cavities in which the fluid seemed to be encapsulated, and into which blood had been exuded. Marchand directed especial attention to the fact that the cavities had no epithelium and were, therefore, not glandular in origin.

A case which came under my notice was quite similar to the exceptional instances just described, and yet differed from them in some respects to such a marked degree that it merits detailed description:—

The patient, forty years of age, was greatly exhausted by profuse hemorrhages, and complained of much weakness, constant bearing down, vesical tenesmus and some pain. I removed from the anterior lip of the uterus a tumor as large as an apple which at first appeared to be an extremely soft sarcoma. Its surface was in many respects like a myxoma of the chorion, especially from the great number of smooth vesicular prominences it presented; but upon section there was a striking resemblance to a multilocular glandular ovarian cyst in its first stages. Its malignant nature was evident from the fact that in two months and a half after its removal, the entire vaginal portion and the vaginal vault presented a number of tumors of the same kind, many of which were removed.

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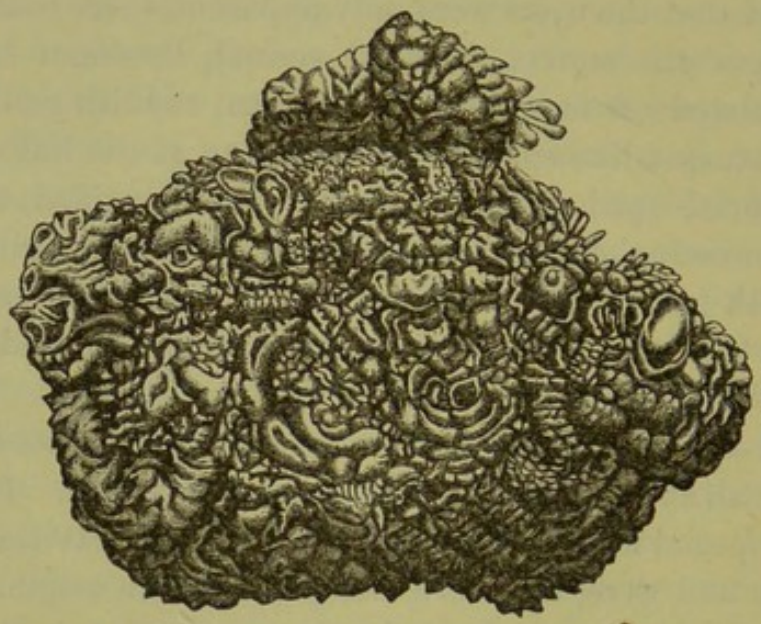
* *Archiv f. Gynäk.*, XIV, p. 178.

† See *Archiv f. Gynäkol.*, Bd. XV, page 437–447.

But complete extirpation was entirely out of the question, and the patient soon died. Unfortunately no post-mortem examination was made, as she had returned to her home.

At the first microscopical examination made soon after the extirpation, the tumor was soft, lamellated, discharged a little

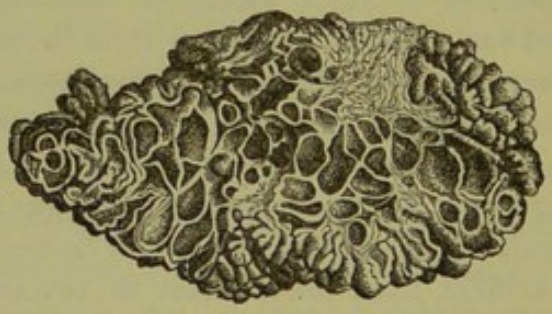
FIG. 59.



Adeno-myxo-sarcoma of the Cervix (Surface).

blood upon pressure, and upon section always showed numbers of cavities, varying in size from a mere point to a lentil, which

FIG. 60.

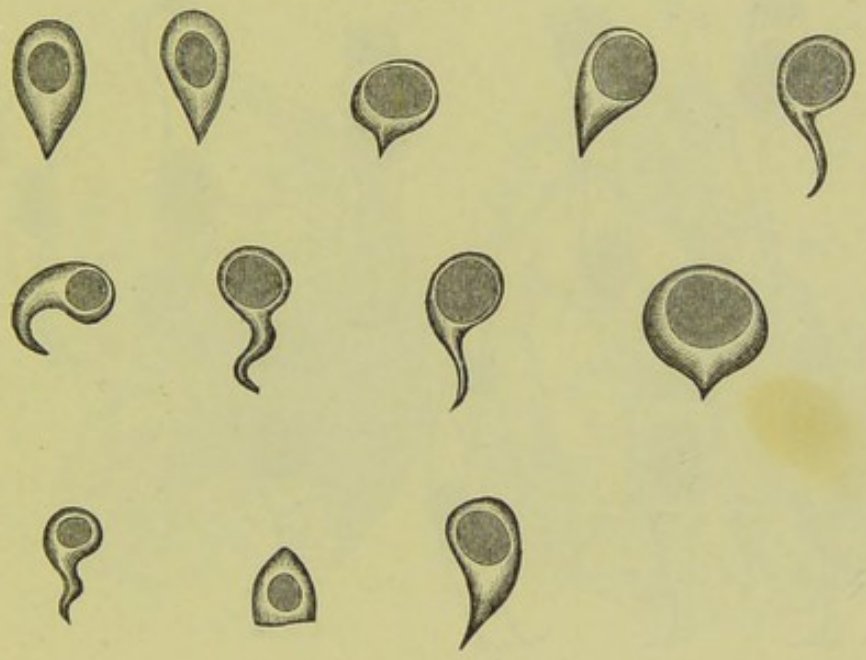


Section of the Tumor.

were filled with tenacious, transparent mucus. These cavities were irregular in their position, and in the cut surface in places, had a strand-like arrangement. All of them were lined with a

typical cylindrical epithelium, the cells of which were opaque, fatty or in process of degeneration, and filled the cavity like a mass of mucus. In the smaller and in the smallest of the cavities the distention caused by the growth of the tumor had flattened the cells until they resembled the flat epithelium of the uterine glands during pregnancy; or they were in a condition of excessive production and contained two or three nuclei. The stroma of the tumor consisted of very delicate fusiform cells or of plaques of cells resembling those of the normal uterine mucous membrane. The tumor showed a few large vessels. The wavy, uneven surface was everywhere covered with cylindrical epithelium.

FIG. 61.

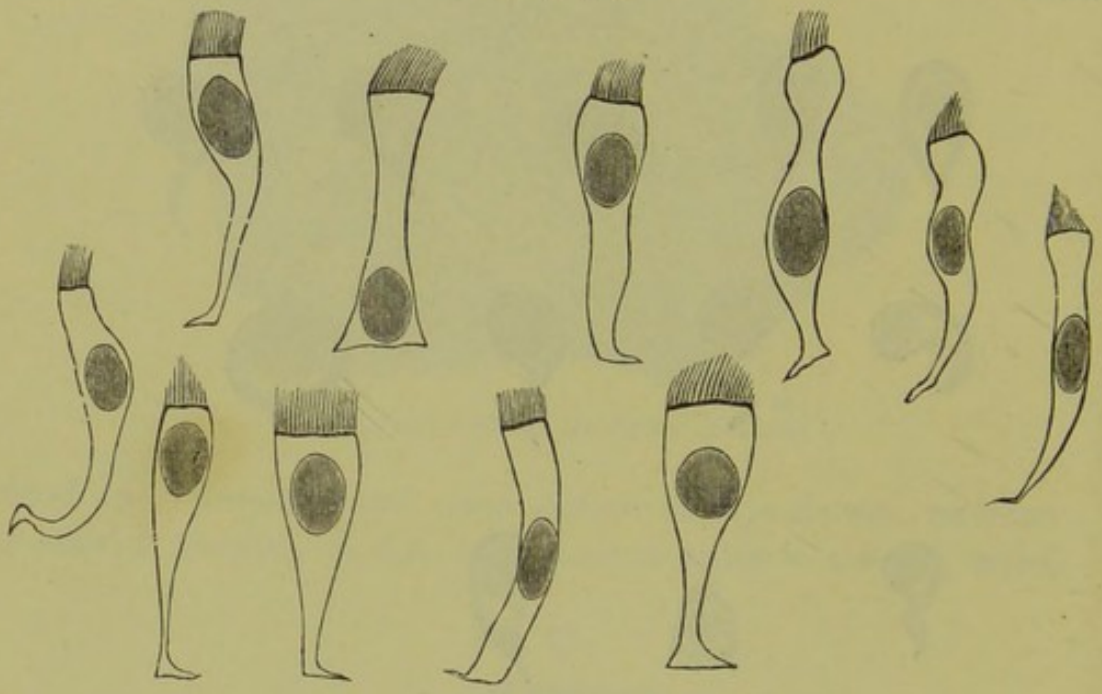


I recently requested my assistant, Dr. Overlach, to make another careful examination of the tumor, which revealed the following interesting facts. First, it was found that the surface was not covered by simple cylindrical cells, but by cells which were identical with the so-called metatypical epithelium of ovarian cysts, described by Malassez and De Sinéty. This fact increased the similarity of the tumor to an ovarian cyst. The cells are characterized by their marked globular or pear-shaped body, which terminates in a thin pedicle, and contains a very large round nucleus. They all seem to be distended, are placed in layers, one above the other, but, instead of forming a smooth uni-

form superficial stratum, some of the round bodies project. Professor Ackermann found such cells in a glandular polypus of the anterior lip of the uterus, which I had extirpated.*

In the diverticula between the vesicles, as well as in the larger and smaller cysts themselves, there was very large, elevated, ciliated, cylindrical epithelium, 0.003 millimeter in diameter (Fig. 62). These cells are identical with the conspicuous club- and flask-shaped epithelium of the inner surface of the cervix and of the large, irregular, acinous cervical glands. The nuclei were arranged in a row but situated in various parts of the cells.

Fig. 62.



Many cells were ruptured at the ciliated extremity and discharged a tenacious, transparent secretion which formed the contents of the small cysts.

Like the epithelium, the essential structure of the tumor also was of two kinds: While the interstices of the cysts and the diverticula consisted of compact, round and fusiform cells, with a clear intercellular substance, and a few broad strands of fibrillated connective tissue (Fig. 63), nearer the surface, that is below the metatypical epithelium and particularly in papillary excres-

* *Virchow's Archiv*, Bd. xviii.

cences of the surface, there were large and small cells which showed a reticulated structure, in that innumerable delicate, branched threads anastomosed and crossed each other in every direction, thus forming numerous cavities bounded by the filaments. This extremely fine and delicate network of minute filaments was traversed by a few coarser, wavy strands. In the direction of the coarser strands and at their intersections there were isolated, large round cells, which seemed to be the only nucleated formations of this tissue (Figs. 64, 65, 66, 67).

If the tumor be named from this, we must first assert that it is an adenoma, and, indeed, of the acinous cervical glands. The proof is in the fact that the real cysts are lined with the charac-

FIG. 63.

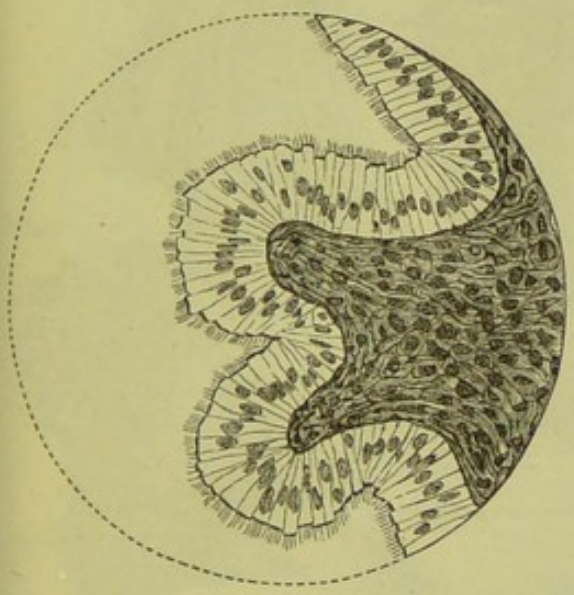
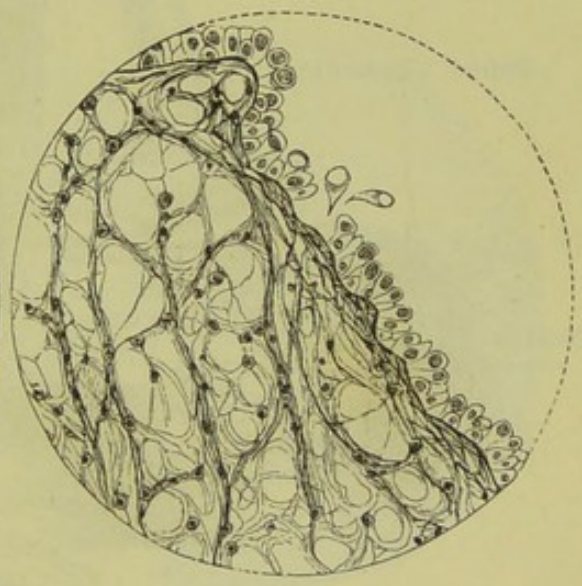


FIG. 64.



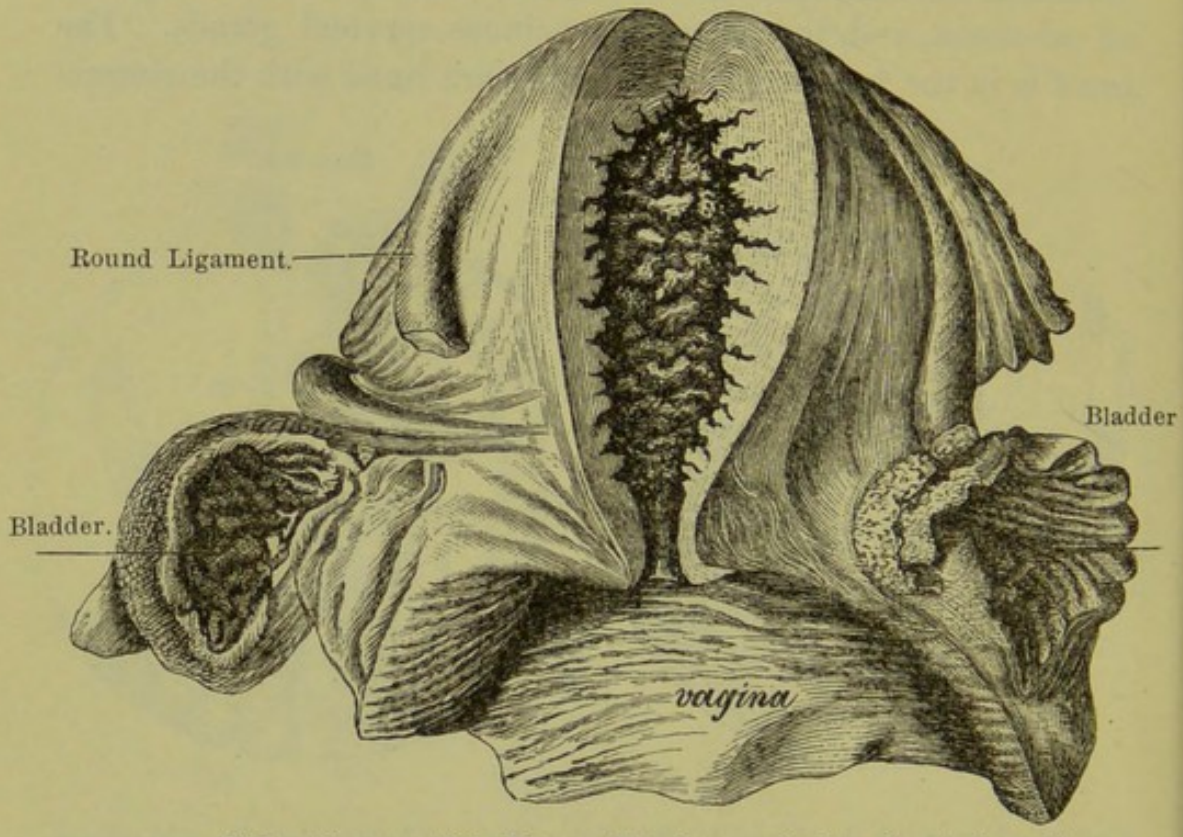
teristic large, club shaped, ciliated cells, and also in the peculiar, clear, cellular contents and the anastomotic connections of the cells with one another. In this respect the tumor is very different from those described by Thiede, Rein and Spiegelberg. It is, however, closely related to Spiegelberg's by the sarcomatous degeneration of its stroma, while in other respects it is similar to the myxoma described by Rein, though it contained no cartilage. The most appropriate name is doubtless *adeno-myxo-sarcoma cervicis*, the adenoma being the primary condition, which latter passes into myxomatous degeneration. It is certainly a rare combination of malignant elements. It represents a transition from

epithelioma to sarcoma and conclusively proves that our knowledge of malignant diseases of the vaginal portion is by no means complete.

2. *Sarcoma of the Uterus.*

Pathological Anatomy.—Sarcomata of the uterus, which are classified as mucous, muscular and peritoneal, originate in the interglandular tissue of the uterine mucous membrane, from the inter-muscular and subserous connective tissue, and finally, from

FIG. 65.



Diffuse Sarcoma of the Mucous Membrane. Section of anterior wall.

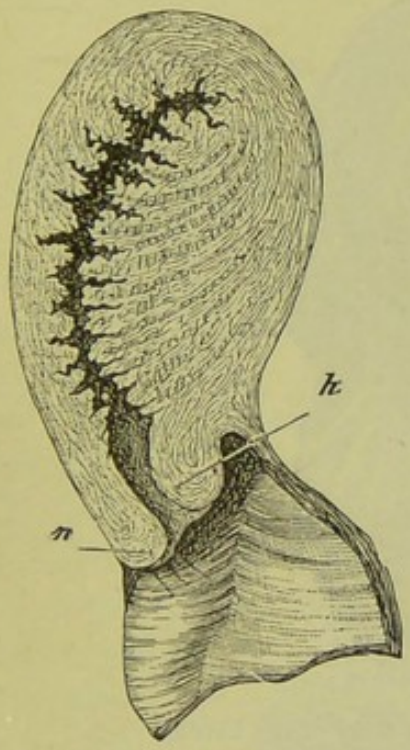
the peritoneal coat of the uterus. The mucous forms may begin in the cervical walls. Winkler has collected all the known cases of this class. In addition to the adeno-sarcoma of the cervix described in the preceding chapter, I have extirpated a similar tumor of the anterior lip. It was as large as a walnut and was composed of small cells. Sarcomata may appear on the cervix in a form resembling cancroid papillary tumors.

Sarcoma of the mucous membrane is more common higher up than at the cervix. Here it forms knotty, villous prominences

which grow toward the cavity and protrude through the internal os. They may also penetrate the uterine walls, pass to adjacent organs and even perforate the abdominal walls and appear at the surface.

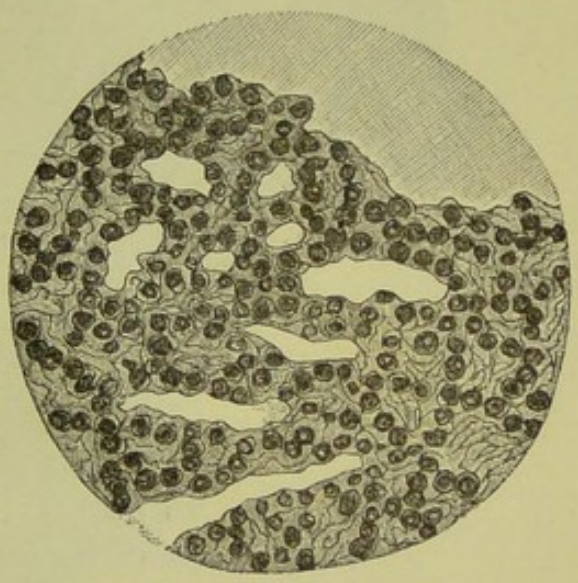
Sarcoma of the uterus which does not originate in the mucous membrane may result from existing myomata, the most common condition, whether the tumors be interstitial or submucous. As a rule, the round or fusiform cells do not lie upon the periphery, but either near or exactly in the centre of a mass of muscular tissue

FIG. 66.



Section of Diffuse Uterine Sarcoma.
h, posterior lip. *n*, anterior lip.

FIG. 67.



Round-celled Sarcoma.

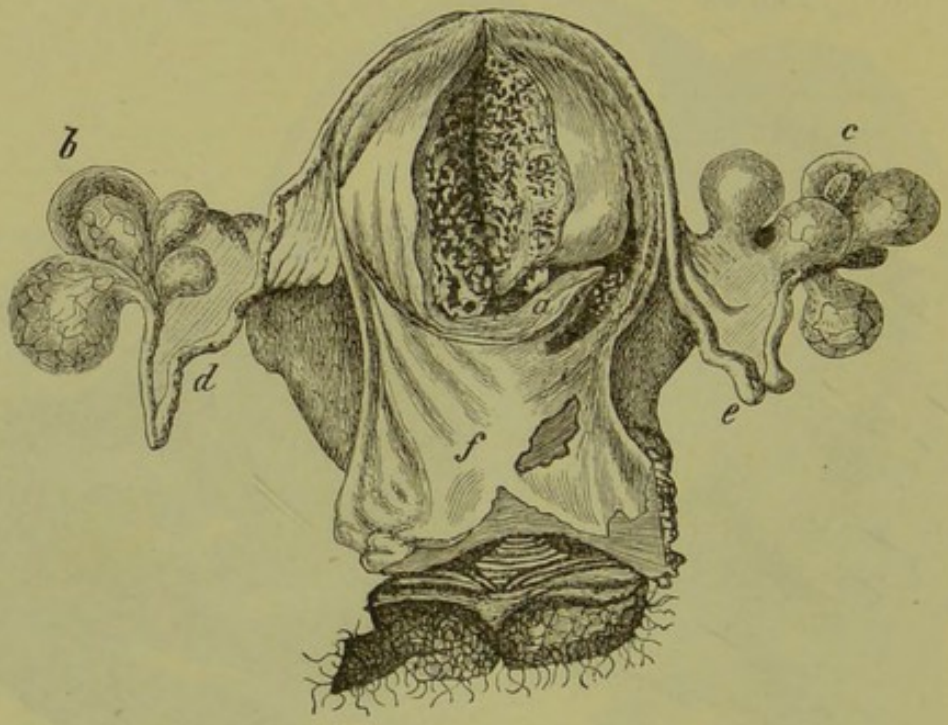
which forms a capsule about them; this fact is of significance with respect to the extension of the growth. When it has grown through its envelope, metastases occur through the agency of the lymphatics and veins, a fatal termination soon resulting from sarcoma of the glands, abdominal walls, lungs, etc.

Other sarcomata of the uterine muscular tissue originate directly from the interstitial structure, without the previous existence of myomata, in the form of scattered nodules which displace the tissues, penetrate the vessels, become subperitoneal,

extend to adjacent organs and are carried by the veins to the lungs, spleen, liver, kidneys and brain, causing in these organs hemorrhagic infiltration and fatal inflammation. One of the most interesting cases of this kind which I have ever observed, and in which metastasis to all the above-named organs occurred, is shown in Figs. 68 and 69.

Sarcomata of the exterior of the uterus begin either in the subserous tissue or in the peritoneum itself. There are plexiform

FIG. 68.



Primary Interstitial Sarcoma of the Body of the Uterus.

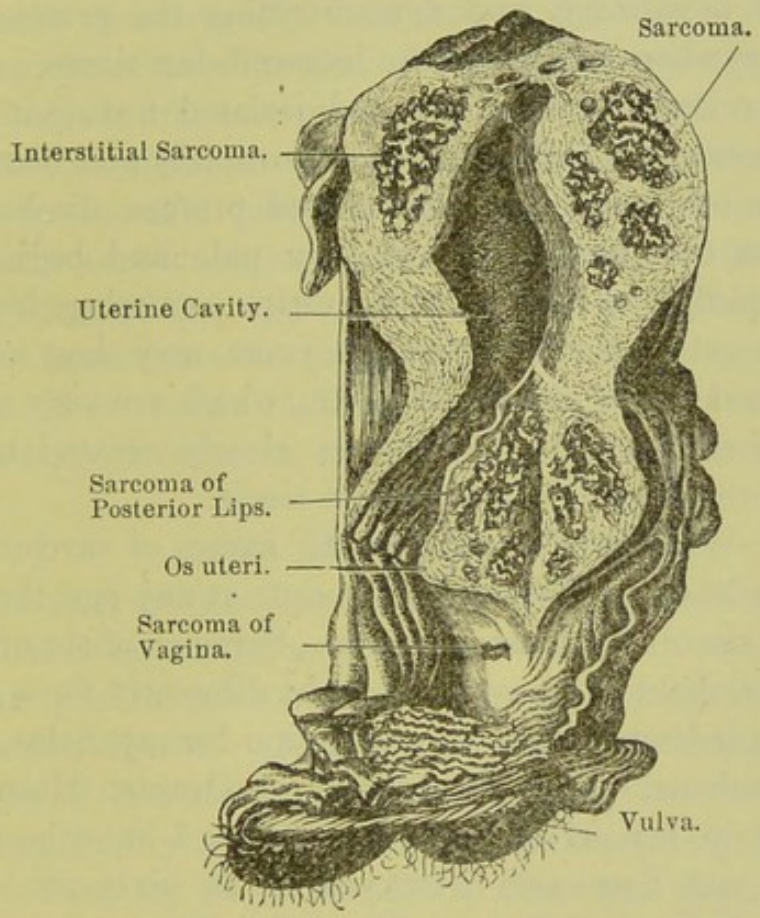
a, anterior wall laid open; *b* and *c*, multiple, pedunculated ovarian cysts; *d* and *e*, tubes; *f*, posterior wall of bladder.

angio-sarcomata, and the one represented in the preceding illustration belongs to this class

Symptoms.—The more rapidly a mucous sarcoma grows, the sooner a profuse mucous secretion, often mixed with blood, appears. Severe hemorrhages are rare. Pain is caused by the extrusion of portions of the tumor through the internal os; otherwise, the pain is slight. The menses are more profuse and protracted. Hydrorrhœa of the uterus may cause slight hydrometra by retention when portions of the tumor occlude the

internal os. The discharge becomes brownish and has an offensive odor when the papillary masses begin to disintegrate. If the tumors are comparatively firm and enclosed in muscular capsules, they may become submucous, form pedicles, and be expelled like polypi, or, as the pedicles are usually very firm, they may even cause inversion of the uterus, as has been reported by Langenbeck, Spiegelberg, Nyrop and others. Sar-

FIG. 69.



Interstitial Sarcoma of the Body of the Uterus.

coma of the uterus may be secondary, arising from a primary sarcoma of the ovary, the latter being the more common; indeed, it is often impossible to say in the dead subject, which of the two tumors was primary.

Patients with uterine sarcoma are, as a rule, very pale; œdema is frequently an early symptom; when there are no hemorrhages, symptoms of anemia may be almost or entirely wanting, indeed, the cheeks, lips and hands may be cyanotic, particularly if there

are metastases to the lungs, and then the great frequency of respiration stands in marked contrast with the temperature, which is normal, and at once directs attention to these organs.

Diagnosis.—A positive diagnosis of uterine sarcoma cannot be made without a microscopical examination, even though the rational signs render its existence probable. Adenomata and adeno-carcinomata are most readily confounded with sarcomatous tumors. They can be differentiated only after excising the growth or a part of it, or by scraping the prominences on the uterine mucous membrane, and demonstrating the presence of large cells, everywhere separated by intercellular tissue. Suspicion will be excited that a hard, round, isolated nodule in the uterine wall is a sarcoma, whenever it grows rapidly and becomes sensitive, when other nodules appear and profuse discharges occur, and when the patient becomes very pale and begins to lose strength rapidly. Granular endometritis occurring, for example, after the extirpation of a sessile myoma, may show in the masses scraped out of the uterus, cells, etc., which are very similar to those of sarcoma, and really are closely related to it, though they represent simple granulation tissue.

Ætiology.—We know but little of the causes of sarcomata. The disease may be congenital, and may occur at any age, though less common in the old than carcinomata. Sarcoma of the uterus is very rare; for about eight years I sought diligently for a case of the disease in order to obtain an illustration for my Atlas, and was unable to find one. None occurred in the Dresden Hospital, in my clinic or in my private practice. Since I have been in Munich, I have seen four cases in two years. In sixty-two cases reported in the literature of the subject, the climacteric period showed a certain predisposition to the affection. Of sixty-three patients twenty-five were sterile, which is a very large number when compared with the sterility observed in women having carcinomatous affections.

Sarcomatous degeneration of a uterine myoma is likewise rare. I have operated upon and reported one case of the kind.*

Prognosis.—Sarcomata are undoubtedly malignant tumors;

* "Berichte und Studien," Bd. III, 1878.

they grow rapidly and soon destroy the tissues affected. It thus seems very remarkable to me that, in all the cases of sarcoma of the uterine mucous membrane which I have observed, extension outward was so slow. The rigidity of the submucous tissue and the firmness of the muscular fasciculi may be unfavorable to rapid growth. If the tumors are completely extirpated in their early stages, it appears that there is less danger of recurrence than after total extirpation of carcinomata. If such an operation is impossible, the prognosis is bad, and the outcome is generally more rapidly fatal than in the case of carcinomata.

Treatment.—The first and only indication, after sarcoma of the uterus is diagnosticated, is its early removal. Those affecting the mucous membrane must be treated by curetting, or, if polypoid, by removal and cauterization of the pedicle. When the uterus is very much enlarged and the cervix is free, total vaginal extirpation of the organ is indicated ; I performed this operation in one case with a fortunate result. When complete removal is not possible, we are confined to symptomatic treatment, which is essentially the same as in carcinoma under like conditions.

III. Myomata of the Uterus.

The most frequently occurring neoplasms of the female sexual organs are myomata, muscular tumors of the uterus. They were formerly called scleromata, steatomata, sarcomata, scirrhus, fibromata and fibroids ; the polypoid forms were designated as moles, fungi and excrescences. Though these tumors were known for thousands of years, their liability to become polypoid was first pointed out by Bayle in 1813. The term myomata or leiomyomata has been applied to them only since 1843, when they were carefully examined in regard to their histological nature by Julius Vogel. The names formerly used may be explained if we remember that the relations of the several constituents of these tumors to each other are extremely variable. If the muscular fibres, which are usually larger in myomata than in the non-gravid uterus and have large nuclei, predominate, the tumor is soft and elastic; if the tumor is composed chiefly of connective tissue it is firmer; in the first case we speak of myomata, in the latter of fibro-myomata.

Ordinarily these tumors are not very vascular, but in exceptional cases, not only the adjacent tissues, but the tumor itself contains a great number of large vessels, so that upon section it appears like cavernous tissue, the *myoma teleangiectodes seu cavernosum* of Bastard, Blodgett, Grammatikati, Rubio and Soller.

When there is ectasis of the lymphatics lying between the muscular fasciculi and near the sheaths of the vessels, we speak of *myoma lymphangiectodes*. The muscular and connective tissue fasciculi are often arranged concentrically around wide capillary vessels.

Nerves have hitherto been seldom discovered in myomata, but Astruc asserted that he found them in the parenchyma of a polypus. Bidder, in a large fibroid, once found a nerve-fibre having a double contour; but most observers have been unable to discover them.

The great majority of myomata originate in the walls of the body of the uterus; they are very rarely developed in those of the cervix, which has less muscular and more fibrous tissue—only about 5 per cent. of all cases. Most of these tumors are at first intraparietal, either central, as in Figs. 71 and 72, nearer the peritoneum, as in Fig. 70, or nearer the uterine mucous membrane, as shown in Fig. 73. They evidently grow in the direction of least resistance.

a. When they grow externally they become subserous (Fig. 70). The more they grow away from the muscular walls, the more they push the peritoneum before them, and thus form pedicles, becoming peritoneal polypi (Fig. 73). Sessile tumors of this kind grow for a longer time and may reach great dimensions; in a parturient woman I have seen a movable tumor of the left wall as large as a man's head; it seemed very much like an ovarian tumor, for it had undergone central fatty degeneration and showed indistinct fluctuation. When the tumor itself elongates the pedicle, the muscular fibres diminish in size, the vessels are obliterated, and the serous membrane and connective tissue form the chief attachment to the uterine wall. Such peritoneal polypi are usually multiple; rarely are external myomata of the uterus single (Figs. 70 and 73). Peritoneal polypi show a greater tendency toward calcification than other myomata, on account

of the obliteration of the vessels; amorphous ossification may occur, usually in the interior; more rarely scales are formed at the periphery.* If inflammatory symptoms are developed from tension, pressure or torsion of the pedicle, adhesions to the omentum or intestines may be formed, and the vessels from the latter pass into the tumor and thus furnish a new source of nutrition; complete separation of the tumor from the uterus may also occur. Large polypi of this kind may elongate the uterus, twist it upon its axis, cause retention of its contents, hydrometra may develop; finally, the cervix may be completely separated from the body, with a fatal result, as in a case reported by Pinolini.

b. The intraparietal or intramural are simple or compound, and may reach enormous dimensions.† They are most frequently found in the posterior wall near the fundus, as in Fig. 71, and greatly distort the uterus and sometimes dilate its cavity to the size of the puerperal organ. When they grow laterally, they become intraligamentous, as in Figs. 75 and 76; when they grow downward, they may split one of the lips; when they grow from the posterior wall, according to Herrick, they may become retrouterine or retrovaginal in Douglas's cul-de-sac. The flat, prominent intraparietal myomata by their growth at times cause effacement of the cervix, and project like a child's head at the external os, so that they can be felt through it, often remaining in this position unchanged for years, probably because their connections are so firm that they cannot form pedicles. I have seen this condition in three very interesting cases.‡ Intraparietal myomata may diminish in size from fatty degeneration; they may also become calcified, as in the cases of Bastien, Duncan, Montgomery, Müller, Potter, Prelli, Upshur and Wright.

Furthermore, the interstitial tissue may undergo proliferation and be infiltrated with mucous and lymph corpuscles and nucleated round cells rich in mucin; such a tumor is known as *myxomyoma* (Godson and Stocker). From it a myxosarcoma may be developed, by gradual relaxation of the tissues, and the constantly increasing appearance of round cells, while the muscular tissue

* Busch, *loc. cit.*, p. 460. † 78 kilos, p. 411. ‡ Atlas, p. 51.

disappears in some places and remains unchanged in others, thus forming trabeculæ. Suppuration of large intraparietal myomata has been seen; I met with it once in the dead and once in the living subject; cases have also been observed by Benicke and by Gorvits.

The destruction of the tissue begins with degeneration of the round cells into granular cells; cyst-like intermuscular spaces develop, which possess no walls of their own. Moreover, there may be an œdematous softening—a degeneration of the relaxed muscular structure, and resulting cystic formation. The so-called fibro-cystic tumors have therefore originated from solid portions of the tumor which, by softening, change to a synovia-

FIG. 70. FIG. 71. FIG. 72.

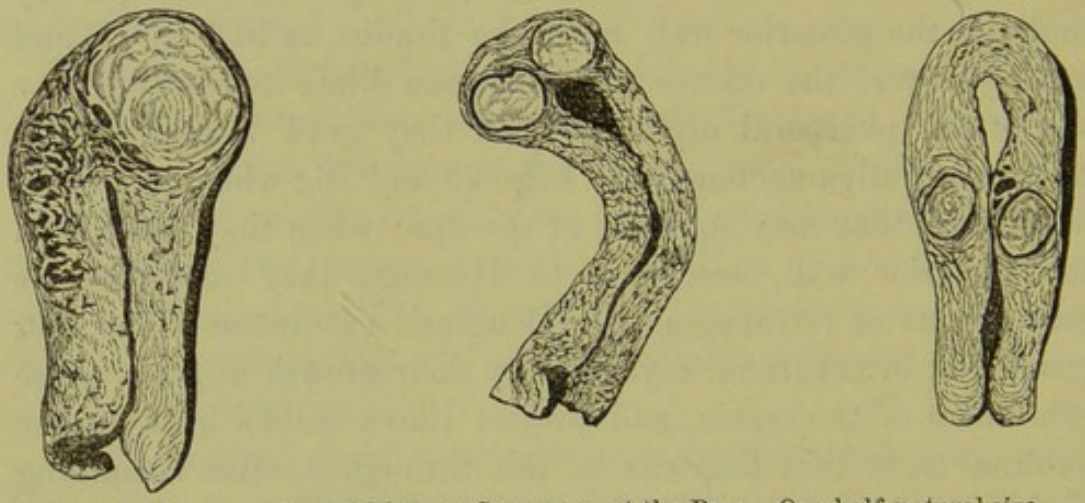


FIG. 70.—Subserous Sessile Myoma, Cavernous at the Base. One-half natural size.
FIG. 71.—Intraparietal Myomata, in the Fundus. One-half natural size.
FIG. 72.—Intraparietal Myomata, at External Os. One-half natural size.

like fluid, or they were originally large infarcts of blood or other fluid consisting of the débris of sanguinolent material. Sometimes large cysts from cavernous vessels may be mistaken for myomatous cysts. In one case of this kind upon which I operated, according to Birch-Hirschfeld's examination, typical blood-cysts had formed from such dilated veins. But it is very probable that the condition is due to the distention of the enormously dilated venous plexus in the vicinity of the tumor, rather than to ectasis of the vessels of the tumor itself. Cystic myomata may be subserous (Barker, Carter, Davy) or submucous (Baer, Pinolini); most frequently they are intraparietal (Beates,

Chambers, Coles, Diesterweg, Fraenkel, Goodell, Herrick, Holston, Meredith, Meyerle, Paddock, Renfro, Schwarz, Stockard and Vidal Solares).

Klob states that he has once seen cancer begin in a very large myoma of the posterior uterine wall.* I have often observed them to occur in the same individual independently of each other (Nicaise, Palfrey).

c. When they grow internally they become submucous, and the looser their connections with the uterine wall the sooner pedicles are formed. Internal fibrous polypi are most frequently found near the fundus, and usually have broad pedicles containing muscular and vascular tissue. At first round in shape, as in Fig. 73, they soon become oval or, more rarely, acuminated, as in Fig. 74, and may be the size of a child's head or larger,† then pass into the vagina, and so completely fill up the true pelvis that it is impossible to introduce the finger. These tumors are usually solitary; after one has been removed, however, as Schatz observed in a case formerly under my care, a co-existing intraparietal myoma may become a fibrous polypus. I have also seen a case of this kind; in each of two successive years I removed such a polypus from the wife of a colleague in Dresden.

Spontaneous separation of the pedicle has occurred; the process may originate from great traction upon it, from ulcerative changes or from the pressure of the os uteri. A thin pedicle may be torn when the tumor is firmly grasped, as happened to me on two occasions during the process of paring down very large tumors of this kind. Ulceration and gangrene may also result from constriction of the tumor or its pedicle (Bompiani, Jackson, Hurry, Sorel, Stadfeldt).

d. Neither in the living nor in the dead subject have I ever found a primary myoma of the neck of the uterus, though I have occasionally seen those which have come down from above. Schroeder found 8.1 per cent. of all myomata cervical. But when I look at his illustrations, the question always arises as to whether they did not grow down from above, a condition which

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* *Loc. cit.*, p. 163.

† Preparation in the Dresden Lying-in Institute.

would seem to be probable (see Fig. 72). According to Virchow, cervical myomata do not lie very firmly attached to the wall and may be easily enucleated. On account of their containing few muscular fibres, they usually do not grow rapidly, and seldom become calcified. To understand their great infrequency, the comparative absence of muscular tissue in the cervical walls must be borne in mind, and also the difference in the walls of the vessels of the cervix and those of the body, viz., the walls of the arteries in the cervix are said to have a much thicker muscular layer than those of the body of the uterus (Henle).

e. Myomata of the broad ligament are probably at first subserous or intraparietal, and grow from the uterine wall outward

FIG. 73.

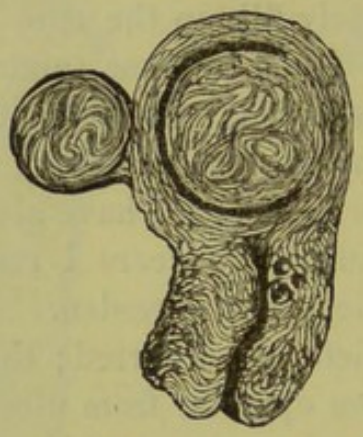


FIG. 74.

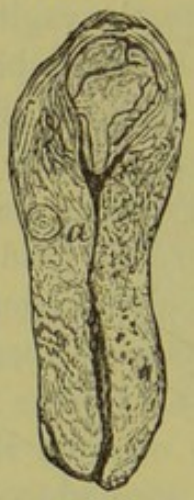


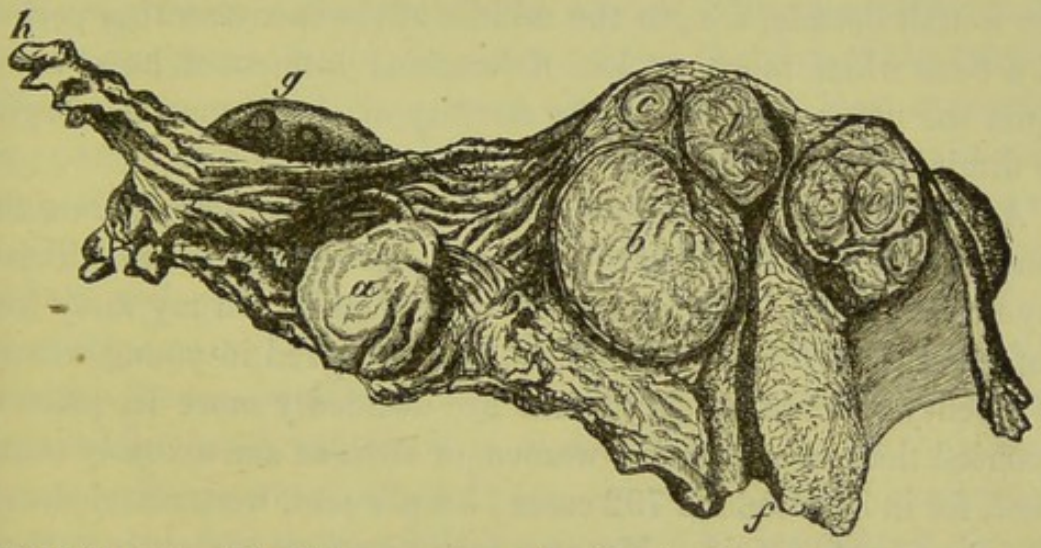
FIG. 73.—Subserous and Submucous Myomata. One-half natural size.
FIG. 74.—Submucous Myoma becoming pointed internally. One-half natural size.

between the folds of the ligament. There are, however, tumors of this kind, as in Fig. 75, *a*, which are so far removed from the uterus, ovaries, ovarian ligaments and tubes that we must admit the possibility of their primary origin in the broad ligament. Virchow once found a bean-sized fibromyoma in the *ala vespertilionis* just above the ovarian ligament, and he also mentions that Walter removed a yellowish-white stone, $1\frac{3}{4}''$ long and $1''$ $2'''$ thick, which could hardly be considered of venous origin, from the round ligament in a woman thirty years of age; the tumor weighed more than five drachms. We not infrequently find bean-sized tumors, which contain muscular fibres, and are therefore

myomata, beneath the peritoneum of the tubes and broad ligaments, but intraligamentous myomata the size of walnuts are very rare; I found only one in 400 post-mortems, and this is illustrated in Fig. 75.

Ætiology.—Klob states that uterine myomata occur in 40 per cent. of women after the fiftieth year. In 575 autopsies upon females, I found 73, or 12 per cent., with myomata; of 135 before the thirty-fifth year, only 7, or 5 per cent. In the first place these neoplasms are dependent upon the peculiarities of the vessels of the uterus, in that its arteries are subjected to a very high pressure before they reach the uterine walls, notwithstanding their convo-

FIG. 75.



Multiple Myomata of the Uterus.—*a*, tumor in right broad ligament; *b*, *e*, subserous; *c*, intraparietal; *d*, submucous; *f*, external os; *g*, right ovary; *h*, right tube.

luted course. Apart from this, the vessels of the superficial layers of the uterine mucous membrane are remarkably delicate. This is the more significant, because the uterus is for thirty years subject to a congestion every three or four weeks, and various disorders may occur in connection with this condition. Another essential peculiarity of the uterus is the power of reaction to a comparatively slight, but constant and gradually increasing irritation (the ovule), which causes a general hyperplasia in a short time.

In the living subject, I found that 25 per cent. of uterine myomata were subserous, 65 per cent. intraparietal, and 10 per cent. submucous; they were more frequently located in the poste-

rior wall and fundus than in the anterior wall. In my own experience, 18 per cent. were in women between the twentieth and thirtieth years, 34.3 per cent. in those between the thirtieth and fortieth years; *i. e.*, more than one-half of these patients came to the physician before their fortieth year, and almost one-third before the thirty-fifth.

In regard to the time when the symptoms first manifested themselves, about one-fourth of the patients complained before the thirtieth year. The average age was thirty-three years, the percentage being the same as in twenty-seven primiparæ with myomata. The age of the IIparæ to Vparæ was also 34 to 36 years. From this it is probable that the development of myomata is most frequent at the end of the third and beginning of the fourth decade, *i. e.*, in the middle of the menstruating period, at a time when more or less deleterious influences have acted upon the uterus, and when the fertility of the woman has begun to diminish.

A congenital myoma has hitherto not been found, from the tenth to the fifteenth year being the earliest period at which a myoma has been diagnosticated during life. In my forty-four autopsies of myomatous subjects, two occurred in young women of twenty-one years. Myomata are decidedly more frequent in married than in unmarried women, or such as are sexually continent, for in Schroeder's 792 cases 77.5 per cent. were married, and 22.5 per cent. single. My own investigations corroborate these statistics. With regard to the influence of myomata upon sterility, I can again confirm Schroeder's figures, according to which sterility frequently appeared as a sequel of myomata, though the converse was not established.

The view that myomata never appear before puberty is not beyond question, for Beigel claims to have found a myoma in a girl ten years old, and because the early occurrence of profuse hemorrhages would lead one to suspect an anomaly of this kind; beside, I have found a myoma in a patient, who, though married, had never menstruated.

In our studies of the origin of uterine myomata, we must always consider the influence of a local irritation which affects the uterus either directly or indirectly, and which is long-con-

tinued. In this category belong abortions with their causes and consequences (Cohnstein); direct contusions of the uterine walls from blows, falls, violent separation of the placenta; and all other factors which cause disease of the inner surface of the uterus. Indirect irritations are lifting heavy objects and violent concussions of the body before, during or after the menstrual flow. Other significant factors are such diseases as prolapsus of the uterus, ovarian tumor, typhoid conditions and cardiac affections, in so far as they influence the walls of the uterus, also lacerations of the uterine walls and parenchymatous hemorrhages, especially when the effects continue long and a number of causes act together. I refer those who may care to investigate this subject further to my article in "Volkmann's Sammlung," No. 98.

Symptoms.—The symptoms arising from myomata of the uterus are by no means dependent upon the size of the tumors. There are many small myomata which cause the most excruciating pain, while others as large as a child's head may exist for a long time without producing any suffering, and are often only accidentally discovered by the patient or physician when examining the abdomen. The symptoms are extremely variable. When the tumor grows uniformly in all directions, in a firm, otherwise healthy uterus, and is enclosed by firm muscular tissue, it will necessarily cause considerable tension and more or less pain. Many patients thus affected are simply called "hysterical," because the tumors are still too small to be recognized by palpation, and the uterus may be neither enlarged, displaced nor otherwise affected. Indeed, no other condition so well deserves the name as this. Hysteria or pain in the uterus is, in the early stages, the most important, and often almost the only symptom; gentle palpation of the uterus causes great suffering. Cohabitation is painful, the menses increase the sensitiveness and are often accompanied by headache, toothache, sacral pain, a feeling of sinking and of internal heat, which may confine the patient to bed, even though the hemorrhage is not profuse. After the cessation of the menstrual flow, there occur sensations of something moving about in the pelvis, and spasmodic pains in the bladder or rectum. At the same time, the patients are apparently strong and vigorous, and it is to them a source of grief that no one

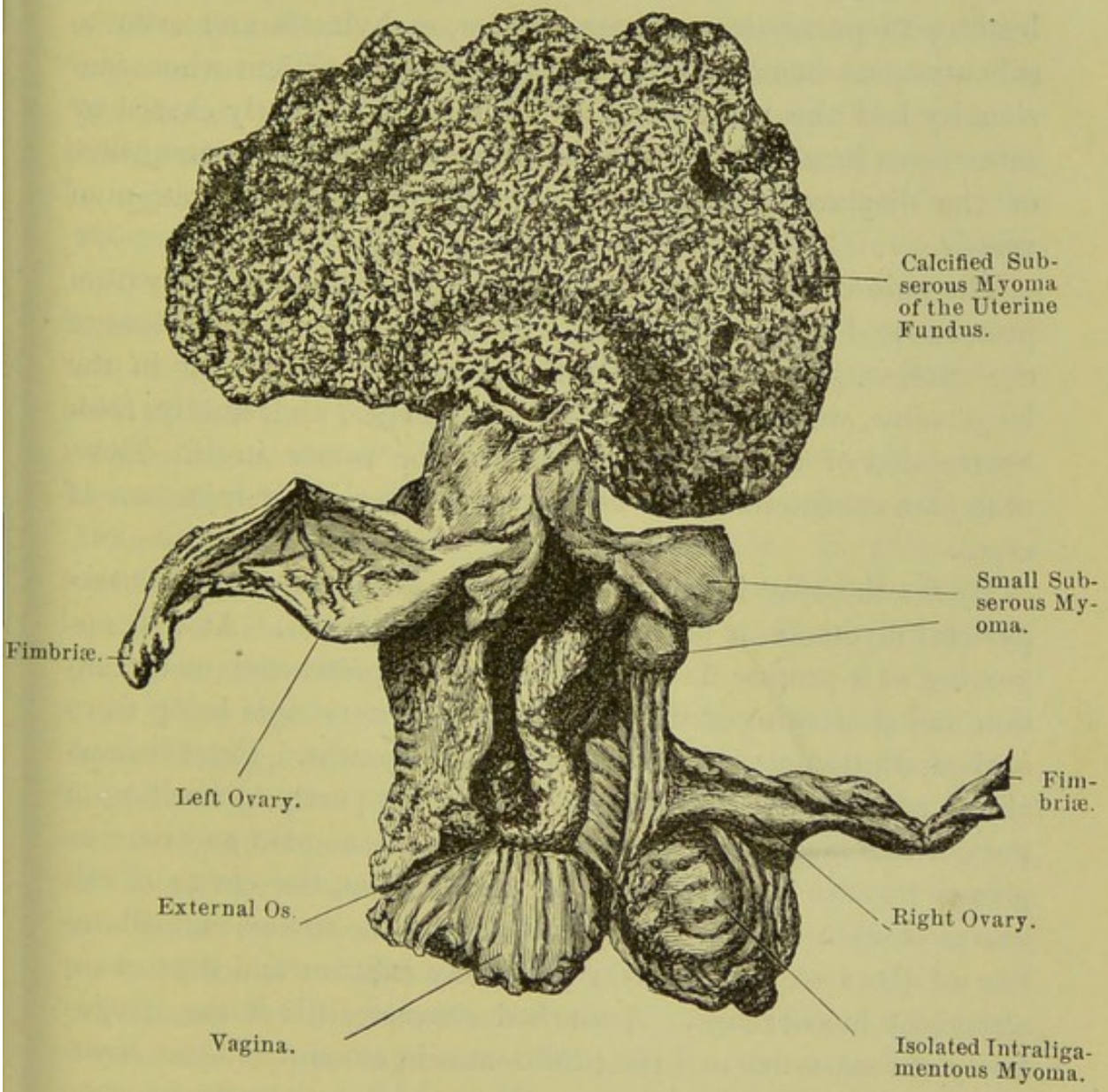
recognizes their suffering and that they are often not even considered ill.

a. If the tumor now grow outward, the intensity of the suffering may diminish in proportion to the lessening in the tension of the wall. Small peritoneal fibrous polypi cause but little inconvenience; but when they grow larger, symptoms of pressure become manifest, depending upon whether the tumor is situated between the bladder and the uterus, as in Fig. 73, or sinks downward into Douglas's cul-de-sac. Perimetritis, adhesions, torsion of the pedicle or separation from the base may occur, accompanied by symptoms of peritonitis. Rokitansky, Simpson, West, Turner and others have observed separation of subserous myomata from the uterine wall. They are then nourished by adhesions and vascular connections with the intestines or omentum. There may be torsion of the pedicle of the tumor or of the uterus (Küster), or symptoms of intestinal strangulation may appear (Duncan, Lévêque). The most interesting case of large, subserous, pedunculated myoma that I have ever examined, shown in Fig. 76, was a tumor 19 centimeters ($7\frac{3}{5}$ in.) broad, and 12 centimeters ($4\frac{4}{5}$ in.) thick. Its surface resembled a cauliflower; its structure had become calcified, and accompanying it was a myoma of the left ovarian ligament, as large as a walnut, and also partially calcified. The lime-salts were deposited in two forms, viz., the principal deposit in the bundles of the fibromyoma which was almost entirely calcified, and a less extensive deposit in the connective tissue between the bundles. The preparation was taken from a patient aged 70 years, who died from senile marasmus and pneumonia. Several cases of subserous myoma, with a firm pedicle, upon which I operated because the patients were no longer able to work on account of the size of the tumor, showed no other prominent symptoms. In the first case the tumor weighed 12 kilos. (30 lbs.), and it had a circumference of 107 centimeters ($3\frac{1}{2}$ ft.). Yet the patient complained only of dyspnœa and of sharp pains in the abdomen. The others complained of weakness and backache, particularly during menstruation.

b. Intra-parietal tumors may grow to be very large without forming pedicles. The larger the number of connecting bands

passing from the wall into the interstices of the tumor, the less likely is the tumor to become separated from the wall. In many such cases the size of the tumor is the chief source of complaint; by pressure on the diaphragm it causes shortness of breath, and inconveniences the patient in walking. The more completely

FIG. 76.



the tumor has grown into the false pelvis, the less is the discomfort during the early stages. When the tumor grows toward the cervix, the first sequelæ are constipation, hemorrhoids, dysuria, strangury and, not infrequently, retention of urine. If the tumor grow downward into one of the lips, it may split the

latter, enter the vagina, become gangrenous and cause death by septicemia. Such cases have been reported by Labat, Davis, Hue and others. By involving the bladder the tumor may affect the ureters and cause their dilatation as in pregnancy, and catarrh of the pelvis of the kidney, even nephritis (Morris) and hydronephrosis (Pozzi) may follow.

The vessels and nerves of the true pelvis are pressed upon, leading to paralytic weakness, œdema, ecchymosis and even to subcutaneous hemorrhage. I have treated a patient who occasionally had the rusty sputa of pneumonia, evidently caused by submucous hemorrhages into the bronchial tubes, in consequence of the displacement of the diaphragm and the laceration of vessels.

The pain of which these patients complain arises not only from pressure and tension, but also from inflammatory conditions of the surface, perimetritis, myositis, disordered circulation in the large veins, which often causes hemorrhages, and, finally, from contraction of the muscular fibres of the tumor itself. These muscular contractions are especially common after injections of ergot.

By far the most important symptom of the majority of intraparietal myomata is hemorrhage from the uterus. At first appearing as a profuse flow, it is followed by protracted menstruation and shortening of the intervals, the menorrhagia being more or less continuous, often for weeks and months. Fatal hemorrhage may occur. The hemorrhage is due partly to swelling of the mucous membrane, and partly to the adenomata and mucous polypi formed in its structure. In addition, the cavity of the uterus is often elongated and widened by the tumor, and dilatation of the vessels produced; these may rupture and thus cause abundant hemorrhage. A marked characteristic is the irregularity of recurrence and the profuseness in amount of the metrorrhagia, which after having been absent for months may suddenly reappear and become so severe as to threaten life.

Sometimes thrombi are formed in the large vessels of the tumor, with subsequent hemorrhages (Bastard); abscesses are then developed (Gorvits); fluctuation appears, with high fever and violent pain; the abscess opens; its rigid walls cannot be

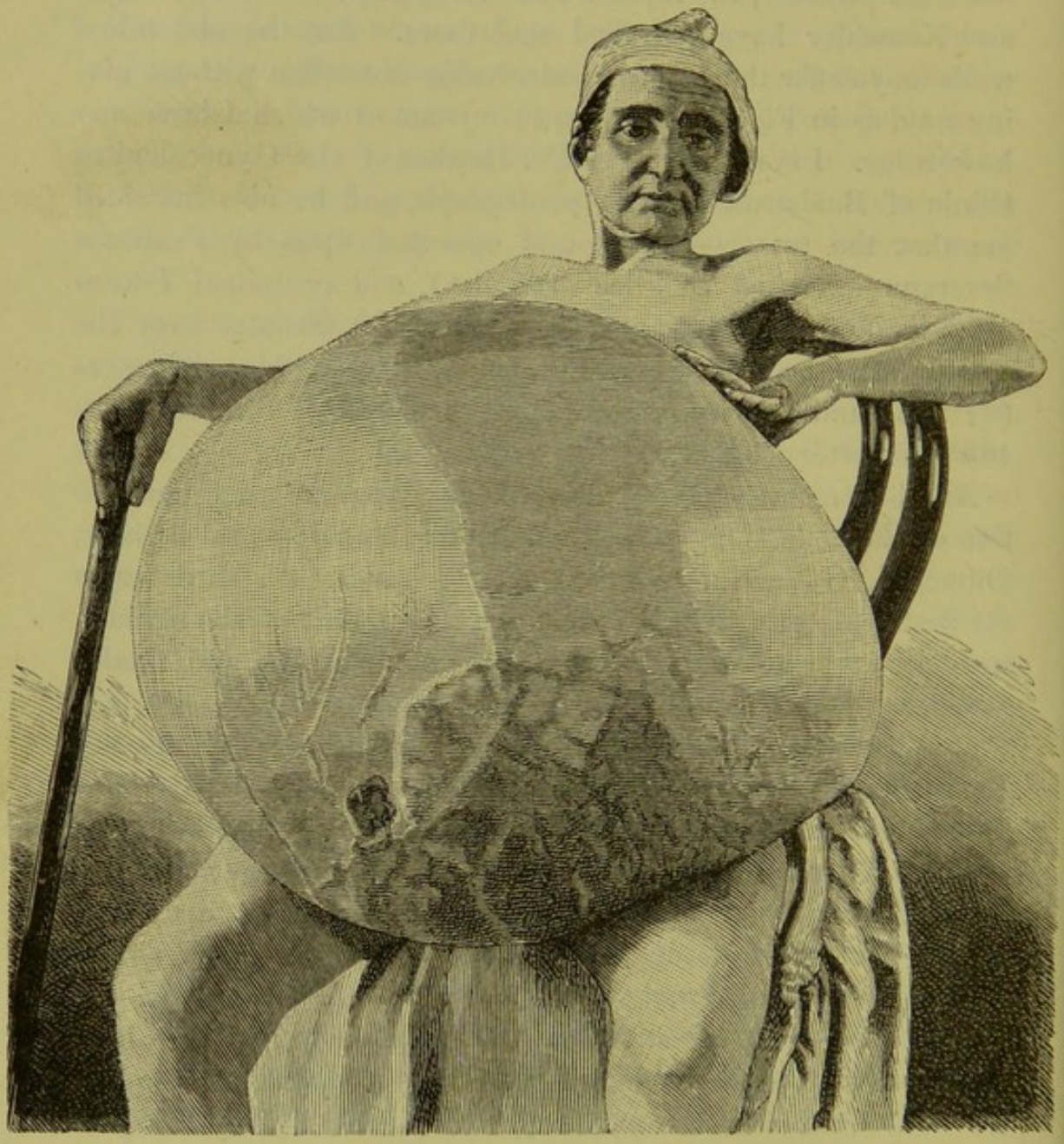
approximated, air enters and sloughing supervenes, with an early fatal issue. The larger the size of the tumor the more the abdomen is distended; the epigastric veins appear above the level of the surface, as is well shown in Fig. 77; the skin becomes œdematous and the abdomen pendulous. The skin may become gangrenous from pressure, the myoma thus being exposed. Düll, Degen and Neuschler have described such cases. But the abdominal walls may suffer the greatest conceivable distention without giving way, as in Fig. 77, the largest myoma of which I have any knowledge. I am indebted to Dr. Hepites of the Gynecological Clinic of Bucharest for the photograph, and he also informed me that the tumor—a fibro-cyst operated upon by Professor Severanu—weighed 78 kilos (195 lbs.), and contained 7 kilos (17.5 lbs.) of a coffee-ground sediment. The distance over the tumor from the sternum to the symphysis was 104 centimeters (3½ feet), and its circumference at the level of the umbilicus 185 centimeters (6 feet).

Another mode of termination is in gangrene and perforation of the abdominal walls, cases having been reported by Soir, Dumesnil, Gutierrez, Hofmokl and Schmidt. In these cases the first symptoms were inflammation in the wall of the myoma, with probable adhesion to the abdominal parietes, and finally gangrene and perforation.

c. When the tumor becomes submucous, the symptoms are hemorrhage, profuse albuminous discharge and occasional labor-like, bearing-down pains. The os uteri gradually yields to the pressure, and the tumor passes through the cervix into the vagina. If the uterine contractions diminish, the tumor may return to the uterine cavity and be again expelled with the onset of renewed contractions (Pozzi, Truchot). If the pedicle be strong, the contraction sudden, the insertion near the fundus and the patient bear down actively, an inversion of the uterus may result, as in the cases of Chenantais, Mason, Olive, Occhini and Reamy. While in the vagina the polyp is exposed to the air and other irritants' and traumatism and pressure sores and discoloration frequently result, especially when there are stasis and swelling of its structure. The discharge becomes ichorous and offensive. When the bearing-down pains are severe, the tumor may appear at the

vulva, and the absorption of septic material thus jeopardizes the life of the patient. The tumor may be partially or wholly discharged spontaneously, as reported by Bompiani, Sorel, Hurry, Stadfeldt, Jackson and the author. The occurrence of septicemia

FIG. 77.



Enormous Cystic Myoma.

was observed by Labat, Girandeau and Lediard; peritonitis by Trélat, Morris, Pinolini and Hirigoyen. Death may follow spontaneous expulsion, as in the case described by Davis. The author

saw a case in which the patient had pyemia and peritonitis when admitted to the clinic, and although a decomposing polyp as large as the fist was removed without loss of blood, she died a few days later. The patients rapidly become anemic and cachectic from the hemorrhages, profuse discharge and pain which accompany even small polypi, and it is often weeks and months after the operation before they regain their health.

d. Breisky found profuse menstruation and mucous discharge to be the only constant symptoms of large cervical myomata. Pain was present in two of his six patients. The duration of the period of development varied between six months and six years.

As a result of the large, frequent, and protracted hemorrhages, profound anemia is an early symptom in most cases of myomata. Of a waxy, sallow color, startling in appearance, the patient staggers upon her wearied legs, creeping around, until recurring loss of blood drives her to bed. Headache, cardiac palpitation, trembling, coated, pale and swollen tongue, anorexia, nausea, vomiting, rheumatic pain in the muscles, insomnia, nervous twitchings and faintings are the well known, most common symptoms of this fearful anemia, with which œdema of the lower extremities is now and then associated. The urine is concentrated and sometimes albuminous, these changes depending upon compression of the ureters. In Pozzi's and Morris's cases hydronephrosis and nephritis supervened. Retention of urine without an apparent cause is a common symptom. It may be due to the extension of the œdema to the muscular tissue of the bladder, thus causing insufficiency of the detrusor urinæ muscle. More rarely there is direct compression of the neck of the bladder, such as we meet with in retroflexion of the gravid uterus. When the retention is not relieved uremic symptoms are developed, such as a tendency to diarrhœa, nausea, vomiting and headache, without much loss of blood (Hicks, Pourrat, Pozzi).

If the hemorrhage becomes less profuse, despite the large tumor, the patient may quickly recover strength. The pale lips and cheeks take a natural color, and there is a rapid gain in flesh.

When one polypus has been expelled, a second may be devel-

oped, with a repetition of all the symptoms (Fox, Krasinoi and Post). It is indeed wonderful how long many patients are able to bear the metrorrhagia, leucorrhœa, pain and numerous functional disorders; they continue to live for years and even for decades, recovering sufficiently during each menstrual interval to enable them to endure the next flow.

We designate myomata as benign tumors, but this name is suitable to those only which cause no menorrhagia, which do not grow rapidly, and which become polypoid, so that it is possible to remove them. The others differ from adenomata, sarcomata and epitheliomata of the uterus only in their longer duration and less severe pain; but we need not hesitate to believe that many patients would prefer a malignant disease of short duration to this interminable malady with its constantly recurring relapses.

The advent of the menopause is favorable, for the tumor may shrivel and become so small that it causes no more discomfort. But, unfortunately, this is not always the case, for I had one patient with a myoma as large as the fist, in whom the hemorrhages were absent for a year after the menopause, but one day while she was sleeping after dinner, returned with greater severity, death resulting in a few hours, in spite of the transfusion employed by C. Hueter and myself (1868).

Diagnosis.—It is evident that tumors such as those shown in Figs. 71, 72 and 74, cannot be diagnosticated, because they are small, surrounded by muscular tissue and cause no prominence on the uterine wall. But the probability of their existence should not be lost sight of in all cases in which there is great sensitiveness of the uterus, unaccompanied by fever or other symptoms or anomalies. One should also carefully observe any difference in the consistence of the wall of the body of the uterus, and endeavor to ascertain the thickness of its walls by the sound, or by pressing the body of the uterus against the promontory. As soon as a prominence is formed, the tumor is more easily recognized, the diagnosis is confirmed by its firmness, insensitiveness, rough and irregular surface, and the impossibility of separating it from the wall of the uterus. Nevertheless, peritoneal polypi may be mistaken for ovarian tumors, and the intraparietal

variety for hematocele, perimetritis, and parametritis, etc. Error will be guarded against by obtaining an accurate history of the case, by repeated examinations and long observation of the patient. When the tumors have attained even a moderate size, are not too firm, and the vaginal portion is situated so high as to be difficult to reach, it is not an easy matter to make a diagnosis. Then the sound must be employed; but in its use there are many difficulties to be avoided and obstacles to be overcome. Sometimes it penetrates the cavity of the uterus, can be unmistakably felt through the abdominal walls and moves the wall of the uterus about, so that one believes this organ has been isolated from the tumor, when in reality the sound was simply elevating the anterior wall. Auscultation should not be forgotten, as the vascular souffle can be demonstrated in two-thirds of all large myomata. But the souffle may be present in ovarian tumors also. Repeated harpooning of muscular tumors for the purpose of obtaining some of the tissues for examination is perfectly harmless, although we do not always find non-striated muscular fibre, but often only connective tissue present, and simply learn that the tumor is more or less solid; its exact location remains an enigma, indeed it may be almost impossible to make out this point even at the autopsy. As submucous tumors, even before they have formed pedicles, produce tension and gradual effacement of the cervix and dilatation of the os uteri, especially during the menstrual flow, internal examination must be repeatedly made at this time to ascertain whether the finger can pass through the canal and thus examine the tumor. When the tumor is situated in one of the lips it may be easily recognized by the thickening and induration if the finger can be passed around the lip. But when the tumor has grown so large that it fills up the true pelvis, it is extremely difficult to reach or even to recognize the os. As soon as the tumor has divided the affected lip and entered the vagina, this laceration may be mistaken for the os uteri.

When it is certain that pregnancy does not exist, carbolized sponge tents may be used to dilate the cervix, in order to determine the location of a palpable tumor, whether submucous or

pedunculated, or eventually to apply styptics to the inner surface of the uterus.

The chief conditions with which myomata may be and frequently are confounded are briefly as follows:—

Pregnancy.—The myoma causes a firmer and more circumscribed resistance in the body of the uterus, menstruation is not diminished in three-fourths of all cases, but is more profuse, lasts longer and recurs more frequently than usual. The visible portions of the uterus are not of the bluish-red color characteristic of pregnancy. The myoma grows more slowly. But if, notwithstanding the presence of these symptoms, there remains a suspicion of pregnancy, the sound and mechanical dilatation should under no circumstances be employed, but the discharge is to be controlled, and the changes in size and consistence of the uterus, and also the condition of the mammary glands, are then observed. Very often a positive conclusion cannot be arrived at from a single examination, but only after this has been repeated two or three times, at intervals of a few weeks. In myoma the vaginal portion usually remains hard.

Hematocele, Perimetritis, Parametritis.—These tumors fill the true pelvis more or less completely, are uneven, rough and nodulated and extend close to the pelvic walls. The majority of the cases, as revealed by the history, are sudden in origin, the latter affections appearing with symptoms of inflammation, while hematocele is attended by manifestations of fever and more or less pain, and is soon followed by anemia. These tumors also gradually diminish in size, and become more uneven and compact, while a myoma undergoes no essential change, at least not within the first few weeks.

Retroflexion of the uterus might be mistaken if there were an intraparietal myoma of the posterior wall, or if a polypus hung from the fundus into Douglas's cul-de-sac. This error in diagnosis may be avoided by ascertaining by the sound the position and direction of the uterine cavity, when this cannot be done manually, by separating the uterus from the tumor behind it, and by feeling the fundus at the pelvic inlet.

In *chronic metritis*, either the body alone or the cervix, or both,

may be thickened; the consistence of the wall is, however, not as firm as in myomata, and the sound penetrates the middle of the uterus, while in myomata it is either impossible to introduce the instrument at all, or it passes to the front, behind or laterally, depending upon the location of the tumor.

Ovarian tumors may be confounded with myomata, especially when the latter are subserous or are peritoneal polypi. When the ovary is firm and nodulated, and adherent to the posterior uterine wall, an exact differentiation is often impossible If the ovarian tumor is small and movable, the diagnosis is usually quite easy, for the ovary is nearly always at the side or behind the uterus, and the ovarian ligament may be felt and made tense during bimanual examination. Pressure upon the ovary is generally very disagreeable to the patient, while in small subserous myoma this is not so, and the consistence of the latter is firmer than that of an ovarian tumor. Under certain conditions an exploratory puncture will decide the question; as, if the ovarian tumor be cystic, some fluid containing cylindrical epithelium will flow from it, while a myoma is difficult to puncture and presents a uniform resistance to the needle. The difficulties increase, first, with the size of the tumor; secondly, with changes in the consistence; thirdly, with and after peritoneal affections, which have been followed by adhesions; and fourthly, with other complications. Myomata which have undergone fatty degeneration in the centre, or which are œdematous or cavernous, may very closely resemble ovarian tumors. Exploratory puncture and the most careful microscopical examination alone can remove the doubt; yet there are exceptions; *e. g.*, ovarian fluid by no means invariably contains cylindrical cells, metalbumen or paralbumen, and, on the other hand, large quantities of fluid may be evacuated from œdematous myomata.

When *retro-peritoneal tumors*, such as fibromata and sarcomata, have reached a certain size, it is wholly impossible to differentiate them from myomata, even by examination by the hand in the rectum, a procedure by no means safe, because the size of the tumor prevents one from determining its origin. Besides, myomata of the posterior wall of the uterus may become

retro-vaginal. The diagnosis of myoma would be probable if the uterus could be moved, even a little, independently of the tumor, when the ovaries could be found, and when constitutional symptoms, especially the cachexia, are absent, at least if there be no marked metrorrhagia. Finally, myomata are much more common than retro-peritoneal tumors.

Myomata may be differentiated from *uterine sarcoma, epithelioma and malignant adenoma* of the body of the uterus by their slow growth, their hardness, their globular form, and the absence of the sloughing and discharge of fragments of dead tissue, as long as a pedunculated fibrous polypus has not become gangernous, and also by their non-recurrence after extirpation, unless in very exceptional cases. Furthermore, the longer duration of the profuse hemorrhage, and the small size and firmness of the vaginal portion, will often admit of the exclusion of these malignant neoplasms at the first examination of very anemic patients.

Fibrous polypi are not infrequently mistaken for *inversions, et vice versa;* but in inversion the fundus uteri is not in its usual location, there being a depression in its place, which becomes more distinct by traction downward upon the tumor. Ordinarily, inversion occurs suddenly with very threatening symptoms, only rarely in a gradual manner. The tumor is sensitive, and when the speculum is introduced, one or the other of the tubes may be seen and the sound passed into its orifice. No pedicle can be found in inversion, but the tumor passes in every direction into the uterus. The tumor caused by inversion bleeds freely when touched, which is not usually true of fibrous polypi. In case the patient has been delivered shortly before, the large size of the tumor compared with the small part of the uterus to be felt above it and the absence of the body of the organ would be significant. In sensitive patients, a bimanual examination must be made under anesthesia.

A final diagnostic aid, and especially for the differentiation between large myomata and ovarian tumors, is exploratory incision through the abdominal walls, made with full antiseptic precautions, just as though an ovariotomy were to be performed. If

the symptoms and condition of the patient allow, this incision should be followed by total extirpation of the tumor by one of the methods described later.

The *diagnosis of the complications of myomata*, such as ovarian tumor, is included in what has been said. Suppuration of the tumor would be recognized by the great pain, fluctuation, fever, jaundice, etc. Ascites is seldom associated with myomata, and is easily recognized. As a rule, it is found only when the myoma has become a myosarcoma, the consistence of the tumor softer and the tumor painful. Cachexia is evident in such patients even when there is no metrorrhagia. Again, as I have seen in one of my cases, ascites may appear when carcinoma of the peritoneum has been developed along with myoma. In such cases one will feel numerous, small, sensitive nodules in Douglas's cul-de-sac, and after puncture and evacuation of the fluid the myoma and carcinoma may be differentiated. It is also possible that sarcomatous and carcinomatous affections may be recognized by microscopical examination of the fluid evacuated from the abdominal cavity.

Fibrous polypi may be differentiated from placental polypi, from a loosened ovule, from polypoid adenomata, from firm, pedunculated sarcomata, by the varying consistency and sensitiveness, by the strong pedicle, the absence of cystic spaces, and the smooth surface. If fragments of the tumor are broken off they will be found to contain, in the myoma, non-striated muscular fibre, while the above tumors present remnants of the decidua, or villi, or glandular epithelium, all of which are easily recognized. After the extirpation of such tumors, the uterus must be carefully examined for any other suspicious prominences; most varied combinations often occur. We must always endeavor to obtain an accurate history, and this will protect us from many a source of error.

The terminations of cases of myomata are various; a large proportion of the patients retain the tumor during life, with but little change either in regard to its size or consistence. Many of the symptoms are not produced by these stationary myomata, and such are, therefore, really benign; in this class belong especially the subserous and the smaller intraparietal tumors which

cause no hemorrhages. In others the most threatening symptoms are materially lessened in severity with the advent of the menopause.

Spontaneous retrogression of an intraparietal myoma is very rare; in my own cases I have seen but a single instance. In this connection, one must thereby suppose fatty degeneration of the muscular fibres and subsequent absorption, in a manner similar to that in the puerperium. The tumor in my case was the size of a hen's egg, and situated in the posterior wall. Loehlein has recently reported three cases of complete cure.* One of these patients had been pregnant seventeen times, and had several myomata, the largest the size of an apple; eleven weeks after confinement not a tumor could be found. Simpson has also seen some examples of this change, and expressed the opinion that fatty degeneration could occur at other times than the puerperium, as he had seen examples of it at autopsies. Other authors, among them Michels and Engelmann, assert that the brine-baths of Kreuznach may cause complete disappearance of the tumors.†

When the tumor becomes pedunculated, the pedicle may be loosened by thinning and traction, and the mass spontaneously expelled as part of a child is at term. If this occurs rapidly, and the tumor be not too large, it does not tax the patient's strength, but when the tumor is large and becomes gangrenous, fatal septicemia may ensue. In Ygonin's case, the patient recovered after spontaneous expulsion of a tumor 18 centimeters (7 in.) long, and 37 centimeters (15 in.) in circumference. I have found the pedicle separated, in two cases in which the tumors were the size of a child's head.

In about 10 per cent. of all cases, death is a direct result, sooner or later, and may occur in different ways. It may come from enormous loss of blood, or from uremia; by compression of the ureters hydronephrosis may result, and by the enormous distention of the tumors dyspnœa, emaciation, and exhaustion, in which sometimes pulmonary disease occurs.‡ Thrombosis of

* *Zeitsch. f. Gebh. und Gynäk.*, 1877, Bd. I.

† Two cases. *Zeitsch. f. Gebh. und Gynäkol.*, Bd. I, 1877.

‡ See interesting case of P. Richter, *Cent. f. G.*, 1878.

the veins of the thighs and pelvis, with subsequent fatal pulmonary embolism, has repeatedly been observed.*

Suppuration with septicemia and pyemia have caused death after successful extirpation, as occurred in two cases of my own after total and one after partial extirpation.

But comparatively few have been or can be cured by operative measures. Possibly many patients, by total or supra-cervical amputation, might have been cured, could the operations have been performed under as complete aseptic methods as at the present day. The prognosis has improved, and will continue to improve. C. Braun has collected from the literature of the subject sixty cases of intraparietal tumors, of which 68 per cent. were cured by enucleation, and twenty-nine subserous myomata, of which 60 per cent. were cured by laparotomy.† K. Schroeder operated upon eighty-eight patients, losing 26 = 29.5 per cent. of the whole number. Eight operations for pedunculated subserous tumors were successful, and four out of five in which the tumor was inserted above the uterine appendages—the death from accidental cause; of 55, on the other hand, in which the origin was below the appendages, most recently of 35 only 7, finally, in those in which no pedicle could be made, the tumor to a great extent having to be shelled out of the pelvic connective tissue and the substance of the uterus, of 17 operations, 8 were fatal.

Treatment.—If the recent literature upon the treatment of myomata of the uterus were divided into the medical and the surgical methods, it would be at once apparent that the latter is rapidly gaining in popularity. The number of articles devoted to the consideration of operative measures for the cure of this affection is five times as great as that of those advocating medical treatment, and in the latter ergot and electrolysis are alone mentioned with any degree of confidence. But we must not forget that, though the number of cures recorded from operations is very large, yet there are just as many unsuccessful cases never published. When, therefore, we find 27 per cent. of fatal cases occurring in a total of 253 operations performed by the ablest

* Duquet, *Gaz. des Hôpitaux*, 1877, No. 146.

† Virchow-Hirsch, 1874, Bd. II, 760.

gynecologists, we must remember that this percentage would be materially increased if the isolated unsuccessful cases were also included. Granting that great improvement has been made in the technique of the operation, and that the number of successes is larger than formerly, still the indications for myomotomy are by no means identical with those for ovariotomy; more frequently in the former than in the latter are the subjective rather than the objective symptoms of the patient made the rule of action, instead of being guided by the certainty or uncertainty of success. "Operate by all means, for what difference can it make to a patient with such a tumor?" is often said by young physicians, and was once heard by a patient just coming out of anesthesia. The patient earnestly wished to be operated upon, but this remark caused her to change her mind. It is usually an unreasonable excuse offered that such patients would rather die a speedy death than endure years of sickness; yet, if the chance of success were always pointed out, along with the dangers of the operation, and the decision then left to the patient, the selection of operative cases would undoubtedly be a better one, and the number of successes proportionally greater. "We should not show what we can do, but do only that which is for the best." It is beyond question that we can often cure a patient by enucleating an intra-parietal tumor by laparotomy, or by completely removing it by the supra-vaginal amputation of the uterus; but who can assert that, under the protracted use of ergot, the tumor would not have first become submucous, then pedunculated, and finally have been expelled from the uterus, thus attaining a radical cure, without submitting the patient to a dangerous operation, or mutilating her for life? The difference in treatment consists simply in the measure of patience possessed by the physician, which he understands how to communicate to the sufferer, a quality based upon the experience that by far the majority of cases are unsuited to the operation, and that the physicians who prefer to operate whenever possible, certainly do not find more than one case in five which is suitable. Schroeder's words are very encouraging when speaking of the prognosis of myomotomy: "In very exceptional cases only, do I decide to operate at once. I have performed

the majority of my operations only on being convinced that they were necessary, after long observation of the patient." The author deems himself fortunate in being able to say the same of himself.

From this explanation, and from what we have said of the ætiology of myomata, it becomes evident that prophylactic measures are of great importance and must not be undervalued. Especial attention should be given to the periods in girls, to the avoidance of accidental injuries, and to the correction of anomalies of menstruation. Domestic remedies that hasten or delay menstruation, as foot-baths, acid beverages, mustard plasters, etc., are highly objectionable. Dancing, gymnastics, prolonged mountain-climbing, long-continued singing in public assemblages, and standing in over-heated or crowded rooms during menstruation are generally harmful. Among married women much suffering results from carelessness and want of necessary care after abortion, in getting up too soon, by too early exertion in standing and walking, and in household duties, from using heavy sewing-machines, etc., and neglect of requisite precautions at the first return of menstruation.

The treatment of small intraparietal myomata should be, on the one side symptomatic, and on the other against the causes of their growth.

Uterine neuralgia, dysmenorrhœa, abdominal distention and menorrhagia afford indications for symptomatic treatment. The neuralgia and dysmenorrhœa may often be relieved by bromide of potassium, 15.0 : 175.0, one tablespoonful 4 times a day, tincture of gelsemium, in 5 to 25 drop doses daily, and locally by vaginal suppositories of cacao-butter containing extract of hyoscyamus, belladonna or chloral hydrate. To prevent the formation of a bad habit, we should avoid the early administration of opium or morphia, especially the subcutaneous use of the latter.

The baths of Kreuznach, Hall in Upper Austria and Toelz-Krankenheil-Heilbronn are frequently of much service for the swelling and the stretching of the uterine wall, and the growth of small myomata; patients may be permitted to use these baths though menstruation has not ceased, and it is not rarely observed

that uterine hemorrhages become smaller and less frequent. During the winter, and for patients who cannot go to the baths, baths of sea-salt and brine, the addition of 1–10 liters, may be beneficially employed at home. After each bath the patient must rest for an hour. Brine abdominal compresses are agreeable to many patients.

Action of the bowels is to be secured by injections or eventually by cathartics. Symptoms of pressure and weight, caused by the presence of small myomata, such as functional disturbance of the bladder and rectum, are not seldom relieved by a round or lever pessary which elevates the tumor above the pelvic floor, or when possible pushes it from the true into the false pelvis.

Prophylactic treatment consists in avoiding every source of irritation which might cause congestion of the uterus; also, by exciting contractions of its muscular tissue, to seek to limit the origin and growth of the tumors. To Hildebrandt, of Königsberg, belongs the credit of having introduced the use of ergot. In the year 1877 his assistant, Dr. Münster, published a case in which by injection of a purified extract of ergot 3.0 : 15, into the abdominal wall, the injections being used 303 times, a subperitoneal fibroid the size of a child's head, and which had caused severe hemorrhages, was reduced to the size of the fist, and menstruation became quite normal. In recent times reported observations of Cushing, Kessler, Marsh, Pratt, de los Rios, Schwarzhölser and Miliken, in the entire disappearance of myomata under the use of ergotin, confirmed the observation of Hildebrandt. My experiences with this means are also very good. For twelve years I have employed it in a great number of cases, and the profuse hemorrhages were not only moderated and removed, but also the swelling was usually lessened. In one of my patients an intraparietal tumor became submucous, and was spontaneously expelled, perfect recovery following. The best article for use is the officinal preparation of the German Pharmacopœia, 2½ grams (37¼ grains) being dissolved in 15 grams (225 minims) of distilled water and 5 centigrams (¾ grain) of salicylic acid being added, but no alcohol or glycerine. This solution will not decompose for years, and scarcely ever causes indurations or

abscesses. I have treated a patient for more than ten years, who during this time has had 1500 injections given, and no abscess followed. The extraordinarily large tumor decreased in size most rapidly during the first six months, and then more gradually, the change being most marked upon the right side, into which most of the injections were made. A tumor as large as a child's head, situated above the symphysis in front of the chief tumor, gradually diminished to the size of an orange. Many times patients have assured me that they had observed an oily discharge from the vagina during the administration of ergot. Notwithstanding the protracted use of the remedy, the injection was invariably followed in six to eight hours by labor-like pains and perceptible hardening of the tumor. Tingling in the hands and feet was very unusual, and soon disappeared. In addition to the hypodermatic use, the patient took three-quarter grain doses of ergotin thrice daily in pill form. The menopause appeared one year ago; the tumor is decreasing in size, and the ergotin has, therefore, been discontinued.

This case shows the daily dosage of ergotin to be 0.15 gram (2½ grains) for internal administration, and 0.05 gram (¾ grain) for hypodermatic use, given three or four times a week, also, that ten years was not too long for its continued use; but I must warn against too large doses, as I had in the very beginning of its use, long before Hildebrandt employed it for myomata, unfavorable results from too great a quantity. In 1868, at my Rostock clinic, I injected hypodermatically, in the case of a very anemic patient with menorrhagia, according to Swiderski's recommendation, 0.18 of a gram. The ergot was chosen by a comparison of the strength of the ergotin of the Hannoverian and the Russian Pharmacopœias, the quantity used being really equivalent to 0.21 gram, for the ergotin of the former is more concentrated than that of the latter. The patient soon developed symptoms of acute ergotism, in that menstruation disappeared, she had an extensive parametritis, suffered from fever for weeks and months, but finally recovered sufficiently to return home, where she was reported to have died. The preparation was at once examined, and found to be faultless.

I have administered doses of 5 centigrams (¾ grain) thousands

of times, and have never witnessed any bad effect, even when it had been given internally for years.

By means of Pravaz's syringe, with a canula 5–6 centimeters long, ergotin has been injected into the cervical wall, using a Cusco's speculum, or through the abdominal wall, immediately into the tumor. Delore employed a watery solution, 1 : 2, injecting the cervix in 63 cases, and found frequently that the injection was followed by nausea, trembling, vomiting, and sacral and abdominal pains, lasting from four to twenty-four hours.* Twice he observed cervical abscess and once pelvic phlegmon. The hemorrhages are said to have ceased and the tumor to have stopped growing. But Loumeau injecting the tumor through the abdominal wall, a fatal peritonitis resulted, and hence this method is too dangerous for extensive employment.

Next to ergot—in my experience even sometimes surpassing it—is hydrastis Canadensis, in the form of the fluid extract or the pill. Fellner's experiments have shown that it causes contractions of the uterus and increases the blood pressure. I have employed it in a number of women with uterine myomata with striking effect, so far as the hemorrhage was concerned. In some cases the tumor seemed to diminish in size. The dose is 25 drops three or four times daily. If gastric disorder and anorexia ensue, the dried extract, 2.5 grams (37½ grains), in pill form may be substituted, each pill containing 0.05 gram, and of these from three to six are to be given daily. These two remedies, ergot and hydrastis Canadensis, will often relieve the metrorrhagia. When they do not suffice, vaginal injections of hot water are indicated. The temperature may range from 37° to 43° R. (115° to 129° F.); one of my patients who was endeavoring to find out how much heat she could bear, used injections at 44½° R. (132° F.); one or more quarts of water are to be injected two or three times daily or every two hours until the hemorrhage ceases. Some patients state that these injections are followed by a kind of spasmodic contraction; others, by labor-like pains. The majority find that they are sedative or that they are conducive to better sleep. The warmth refreshes and invigorates the body

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* *Gaz. hebdom.*, 1877, No. 16.

weakened by loss of blood, while cold injections would increase the depression.

I have occasionally used tincture of digitalis in 10 to 20-drop doses from three to six times daily, until the pulse became much slower, or was rhythmical, or until nausea prevented its further use.

But when all these remedies give no relief the uterus must be sounded or finally dilated, in order to ascertain whether an adenoma of the mucous membrane is present, and, if so, to remove it, as has been previously stated. Even if no adenomata be found, it is advisable to curette the uterus, then mop it out with an aluminium sound wrapped with salicylated cotton; should bleeding continue, the application of a solution of sesquichloride of iron by means of the cotton-wrapped probe is advisable. The introduction of the cotton that has been dipped in the iron solution by means of the sound can be made in the undilated uterus, the sound remaining two hours.

If the uterine cavity is much dilated and elongated, and the hemorrhage threatens life, injections of liquor ferri must be made into the cavity. At first the iron should be diluted with an equal quantity of water, but afterward it may be used undiluted. Braun's syringe may be employed if the cavity is very small; a guttered speculum is used to avoid cauterizing the vagina. I have never seen bad results from these injections. I have never used tincture of iodine in this way, because the iron solution answers the purpose, and I once had to treat a patient for severe parametritis, which resulted from injections of iodine made by her physician.

Severe hemorrhage from uterine myomata may often be checked by vaginal tampons alone. They should be made of salicylated cotton or borated lint, and may remain *in situ* at first from six to eight hours; later, from twelve to fourteen hours. The patient may even be taught to tampon the vagina herself.

Atlee, Brown, and afterward Spiegelberg, have recommended, for the relief of hemorrhage, dividing the mucous membrane covering the tumor. These incisions should be made long and deep in order to remove the tension of the membrane and to reduce the swelling. I have not been able to secure the success from this operation that has been reported by others.

Electricity has been used in myomata. Kimball and Cutter apply it in the following manner: The two electrodes, needles about eight inches long, are inserted into the tumor, and the current allowed to flow for about fifteen minutes. An anesthetic is unnecessary. The battery consists of eight zinc-carbon elements, from six to ten inches long. The operation, repeated from one to nineteen times, is said to have stopped the growth in twenty-six cases, but was without effect in ten; the tumor was reduced in twenty-three, in thirteen not reduced. Two cases terminated fatally from peritonitis, and the tumor is said to have completely disappeared in three instances. Other authors, as Everet, have also employed faradization, but have used ergot at the same time, so that it is impossible to state to which remedy the benefit is to be ascribed. Very recently has electrolysis, the constant current, been brought forward by many authors for lessening the size of myomata, and Pegoud, Musci, Gressot, Chassagny, Serre, Freeman, and Zweifel so strongly praise it for this, and even for causing the disappearance of myomata, that in cases in which no benefit follows ergot and hydrastis, and extirpation of the growth cannot be thought of, trial of this means is advisable. Nothing has been done lately with absorbents, such as iodine, bromide of potash, chloride of calcium, arsenic, phosphorus, etc.

During the menstrual intervals, the effects of the hemorrhage and dysmenorrhœa must be treated. The appetite is to be improved by compound tincture of cinchona, the Paris pill of saccharated citrate of iron and quinine, the albuminate of oxide of iron; all the functions regulated, and the tendency to hemorrhage combated by daily hot water injections.

Operative treatment next claims our consideration, and we will begin with

a. The removal of fibrous polypi, an operation which is as old as medicine. When the polypus is within reach and the pedicle not too thick, the latter should be grasped by two fingers of the left hand, after washing out the uterine cavity with a 2 per cent. carbolic solution, and divided by Siebold's scissors; the stump retracts immediately and, as a rule, there is no hemorrhage.

When it is found very difficult to grasp the pedicle, it may be removed by the écraseur or by the galvano-cautery. I have often used Chassaignac's instrument and invariably with a favor-

able result, but now prefer the wire écraseur, as it is not so liable to tear the mucous membrane of the interior wall.

When the polyp is so large that neither of these methods can be employed, its size must be reduced, or it must be drawn out, so that the pedicle can be reached. This purpose may be attained by Simon's method of lateral incisions or, as Hegar advised, by an ascending spiral incision the tumor is lessened, made less thick, elongated and drawn out until finally the pedicle is reached—a method known as operative elongation; or there may be cut from the chief mass of the tumor a piece from the size of a walnut to that of a hen's egg, until finally one succeeds in grasping and bringing away the pedicle proper. I have often adopted the last method, and several times found the pedicle was then simultaneously divided.

The polyp being removed, the uterine cavity must at once be irrigated and disinfected.

When the tumor, whether pedunculated or submucous, has not yet entered the cervical canal, but remains above the internal os, it is often difficult to reach it for an operation. I once tried to dilate the cervix with laminaria tents, but such violent symptoms of incarceration ensued that I desisted; the patient was thereby so much improved, with respect to the pain and hemorrhage, that the operation was not afterwards desired. In such cases I now incise the os to the vaginal vault, introduce my finger into the uterus and pull down the tumor by Muzeux's forceps. If it cannot be drawn down, I incise the wall of the tumor and, provided it is not connected with the uterine wall by firm fibrous tissue, endeavor to enucleate it. It may also be removed piecemeal, an extremely tiresome and protracted operation, and one which may be attended by much hemorrhage; yet I have never lost a patient after such an operation. When septic fever, due to gangrene of the growth, is already present, the patient may die even after a very easy operation. Such a termination occurred in one of my own patients, aged 52 years. The case is reported in my *Pathologie*, 133, i, p. 72.

b. The Removal of Cervical, Submucous, and Interstitial Myomata through the Vagina.—This operation was first performed in 1840 by Amussat, at Velpeau's suggestion; recently Boeckel,

Czerny, Flanders, Kohn, Mikulicz, Riedinger, and Sutton have given the operation especial attention. It is indicated only when life is threatened by the profuse and protracted hemorrhages, and when nature is making an effort to expel the growth, as shown by the open cervix, and the presence of the tumor at the internal os. The larger the tumor, and the firmer and narrower the parts, the latter being the case especially in women who have not at all or only seldom given birth, the more difficult the operation. Success will also depend upon the nature of the union of the tumor with the uterus, as, when connected at all points with the fibres of the uterine walls its separation is extremely difficult or even may be impossible. After washing out the vagina, the mucous membrane and the thin layer of muscles which cover the tumor are divided, the finger is introduced, the tumor loosened from its bed, and gradually dragged down by Muzeux's forceps. If this instrument does not retain its grasp, a Schultze's forceps may be substituted, or, possibly, even the obstetric forceps may be necessary, and then the extraction is done (Derville, Karafiath, Schlossberger), and finally, its connection with the uterine wall separated by the fingers or instruments within the vagina or vulva, and during this one must observe whether there be an unavoidable inversion of the uterine wall. If it be too large to be extracted in this way, the size must be reduced, as in a large polpyus, by excisions until the uterine wall is accessible. In one of my operations the peritoneum was torn, and the patient died from hemorrhage, a divided vein bleeding into the abdominal cavity.

When the neoplasm cannot be entirely removed, that portion which is loosened from its connections must be separated by the wire écraseur, or by the galvano-caustic loop, which I prefer; the portions remaining may shrink or gradually disappear under the combined internal and hypodermatic use of ergot.

If the cervix is not sufficiently prepared, it may be dilated by the daily use of the colpeurynter, or by rapid dilatation by means of Fritsch's or Schultze's dilators. Small tumors are easily enucleated and extracted, larger ones must be incised, and their expulsion favored by the administration of ergot or hydrastis Canadensis.

Gorrequer-Griffith puts the patient in bed for some time, dilates the cervix by laminaria so that two fingers can be introduced into the uterine cavity, and then enucleates all small intramural tumors; before the operation, relaxation of the tissues is promoted by glycerine tampons, or cauterization with nitrate of mercury, and ergot and strychnia are given internally.

When cervical myomata the size of the fist project into the connective tissue between the bladder and uterus, to one or the other side, or into Douglas's cul-de-sac, Czerny and Boeckel direct that that portion of the vagina rendered most prominent by the growth should be incised, and from this the tumor be enucleated.

In large submucous myomata, if the cervix remains closed, laparotomy is to be preferred to the operation through the vagina.

The after treatment consists in carefully washing out the uterus, and placing a firm tampon into the vagina, which may be allowed to remain twenty-four hours. If the odor of the discharge is offensive after removing the tampon, daily uterine injections must be employed.

c. The Removal of Intramural Tumors of the Body of the Uterus by Laparotomy.—Historical.—The first attempts to do this were made about 1846, by Heath and Charles Clay. Burnham performed the first successful operation in 1853. In 1873 Péan published his successes with extra-peritoneal treatment of the stump. The surprising results of Hegar's operations were published in 1880, 1881, and 1882, by Dorff and Kasprzik. K. Schroeder has been particularly successful in the intra-peritoneal treatment of the pedicle, and the operative removal of subserous myomata.

It is a difficult matter to give precise indications for this operation. I consider that neither rapid growth, the most profuse hemorrhage, nor the pain and pressure caused by these intramural tumors are sufficient indications for laparotomy, and I have never yet met with any case with chronic ascites which could be removed in no other way (K. Schroeder). I am, therefore, of the opinion, also expressed by Schroeder, that the indication for myomotomy depends on purely individual circumstances, not only on the part of the patient, but very often, also, on the

part of the physician. Poor persons who cannot live with their tumors outside the hospital, may be operated upon when they insist upon it, and after the dangers of the operation have been fully explained to them; but if the patient is situated in better circumstances, a purely symptomatic treatment would make life endurable. On the other hand, there are two changes that may possibly occur in the tumor, viz., cystic degeneration of rapid development, and abscess in the substance of the tumor, which give a clear indication for laparotomy. Again, I think that when complete removal is found impossible, partial extirpation through the abdominal walls may come for consideration and be just as feasible as the vaginal operation; at least, this question is still open for discussion.

The method of operating, for which we are indebted to Schroeder, is as follows: After the large tumor has been brought out through the abdominal wound, the spermatic vessels are ligated on each side, at a portion of the broad ligament found to be translucent when held up to the light, and externally to the appendages. Next, the appendages are ligated, a double ligature being passed low down about the round ligament, and these parts then divided between the ligatures. The tumor is now lifted up and a piece of rubber tubing applied tightly about the cervix, and the anterior and posterior peritoneal incisions united at least 5 centimeters (2 in.) above the elastic ligature. During the extirpation which follows, the posterior and anterior walls of the uterus are grasped by Muzeux's forceps, the uterine artery isolated and ligated, and the cut surfaces of the cervical mucous membrane cauterized with a 10 per cent. carbolized solution. The mucous membrane is united first, and then the two surfaces of the exsected wedge sutured at different levels, their distance depending upon their thickness, and the stump is covered by approximating the edges of the peritoneum. Finally, the elastic tube is removed, hemorrhage checked, the stump and the abdominal cavity cleansed, and the wound in the abdomen closed.

In very large, intrauterine, submucous myomata, Martin directs opening the wall of the uterus, enucleating the tumor, and then sewing up the incision in the manner suggested by Sänger.

When one or more of the subserous tumors have grown in any direction into the pelvic connective tissue, then the appendages and vessels are first ligated, and afterward the peritoneum covering the tumor incised. It is then raised out of its bed, a ligature passed under it and around the cervix, and the operation completed as in intramural tumors. Hemorrhage is checked by acupuncture or ligatures; the gaping wound in the connective tissue is closed by sutures as far as possible, or, if too large, drainage made through the vagina, and finally the abdominal wound closed. The wound in the pelvic peritoneum was so large in one of my own cases, that I could not bring the edges together; I therefore disinfected the cavity thoroughly and closed the abdominal wound without drainage, the patient recovering without elevation of temperature.

Péan's so-called extraperitoneal operation is the opposite of the one just described. I once operated by this method, perforating the stump with two steel needles placed at right angles, after first bringing the tumor out of the abdominal wound, and then passed a loop of wire through the uterine wall at the level of the internal os. The two halves of wire were employed to constrict the corresponding halves of the uterus by means of Cintrat's serre-nœud. The tumor was then amputated just above the needles, the stump and abdominal cavity disinfected, and the abdominal wound closed around the stump. The case is fully reported in my *Pathologie der Weibliche Sexualorgane*, and the fatal termination from venous hemorrhage explained. In 1878 I first called attention to the fact that the needles were of no use, the cervix being more easily ligated with three loops of silk; the stump can thus be closely sutured and returned to the abdominal cavity.

Kocher has likewise discarded the Péan needles for Koeberlé's wire écraseur. In a recent operation, he fastened it in the lower angle of the wound and sewed the stump into the cavity thus made; the serre-nœud was removed the twenty-eighth day, the wire remained longer, and was finally removed by the employment of elastic pulling. The wound was closed at the end of the fifth week.

This extraperitoneal treatment of the stump has since been perfected by Hegar and Kaltenbach; after being cauterized with chloride of zinc and everywhere carefully united with the peritoneum of the abdominal walls, the stump was allowed to heal in the lower angle of the wound; by this method they lost but two patients out of twenty-two. Nevertheless, I agree with Schroeder's opinion that, as the intra-peritoneal method is equally successful in avoiding hemorrhage and septic infection, it is to be preferred, because the traction upon the stump and abdominal walls is avoided and the bladder is less apt to become involved, and that the extra-peritoneal method is inadvisable whenever the myomata are situated deeply in the pelvic connective tissue, even when they lie just beneath the serous membrane. I am, from my own experiences, though indeed not very numerous, a firm adherent of the intra-peritoneal method.*

d. Myomotomy in Sessile and Pedunculated Myomata of the Fundus.—The prognosis is decidedly more favorable in this, than in previously mentioned operations, and approaches that of ovariotomy. Assisted by Dr. Boeters, I adopted the following plan in an operation on one of these tumors, performed in Görlitz. The tumor was larger than a child's head, becoming cavernous, and sessile. After bringing it through the abdominal incision, by means of a strong needle, a loop of thick rubber tubing was drawn through the wall of the uterus at the fundus, the two halves of the loop being employed to ligate the corresponding halves of the uterus, and the tumor was then cut through about half an inch above the elastic ligature. The mucous membrane appearing in the stump was excised, all parts disinfected, and the stump dropped without sewing up the peritoneum or removing the tubing; the patient made a complete recovery. I have repeatedly allowed elastic tubing to remain in the abdomen, and can assure the reader, as Olshausen has done, that it is as well or even better tolerated than silk.

When the pedicle is thin, firm ligation of it entirely or in portions, with silk, will suffice. I consider the closing of the tissues

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* *Vide* Pathologie der Weibl. Sexualorgane, pp. 419 to 421.

over the stump to be unnecessary, and even inadvisable, on account of protracting the operation, and increasing the number of foreign bodies left in the abdominal cavity.

e. When the tumor is very large, subserous, and has grown into the true pelvis in such a way that its extirpation would be hazardous, we may as a last resort artificially anticipate the menopause by removal of the normal ovaries, in view of the fact that the menopause exerts a favorable influence upon myomata. In January, 1876, Trenholme first extirpated both ovaries on account of hemorrhage which threatened the life of the patient, and the results were favorable. Without knowing of this case, Hegar twice performed the same operation, and for like indications, upon the 2d and 3d of August of the same year, also with success.* Budin was able to collect statistics of 32 cases of this kind performed up to 1878. I have performed this operation but once, and then removed only one ovary. The tumor extended to the navel, had grown deeply into the pelvic connective tissue, and the hemorrhage was very profuse. The patient had been previously operated upon for a cyst of the left ovary. I found the right ovary sensitive, the size of a hen's egg and lying upon the myoma. After opening the abdomen through the cicatrix left by the ovariotomy, I brought the ovary into the wound by rotating the uterus about its long axis, removed it with some difficulty on account of adhesions, and applied the actual cautery where the peritoneum was injured. The patient had no fever, but there was hemorrhage from the uterus three days later, which continued some days, and was repeated four weeks afterward, in the amount of a normal menstrual flow, not nearly as excessive as previously. It is probably not superfluous to remark that the ovary had been entirely removed. When the distorted ovary is closely attached to the neoplasm, it is often difficult to find, and still more difficult to remove, lateral incisions through the abdominal walls being occasionally required (K. Schroeder). The operation must often even be left unfinished. The mortality is over 15 per cent., and the desired result fails in 20 per cent. of those cases not immediately fatal. The value of castration for un-

* *Centralblatt f. Gynäkol.*, 1877, pp. 73 to 75.

operative uterine myomata therefore remains *sub judice*, and its value, when compared with myomotomy, cannot be definitely determined with our present limited experience. Besides we will come to fully consider this operation in menstrual anomalies and in ovaralgia.

CHAPTER IV.

NUTRITIVE DISTURBANCES OF THE UTERUS.

1. The Inflammatory Diseases of the Uterine Mucous Membrane.—Endometritis.

Pathological Anatomy.—In acute endometritis the uterine mucous membrane is abnormally congested, reddened, swollen, containing occasional small extravasations, and is more easily separated from the subjacent tissue than when normal. It at first pours out a serous or sero-sanguinolent secretion which later becomes clouded, thicker and purulent, and which contains the débris of cylindrical cells, and exfoliated epithelium from the cervical and uterine glands. This thick, tenacious cervical secretion rapidly disappears, and is followed by an increased discharge which may become quite profuse. After some days the secretion and hyperemia diminish, the swelling disappears and the newly formed ciliated epithelium restores the surface to its normal condition, while the extravasations and transudations into the mucous membrane are absorbed. But if recovery does not take place, the acute variety passes into a chronic endometritis; the two may be described together. The mucous membrane remains thick and flabby in the chronic stage; the former extravasations change to yellowish or dark-brown spots; the inner surface is smooth or uneven, ridged, wavy or nodulated, depending upon the portion chiefly involved. C. Ruge divides endometritis into the glandular, the interstitial and the mixed form.

In the glandular form there are proliferation and increase of the glandular epithelium, and the normally smooth gland tubule has a serrate appearance upon section, and corkscrew-like con-

volutions may appear. Further, the glands are not therewith increased, but only diseased in their walls, or however increased, it is by lateral growth of their ducts by new depressions of the superficial mucous membrane, or by expansions and projections of the gland fundi toward the muscular coat; Ruge designates the first as hypertrophic, and the latter as hyperplastic glandular endometritis.

The diseases in which the stroma of the mucous membrane is chiefly affected, and which are likewise comprised under the name of interstitial endometritis, have also various forms, according as to whether the cells or the connective tissue are chiefly involved. The small round cells, which have a large nucleus, are transformed into fusiform cells with an oval nucleus, and they increase in size and interlace in all directions. By the enlargement of the nuclei and the appearance of more nucleoli they become similar in aspect to the decidual cells.

When the stroma is especially involved, it becomes either softer or indurated and friable.

In the combined form the glands and the stroma are affected, though not in the same degree, the interstitial proliferation usually predominating, while the glands show moderate hyperplasia, and are either generally dilated, or else constricted in some parts and dilated in others.

When the inflammatory process is long-continued, the mucous membrane finally atrophies and becomes thinned, the ciliæ are lost, the gland cells or even the entire glands disappear, and at last the only covering to the inner surface of the uterus is a thin, smooth layer of connective tissue.

All these varieties may be circumscribed or diffused, and be of a severe or a mild type.

In the puerperal state, or especially after abortion or premature delivery, the interstitial form is usually the primary stage, the glands becoming implicated later. Islands of decidua act as irritants and cause abundant small-celled proliferation in the surrounding mucous membrane.

Hitherto we have spoken of disease of the mucous membrane of the body, but the cervical surface will necessarily become affected later, as the irritating discharge flows over it in passing

from the uterus. The swelling presses the pavement epithelium of the vaginal portion outward until it appears in the vault; it is exfoliated, and the cylindrical layer beneath it exposed. At the same time the mucous membrane becomes hypertrophied through the formation of folds and glandular inversions; these may penetrate the mucous membrane and even press into the muscular tissue beneath.

Simple erosions are said to be formed when the dark-red, glossy surface of the cylindrical epithelium appears upon portions of the surface at which pavement epithelium is usually found. When numerous and uniform new gland inversions develop, the remnants of tissue between them are said to resemble papillæ, with which they have really no connection; hence the name papillary erosions, for which a more appropriate term would be *papilloid*. When retention of fluids takes place in these glands the dilatation and constriction lead to the formation of small cysts, the so-called *follicular erosions*.

The muscular tissue of the cervical wall not infrequently becomes involved in this affection of the mucous membrane, its structure growing irregularly hypertrophied, rough and uneven.

In nulliparæ chronic cervical catarrh often causes stenosis of the external os, and also dilatation of the lumen of the cervix by a thick, tenacious, firm plug of mucus. The surface of the external os shows simple erosions, while higher up the mucous membrane contains diverticula, is beset with small cysts, and in the later stages becomes rigid and thickened, or thinned and reticulated.

The contents of the distended cervical glands exert a constant irritation upon the walls of the glands; inflammation results and abscesses are often formed. These abscesses may be developed about the whole periphery of the os, but are most common on the anterior lip. They rupture after growing to the size of a pea or bean, and after evacuation of the pus the surface of the vaginal portion becomes uneven and sinuous, so that the resulting cicatrization may leave some loss of substance. When the vagina is also diseased, the purulent secretions penetrate still further into these depressions, often resulting in obstinate ulceration of the lips of the uterus.

In rare cases the lower segment of the uterus becomes œdematous, but the œdema is transient and usually confined to one lip; the œdematous lip may appear lobulated. The œdema is most marked in acute infectious catarrh. Whether as causes or effects, probably on both grounds, in severe chronic catarrh, phlebectasis may be developed. These are deeper, as a rule, than believed to be, in the substance of the mucous membrane, and under it, and appear superficially only at the eroded part. Varicose ulceration, similar to that occurring upon the lower extremities, may result from rupture of the walls of these veins. The edges of the ulcers are firm, irregular, undermined, and sometimes contain ecchymoses; the surface of the ulcer is doughy, bleeds easily, and the vaginal portion is livid, and bluish-red in color.*

Symptoms.—In cervical catarrh the normally viscid secretion is increased in amount, is thinner, and clouded with mucus and pus. It is often streaked with blood, which exudes from the hyperemic tissues, and the distended tense mucous membrane is painful, and causes a feeling of internal heat and distressing throbbing. The pains are like those of the first stage of labor, and are chiefly sacral, shooting into the external genitals. In consequence of the profuse discharge the patient grows irritable and hypersensitive, and the congestion causes a more profuse menstrual flow, which increases the weakness and enervation. Cohabitation is distressing and is seldom followed by conception. A viscid mucus, which collects in the cervical canal, is, in many cases, the cause of the dilatation, the latter not being due solely to the elongated and thickened mucous membrane, and this is evident from the uniform globular distention of the cervix.

In acute endometritis of the body of the uterus there is at first slight fever, with a feeling of internal heat and bearing-down, which are communicated to the bladder and rectum, causing some tenesmus. The discharge is thin, serous, and afterward purulent; palpation of the uterus is not especially painful, but the introduction of the sound, particularly through the internal os, causes suffering.

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* Heitzmann, *loc. cit.*, p. 150*f*, Fig. 19, and plate ix, Fig. 5.

The abnormal secretion in chronic endometritis as, indeed, the healthy secretion, is not yet well understood. B. S. Schultze endeavored to diagnosticate purulent endometritis by finding pus upon a tampon which he had firmly packed against the lips of the uterus. Schröder denied that this is a proof of the pus coming from the cavity of the uterus, meaning, of course, that it may come from the cervix as well. I do not believe that even microscopical examination can decide this difficult question, for the inflammation destroys the ciliæ of the epithelium and alters the form of the cells. But I am convinced, as Schröder also maintains, that the secretion of the mucous membrane of the uterus is slight in amount, and, as a rule, serous or sero-sanguinolent. But that it may become more profuse at times, is shown by the discharge of a considerable quantity after reposition of the retroverted or retroflexed uterus, the secretion having evidently been retained in the organ, thus producing slight hydrometra. When the disease is severe and the swelling great, there may be intermenstrual hemorrhages at irregular intervals, and during menstruation there are pains of varying duration and intensity. At times the pain is more severe when the flow appears, and ceases with the discharge of a quantity of mucus, or fragments of the membrane, *endometritis exfoliativa*, or when the flow of blood is more profuse and unobstructed. There may be paroxysms of shooting pains in the abdomen, sacral region, or in the mammæ, during the intervals of menstruation, which diminish in severity with the appearance of a discharge from the genitals. The pains may extend to the thighs, or along the course of the sciatic or anterior median cutaneous nerve, and are often persistent. When the disease passes through the uterine walls into the contiguous tissues, or more especially into the posterior ligaments of the uterus, a posterior parametritis results, the effects of which, with regard to the position of the uterus, have already been considered.* The process very often extends to the Fallopian tubes, especially in infectious blenorrhœa; then from the tubes to the peritoneum, and in this way grave cases of pelviperitonitis are developed. This subject will be considered later in detail.

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* *Vide* pp. 306–313.

Sterility is a natural consequence of chronic endometritis, not only because the secretion carries away the spermatozoids, and prevents their ascent, but also because the impregnated ovule finds no suitable soil for development in consequence of numerous erosions of the mucous membrane. It is also probable that this condition of the mucous membrane hinders the formation of the decidua. Sterility has, too, been attributed to a peculiar lengthening of the cervix, the *elongatio colli supra-vaginalis*, because conception is said to follow the operative removal of this condition (A. Martin).

The patient is much reduced by the protracted discharge, which, though not always great, may continue to be accompanied by pain and occasional profuse hemorrhages for months and years; the digestion becomes disordered, and then follow anorexia, pyrosis, flatulence, and difficult defecation, which symptoms finally develop into a more or less permanent hysterical condition.

In its *course* and *terminations*, cervical catarrh is usually very obstinate, and seldom disappears spontaneously. At times congenital in origin, its long duration exerts a deleterious influence upon the constitution of the patient, and the possibility that it may lead to malignant affections of the tissue cannot be disputed. The same facts hold true of the glandular and interstitial forms and of their combinations. In all these affections the ever-recurring hemorrhages are dangerous; they may continue for years, and are usually associated with a gradual diminution of the menstrual flow. Still, it must be acknowledged that, compared with the frequency of uterine catarrh, malignant degeneration of the parenchyma of the uterus is extremely rare, the most uncommon of all varieties being carcinoma of the body of the organ. But under all conditions, uterine catarrh, even in the acute form, is a very obstinate affection, and requires great perseverance in treatment, both on the part of the physician and his patient.

Diagnosis.—Some of the difficulties encountered have already been mentioned. Beside the speculum, which enables us to study cervical disease with comparative ease, we employ the sound in many instances, for a knowledge of the extent and

severity of the endometritis may be gained from its use. The secretion must also be examined, as to its reaction. But the differential diagnosis between carcinoma, sarcoma, interstitial, glandular, and fungous endometritis can be made only by removing pieces of the membrane and subjecting them to microscopical examination. There is a difference of opinion among authorities as to whether the cavity should be dilated previous to removing these pieces. My experience is, that in the majority of cases dilatation is unnecessary, for the uterine cavity is usually abnormally wide, especially when the hemorrhages have been frequent; but if the diseased portions have not been reached by the spoon, dilatation is essential in order that the finger may be introduced, the diseased tissue found, and eventually curetted. Due attention should be paid to all existing complications such as displacements, neoplasms in the walls, inflammation of the tubes, of the pelvic peritoneum. It is obvious, that under certain conditions the diagnosis cannot be made without etherizing the patient, and that often an examination by the rectum or the bladder, will be indispensable. In the etiological relation in the microscopical examination, especial attention should be paid to the presence of cocci. The absence of these organisms will not always exclude infectious catarrh, as in cases of ophthalmo-blenorrhœa (Fränkel, Kroner, and others), but their presence in the secretion definitely reveals the origin of the catarrh.

Ætiology.—Fischel has demonstrated the occurrence of congenital bilateral fissuring of the vaginal portion, and also an anatomical ectropion. An illustration of a similar condition is given in the atlas of Boivin and Dugès. Fischel found its existence in women and girls who denied ever having been pregnant; he therefore believes that this anomaly establishes the existence of a predisposition to leucorrhœa in children and virgins.

In early childhood, catarrh of the genital mucous membrane is associated with the acute and chronic exanthemata, *e. g.*, measles and scarlatina, and it frequently persists after recovery from these diseases. Again, catarrh may result from mechanical irritation, as in masturbation, or instrumental irritation of these

organs; finally, the strumous cachexia may predispose to genital catarrh during childhood.

An abnormally narrow external os, with consequent retention of the secretion and irritation of the uterine mucous membrane, is likewise of importance.

In the years of puberty carelessness during the menstrual flow, such as sudden chilling or wetting of the surface, and violent over-exertion as in dancing, are only too frequent exciting causes, though they may not be admitted by the patient.

Among married women one of the most common, if not the most common, cause of catarrh is gonorrhœal infection. Noegerrath called attention to this fact years ago, and also to the significance of latent gonorrhœa in the female as a cause of genital affections. Sänger has recently emphasized this factor, and pointed out its comparatively great frequency. I must confess, however, that in my experience, I have not found it so often as stated by the authors just quoted. I would not convey the impression that the statements of those authors are false, but simply that the clinical material under observation differs. Noegerrath lives in New York, and Sänger in Leipzig, the one a great seaport and the other a trade mart *par excellence*, and both are places where thousands of young men reside who, after daily toil, find refreshment in dissipation with wine and women, which must necessarily, in time, bring about this condition of things. Fortunately, such a state of affairs is not everywhere present.

That pregnancy, labor and the puerperal state are the most important predisposing conditions is generally known. The hyperemia, relaxation, and the increased secretion and distention, the explorations, erosions and injuries of the mucous membrane, the presence of remnants of decidua, with resulting decomposition, all aid in bringing about this catarrhal condition, some being predisposing, others exciting factors. Again, abortions and miscarriages are notably predisposing, probably because pieces of the placenta and membranes are liable to remain unexpelled.

Emmet attributes many cases of catarrh to ectropion of the uterine lips from laceration of the commissure in labor, the cer-

vical mucous membrane thus being more exposed to the action of the vaginal secretion, and also on account of constrictions and vascular disturbances caused by cicatrization of the lacerations. Among German authors, Breisky especially has supported this view, for he has repeatedly observed obstinate catarrh removed by treating this deformity. I have had a similar experience. It has been asserted that the accident named does not result in a catarrh, but in a change of the epithelium into the pavement variety, but to me this analogy does not appear consistent with prolapse of the uterus. We frequently notice obstinate vaginal catarrh associated with lacerations of the perineum, even without descent or inversion of the vaginal walls, which resists all treatment until the perineo-plastic operation is performed; the same is true of lacerations of the rectum and rectal catarrh, which latter at once ceases, when the normal condition of the sphincter is restored. Emmet's theory is therefore materially supported by these analogies.

Chronic inflammation of the mucous membrane of the uterus occurs, also, from the puerperal processes, in that it appears as a continuation above of the cervical catarrh, or *vice versa*, whenever remnants of decidua or placenta remain in the uterine cavity. Furthermore, it may appear as a complication of other uterine affections, notably displacements and malformation of this organ, or neoplasms of its walls, especially myomata. Gonorrhœal infection and masturbation may also injuriously affect the cavity of the uterus.

When obstinate hemorrhages occurring in a case of chronic catarrh of the uterus can no longer be controlled by simpler methods, castration has been performed, based upon the view that the healthy as well as diseased ovaries favored the congestion of the uterus. Cases have been published in which this operation has permanently checked the hemorrhage, but there are also others in which the flow continued as before. According to the latest theory, not the ovaries but the tubes are at fault, and their extirpation has been proposed.*

Pessaries which have remained until encrusted, the use of un-

* Tait and Loewenthal, *Archiv f. Gynäk.*, xxx, 111.

clean sounds, injections of irritating fluids into the uterus, or severe cauterization of the uterine mucous membrane, may cause an attack of acute or chronic endometritis. Similar results follow the insertion of intrauterine stems which are too long, or thick, or rigid, or have a rough surface.

In conclusion, inflammatory conditions of the uterine mucous membrane may follow typhoid fever, variola, cholera, phosphorus-poisoning, and ecchymoses or large hemorrhages; chronic heart disease, which produces stasis in the abdominal organs, just as great obesity and pulmonary emphysema may also cause passive hyperemia and increased secretion from the mucous membrane of the uterus.

The **prognosis** depends upon the causes, duration, intensity, complications of the disease, and the constitution of the patient. It is gravest in catarrh of gonorrhœal origin, because the affection often extends to the uterus, tubes and the pelvic peritoneum, and is difficult to cure. A better prognosis is probable in simple cervical catarrh appearing after an otherwise normal labor, and when the patient comes early under treatment. When the affection has once become chronic, it is difficult to cure. Catarrh associated with displacement of the uterus and myomata, often disappears without treatment when the cause is removed, for example, after the extirpation of polypi, without other treatment. Catarrh which began in childhood and has continued throughout puberty into married life is often incurable or, at the best, can be but temporarily improved.

Treatment.—In the first place, combat the predisposition, and employ all prophylactic measures with respect to menstruation, pregnancy, labor and the puerperal state. Existing causes, such as vaginal and stem pessaries, and foreign bodies, should be removed; cohabitation is to be forbidden; defecation and micturition regulated, and the hyperemia of the genital apparatus diminished by rest, suitable position and diet.

a. Acute Cervical Catarrh.

The tension of the swollen membrane should be relieved, either by the evacuation of distended follicles or abscesses, or by repeated scarification. The secretion must be washed away at regular

intervals by injections, at first of emollient and disinfectant, and later, of astringent fluids; these are useful auxiliaries, but as a rule inadequate to effect complete recovery. Medicines must be brought into direct contact with the diseased membrane, to reduce the swelling, diminish the secretion, and remove the ectropion by promoting a growth of pavement epithelium upon the diseased tissue. Pyroligneous acid mixed with a 3–4 per cent. carbolized solution and painted upon the cervical canal, or poured into the speculum at intervals of two or three days, has been used for years; these applications should be repeated for weeks at intervals of two or three days. If the catarrh extends to the internal os, the lips should be exposed by the speculum, and the canal painted with the above preparation. Other caustics particularly applicable are solution of the nitrate of mercury, a 2 or 3 per cent. solution of carbolic acid, and also tannin. I have seen no particularly good result from cauterization with solutions or pencils of nitrate of silver, and have repeatedly heard the patients complain that such applications were very distressing.

b. Chronic Cervical Catarrh.

If the results are not satisfactory after energetic use of the above caustics, stronger ones must be employed; among other means, I have good success with fuming nitric acid applied every fourth or fifth day to the ulcerated portions. In large erosions the actual cautery is recommended. It has been feared that stenosis and atresia of the os uteri would follow, and I have indeed seen this in some instances, but it was usually the work of only a few minutes to remove them by Ellinger's dilator, and the cure of the catarrh was generally permanent.

When the mucous membrane is much swollen and many of its glands involved, in obstinate so-called papillary erosions, and, indeed, in all cases in which the affection of the lips is deep-seated, or in which malignant disease is suspected, excision of the mucous membrane is indicated, and has often been employed with a good result. The commissures are laid open as nearly as possible to the vaginal vault, and a wedge dissected out of the posterior lip, the base of which extends from the border of the lip almost to the internal os, *i. e.*, when possible, as far up as the

membrane is diseased; the surface of the portion is then inverted, and its border carefully united to the healthy portion of the cervical mucous membrane. The anterior lip is treated in the same way. The sutures remain from ten to fourteen days.

When ectropion has arisen from cicatrices of the commissure, and the catarrh persists in spite of treatment by the ordinary remedies, Thomas A. Emmet has proposed excising the cicatrices, and united the parts in such a way that the os is restored to its normal form and dimensions. Emmet does not perform the operation until the catarrhal condition has been removed as far as possible; it may be combined with the above described resection of the cervical mucous membrane, always avoiding too great narrowing of the os uteri.

It would seem scarcely necessary to mention that constitutional treatment is indispensable in cervical catarrh, especially if of the chronic form. Regular defecation must be secured, and a suitable diet suggested; iron is often essential; massage is occasionally extremely useful. During convalescence the baths of Elster, Franzensbad, and Pyrmont may be used with advantage, and sea-bathing be recommended after the anemia is improved.

c. In acute endometritis of the body, we should advise rest, warmth, sexual continence, and regulation of all the bodily functions; while for the pain, opium in small quantities, or belladonna in vaginal suppositories, may be sparingly used. Local depletion by scarification or leeches is seldom essential. The action of the skin should be promoted by warm baths and compresses upon the abdomen. Mucilaginous injections into the vagina are agreeable to many patients, and at the same time such mild laxatives as calcined magnesia, solution of citrate of magnesia, or sulphur should be prescribed.

d. When the catarrh has become chronic, local treatment alone can be of avail. It may consist in the introduction of the sound, pencils, or other instrument carrying the medicine, or injections and irrigation of the uterus with solutions containing the above-named agents may be used instead.

It has been objected that in the former method the action of the remedial agent is not uniform, and that it may be too severe in places; and this is partly true. Yet the injections often pro-

duce untoward effects, even when made with the greatest prudence; the fluid may pass into the tubes, or even into the abdominal cavity, and beside this, and when the fluid cannot pass out, severe uterine colic with symptoms of inflammation may be caused by the entrance of the fluid into the glands and lymph spaces. From the employment of rods and sounds these need not be feared, and they act efficiently. Those of Becquerel and Rodier, the previously mentioned gum tragacanth rod, to which alum, tannin or liquor ferri is added in increasing quantity, will dissolve more readily if a small quantity of sugar be added. After the introduction of a speculum the uterus must first be carefully swabbed out by absorbent cotton wrapped upon an aluminum sound; then a suppository having been selected which corresponds to the dimensions of the cavity, it may be introduced. A few days should intervene between the first and following application. The patient should lie a few hours until the suppository has had time to melt, and then when she walks her movements will cause the medicine to be uniformly distributed upon the mucous membrane.

More recently irrigation of the cavity of the uterus has become fashionable. I have often employed it and can add my approval of the method so warmly recommended by B. Schultze and K. Schroeder. The latter, otherwise not a friend of dilatation of the uterine cavity, under these circumstances, when the fluid will not flow away freely, advises artificial dilatation of the internal os; Schultze also regards this as essential. Schroeder uses the Bozeman-Fritsch uterine catheter of large calibre, the end of which has several openings. I believe that P. Budin's catheters are preferable; they are crescent shaped upon transverse section, are made of flexible celluloid, and permit the discharge of the fluid without dilatation.* The Bozeman-Fritsch catheter must be removed and reintroduced from time to time to prevent clogging with mucus, or else the solutions used made of less strength. One should be careful in the use of 1 : 1000 solution of corrosive sublimate, also employed for this

* P. Budin, Note sur une sonde pour pratiquer le lavage de la cavité utérine, etc., Paris, 1884. Delahaye.

purpose, for it may cause symptoms of poisoning. The fluid may be allowed to flow in from a fountain syringe, the bowl of which should not be too high, because of the pressure, or be injected through the uterine catheter connected with an elastic tube; in whichever way, applied air must not be allowed to enter the uterine cavity. The quantity of fluid used may be one-half to one quart, and the injections made daily or upon alternate days.

When this plan of local treatment proves ineffectual, and chronic endometritis becomes hyperplastic in character, we must then resort, in many cases, to the removal of the mucous membrane with the sharp spoon; this is especially indicated if the patient becomes weakened by frequently recurring hemorrhages.

The patient is placed in the dorso-coccygeal position, the vaginal portion exposed, the anterior lip held by the tenaculum forceps, and if she is very sensitive or nervous, she should be chloroformed. In general, this slight operation gives so little pain, that narcosis is not always necessary. The distensibility of the internal os is now ascertained by introducing sounds of different sizes, and a sharp spoon then selected which corresponds with its dimensions; this being pushed up to the fundus is used to scrape out the entire cavity; the hemorrhage is usually slight. I do not irrigate the cavity immediately, but first wipe it out with salicylated cotton. It has been proved by the experiments of Düvelius upon the dead subject that the entire mucous membrane can be thus removed. The regeneration is usually rapid, and it has therefore been suggested to irrigate the cavity for a few days succeeding the operation to prevent recurrence of the catarrh. To prevent hemorrhage, and also because hyperplastic catarrh is apt to recur, some authorities have used subsequent injections of iodine or chloride of iron solution, but I have not found this necessary so often as others (Schroeder, A. Martin). Sometimes the first menstrual period will be missed, but, as a rule, menstruation soon returns, and according to Schroeder and Düvelius, conception and normal gestation have occurred after this operation.

But when the catarrh and hemorrhage still continue, the uterine cavity must be dilated with aseptic laminaria tents until the finger can be introduced and the whole surface examined.

This is the most certain way of ascertaining whether there are diseased portions to be removed, or whether there are prominences, polypoid excrescences or myomata in the uterine walls. We will remark in conclusion that A. Martin uses the blunt curette, and that he shows an illustration of regenerated mucous membrane,* which proves that regeneration and not cicatrization follows scraping out of the uterine cavity.

To advise amputation of the cervix, in addition to curetting and cauterization for chronic metritis, "by which means (*amputatio colli*) a stimulus is afforded for the regeneration of the entire uterus," I hold to be altogether unnecessary.

It is universally recognized that constitutional treatment is necessary to improve digestion and promote the activity of the skin, the circulation and tissue changes, and that the various kinds of brine and iron baths and sea bathing materially assist in improving the condition of the patient.

2. Inflammation of the Parenchyma of the Uterus—Metritis.

Inflammation of the muscular wall of the uterus may be acute or chronic.

a. Acute Metritis.

In acute metritis the entire uterus is enlarged, relaxed, softer than normal, and often œdematous. The muscular fasciculi are pressed apart by swelling of the interstitial tissue; the latter is hyperemic, clouded, doughy, and infiltrated with pus corpuscles, which may accumulate into abscesses. As a rule, however, this process is not isolated any more than dilatation of the lymphatics and suppuration in the puerperal uterus, but is generally associated with disease of the mucous and serous coats of the organ. Endometritis is the most common complication of acute metritis, very often its cause. Perimetritis is not unusual, but is generally secondary. Non-puerperal abscesses of the uterine wall may reach the size of the fist or even be larger, and may discharge into the abdominal cavity (Scanzoni, Lados), through the abdominal walls (Reinmann), through the vaginal vault (Kiwisch), or into the rectum (Bird). Schroeder reports a case

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* *Loc. cit.*, Fig. 99, p. 170.

of the last variety, in which an abscess as large as a man's head was said to have resulted from a very careful sounding of the stenosed cervix, and it terminated by rupture into the rectum.

The causes of acute metritis are injurious influences to the menstruating uterus, such as severe chilling, violent exertion, rude coition and trauma; also sudden jars, blows, falls involving the hypogastrium. But the most frequent and most unfavorable cause is gonorrhœal infection. Furthermore, rough gynecological manipulations, the wearing of too large pessaries and intrauterine stems, the employment of uterine injections with too strong pressure, too frequent use of the sound, and forcible reposition of the uterus with the sound, are also responsible for this disease.

Symptoms.—Disturbances of the menstrual flow which may occasion metritis, will either render the hemorrhage very profuse or stop it altogether; then high fever, even a rigor and great sensitiveness, are the usual accompanying symptoms. The pain is located either in the pelvis or hypogastrium, or both, and when the peritoneum is involved, may radiate over the abdomen. The severity is, of course, increased by every movement of the body and of the diseased organ, as by speaking, coughing, sneezing and by the evacuation of the bladder or rectum. The patient, therefore, seeks her bed immediately. Under the influence of warmth, rest in bed and appropriate treatment, the acute inflammation may lessen in a few days, the more violent symptoms disappear and the disease become chronic; or, again, abscesses may be formed and, as they increase in size, the danger of rupture into adjacent organs becomes imminent. If these are adherent, evacuation into the rectum, the bladder or by the abdominal wall is favorable; with the evacuation of pus through these organs recovery may occur. Opening into the abdominal cavity is almost always, if not invariably, fatal. After the emptying of the abscess, a chronic metritis may remain, or it may be complicated by a parametritis. The latter is particularly liable to follow gonorrhœal infection. After the decline of the chief manifestations, frequently there is a return of acute metritis.

Diagnosis.—We will at once recognize the fact that not only the mucous membrane but also the muscular tissue of the uterus

is affected with an inflammation, first by the uniform increase in size, further by the great sensitiveness of the organ to touching and moving it. The fever, and the inability to stand or walk likewise indicate the intensity of the disease. When the physician is called to such a patient for the first time, and the enlargement of the uterus is considerable, a suspicion of pregnancy is aroused, which seems all the more probable on account of the evident uterine hyperemia. To increase the resemblance to pregnancy, pain is sometimes felt in the mammary glands. One dare not insert the sound under these circumstances. The history will protect us from error, particularly if the menses had appeared regularly until the patient was attacked. We must not forget, however, the possibility of attempts to produce abortion, and should examine the patient carefully for injuries of any sort and for foreign bodies in the genital passages; and the discharge should be searched with especial attention for diplococci. When the peritoneum is involved, there is usually some meteorism, the uterus is difficult to circumscribe, and the posterior vaginal vault is often œdematous and swollen.

Prognosis.—Isolated acute metritis is rare, very rare, but is invariably a grave affection. When the cause can be at once removed, the prognosis with regard to ultimate recovery is more favorable; yet the passing over into chronic metritis is very frequent. Non-puerperal abscesses in any portion of the walls of the uterus above the cervix are always very dangerous. The metritis caused by the forcible introduction of the sound or by pessaries is liable to result in the formation of abscesses. Gonorrhœal metritis is often complicated with salpingitis.

Treatment.—Avoidance of injurious influences during menstruation is especially necessary on the part of individuals who are predisposed to hyperemia of the pelvic organs. The first indication is obviously the removal of any active causes, such as vaginal or other pessaries and foreign bodies of any description. Relief will soon be obtained by rest in the horizontal position and by anodynes, ice-bags upon the abdomen, warm mucilaginous injections into the vagina, and rectal or vaginal suppositories of belladonna or opium. Some gynecologists employ scarifications of the vaginal portion or apply leeches to the abdomen; if we

were to ask them whether they would abstract blood locally in phlegmon of the hand, they would probably say, "No." Why then from the uterus? One can master the metritis in other and better ways than by the local abstraction of blood. The ice-bag and opium are of far greater service. The latter should be employed not only locally, but, after thorough evacuation of the rectum, internally as well. Castor-oil, calcined magnesia and bitter water are indicated; aloes, jalap, senna and all other drastic cathartics are absolutely contra-indicated; calomel is often excellent. When the pain and fever have subsided, the ice-bag is to be removed and warm compresses used. When it becomes possible for the patient to move about warm baths are of service, and absorbents, such as iodine, are to be applied to the abdominal wall or painted on the vaginal portion.

If the graver symptoms do not subside, but the swelling increases, and fluctuation is apparent in the uterine wall, and the abscess threatens to break, it must be incised and evacuated with the usual precautions. But if rupture into the abdominal cavity has already occurred, we might follow the example of Mikulicz, who performed laparotomy in a case of peritonitis from perforation, and saved his patient; or the similar example of gynecologists who successfully perform ovariotomy in case of peritonitis and rupture from strangulation of the pedicle; so we might do a laparotomy, afterward thoroughly cauterizing and disinfecting the cavity of the abscess.

b. Chronic Metritis.

Chronic metritis signifies an inflammation of the parenchyma of the uterus with or without involving the mucous membrane; in this process, according to some authors, the inter-muscular connective tissue and especially the perivascular tissue, is proliferated and indurated (de Sinéty), while, according to others, the chief pathological change is hyperplasia of the muscular fibres (Finn).

The view, that in chronic metritis the muscular fibres are invariably and notably multiplied, as is well known, was proposed and sustained by Dr. Finn.* According to his investigations,

* *Med. Centralblatt*, 1868, p. 564.

the regular distribution of the muscular fibres and bundles is unchanged in chronic metritis, fatty degeneration not being essential, but the fibres always become elongated, and in the later stages of the affection the connective tissue is relatively diminished but absolutely increased, so that the increase in the volume of the uterus is due to hyperplasia of the muscular fibres, the connective tissue playing a subordinate part.

On the other hand, de Sinéty found no change in the muscular tissue, but dilatation of the normal lymph spaces and hyperplasia of the perivascular connective tissue, and invariably disease of the mucous membrane, which consisted partly in proliferation of the glands, and partly in the formation of embryonic connective tissue or of new vessels.* The relaxation of the parenchyma, which from the first is softer than usual, was either general or partial; but it gradually becomes more rigid. The venous channels are everywhere congested. The longer this process continues the harder and firmer the newly-formed connective tissue of the walls; it at length compresses the vessels, thereby lessening the hyperemia and transudation, and causing the tissues to become pale and rigid. In about 650 autopsies, made upon female subjects, I found isolated chronic metritis in nearly 4 per cent. of all cases. It is rarely combined with perimetritis. The walls may become 2 or 3 centimeters (.8 to 1.2 inches) in thickness. Phlebectases of the broad ligaments may be associated with it, and coexisting adenoma of the uterine mucous membrane is very common.

Ætiology.—Anything which causes protracted venous or arterial hyperemia of the uterus, or which hinders the rapid disappearance of an acute metritis, or whatever tends to aggravate an existing affection of the inner surface of the organ, will probably favor the development of a chronic metritis. It is, therefore, very often associated with all the neoplasms of the uterine wall which we have previously described; furthermore, it exists to a greater or less extent in connection with most uterine displacements. But it may be primary and unaccompanied by these affections. It seems to be most common after disturbances of the

* *Annales de Gynécol.*, 1878, tome x, p. 129.

normal involution of the uterus following labor at term, and more especially after abnormal and premature labor. These disturbances are partly of traumatic or infectious origin, and partly due to the retention of shreds of the placenta and of the membranes. It is very difficult to determine whether the increase in volume is due to sub-involution or to hyperplasia of the muscular fibres and connective tissue.

Unsatisfied or abnormally satisfied sexual desire (masturbation or intercourse with impotent men), passive hyperemia, enlargement of the uterus, and adhesions to adjacent organs, *e.g.*, to the bladder or to one or both ovaries, dragging upon the organ, act similarly. Other sources of chronic metritis are affections of the liver and heart, and that form of menstrual anomaly which is known as exfoliative dysmenorrhœa.

Symptoms.—Sooner or later symptoms appear which are characteristic of the previously described tissue changes. If the inflammation involves the puerperal uterus, it usually occurs at the time when the patient leaves the lying-in hospital or her bed at home, to resume her customary duties; often again, not until the time for her menstruation to reappear. The symptoms at the beginning are a certain heaviness and weakness in the limbs, abdominal and sacral pain, increased discharge, constipation, and occasionally irregular hemorrhages. The hyperemia and swelling of the mucous membrane in the earlier stages cause an increased menstrual flow. Later the discharge becomes scanty, and may be extraordinarily slight and brief in young, non-anemic individuals. Many patients have abnormal sensations for days before the flow begins; they may be scarcely able to leave their beds, or if by will power their strength enables them to get up, they have paroxysms of faintness and hysterical attacks. Some feel much relieved after the flow, especially when it has been profuse. Again, others are in the best health about the middle of the menstrual interval, as they have recovered from the last, and the next congestion has not yet occurred. Many are disinclined to sexual intercourse, and conception is much less frequent than normal. After the patients have been confined to their beds for some time, their condition is complicated by disordered digestion, obstinate constipation, faulty circulation, and disorders of respiration.

When in these conditions, trifling external influences, such as excitement, fright, vexation, the onset of the menstrual flow, and cohabitation, cause marked exacerbations. Chronic metritis now and then remains when the original cause, *e.g.*, a retroflexion, has been removed. If conception occurs, abortion is liable to ensue, and the metritis will thus be aggravated. On the other hand, if gestation proceeds to term complete involution may produce a radical cure. The menopause also brings gradual, though not always complete recovery. The affection usually lasts for years with alternate improvement and exacerbation. The complications are many, as perimetritis, perisalpingitis and perioöphoritis which come frequently to an intricate complexus of symptoms. Obstinate neuralgias are very frequent, especially hemicrania and neuralgia of the trigeminus. In a very interesting case which was under my care for a long time, there was paresis of the right side, so that the patient could barely raise her right arm; she dragged the right leg, had difficulty in speech, was confined to bed, and she and her family feared apoplexy. There was, in addition, anesthesia of the skin and muscles. The regular recurrence of these symptoms at the beginning of each menstrual period, the existence of chronic metritis, and the sensitiveness of the uterus all indicated the reflex origin of the condition. Because the flow was very scanty, the uterus was thoroughly scarified at each period, this treatment being continued for eight or nine months, with gradual improvement, until finally the paresis did not recur, and the chronic metritis disappeared after the menopause.

Diagnosis.—We speak of chronic metritis when we are able to demonstrate relaxation of the organ, hyperemia, enlargement of a portion or the whole of the uterus, without the presence of any abnormal growth, in connection with a certain hypersensitiveness of its tissues. The last symptom will not usually be present in pregnancy but, otherwise, the changes characteristic of chronic metritis are very similar to those of the early months of pregnancy. The hyperesthesia is less marked upon simple pressure, than when the whole organ is elevated, moved about, or palpated; it is variable in degree, but generally very slight. When pregnancy can be excluded, the increased thickness and

enlargement of the organ, the pressure of retained secretions and the hyperemia of the mucous membrane may be ascertained by exploration with the sound. In some cases a discharge of mucus will follow the application of the sound, and the latter will be stained with blood, notwithstanding great care is taken in its introduction. Under certain conditions it may be necessary to dilate the cavity, especially when the hemorrhage is profuse, for sessile submucous myomata, when small and situated in the body of the uterus, cannot be differentiated from chronic metritis by the sound alone. It will likewise be difficult or impossible to distinguish the small myomata which occur so frequently in the walls of the organ,* as they form no prominences externally nor internally.

The **prognosis** is not usually favorable, as the disease is seldom completely cured before the menopause, and many patients are thereby absolutely unable to fulfil their duties as wives and mothers. The life of the patient is not directly endangered, and there are times when the improvement is quite notable, but they are rare, and not long. The longer the affection has existed, the less can positive results be promised, only the near approach of the menopause gives more hope. It is altogether questionable whether gestation would be of any advantage; I am aware of no instance in which recovery followed conception, and the majority of authors think that the condition is rather aggravated than improved thereby; still there are exceptions. Secondary chronic metritis from displacement, polypi, and other causes, is more favorable as regards recovery, the removal of the exciting cause, *e. g.*, prolapsus of the uterus, associated with chronic metritis, often producing rapid and permanent recovery.

Treatment.—Obvious causes must be immediately removed. All prophylactic measures should be observed which have been recommended for uterine catarrh. When there is chronic hyperemia of the swollen puerperal uterus, both local and internal treatment will be of service. Internally, the present officinal ergotin is among the best remedies, exciting contractions, diminishing the blood supply, and giving tone to the uterine walls.

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* *Vide* Figs. 70 and 71.

The medicine must be used for months, both internally and externally, just as in myomata of the uterus. Instead of it I have also recently used the ergotinum fluidum of the apothecary Kohlmann in Leipsic, also especially recommended by Schatz, which, when freshly prepared, he regards as very good; internally, 10–12 drops are given three times a day. I have not tried it long enough to know whether it has any advantage over the other ergotin. I also use the fluid extract of hydrastis Canadensis, 15 drops three or four times a day.

In the early stages many patients are relieved by tepid or cool injections, used one to three times daily. Hot injections are preferable for weak and anemic patients, by whom they may be used during menstruation.

When the menstruation is more painful than profuse, and there is a distressing feeling of heat and bearing-down during the intervals, local abstraction of blood from the vaginal portion is of marked advantage. This may be done by scarification or leeches; on the whole, I prefer scarification, as but slight depletion is usually required, and the quantity removed can be more easily controlled.

When the cervix is hypertrophied and elongated, these remedies will prove ineffectual, and its amputation is indicated. C. von Braun has shown that this operation not only lessens the size of the uterus by the portion removed, but that a process similar to puerperal involution is set up, which results in diminution in the volume of the entire organ. The methods employed are very numerous. Many operators remove the hypertrophied portion with the galvano-cautery, first drawing down the uterus by Muzeux's forceps, and grooving the portion by a scalpel to prevent the loop from slipping. The portion of the uterus above the cautery must be fixed by threads passing out at the vulva, so that in case arteries bleed they may be directly cauterized by the Paquelin. When carried out in this way the operation will be a success, and I have obtained excellent results in many instances; but not every practitioner possesses the necessary battery. Another method worthy of recommendation is the wedge-shaped excision of the lips of the uterus, of Simon.*

* Marckwald, *Archiv f. Gyn.*, VIII, 48–69.

It is performed as follows: After drawing down the uterus by a Muzeux's forceps, the os is incised upon each side close up to the vaginal vault; the upper lip is then drawn upward and two parallel incisions made in the lower lip, which extend to the first incisions, the inner passing under the mucous membrane, the other passing outward, not far from the border of the lip, and guided by these, a wedge-shaped piece is excised from the intra-vaginal portion. The surface of the wound is now made even and at once united. The upper lip is then treated in the same way. From four to six sutures are necessary for the breadth of the lips, and one or two for the wound in the commissure. This operation is without danger, there is but little hemorrhage, and it requires but a short time; the os is left in better condition, and is wider than after the other operations. Union is perfect in eight to ten days, though the sutures may be allowed to remain for weeks. It is a matter of comparative indifference what material is used for sutures.

Esmarch, A. Martin, and Galabin employ a different method: After the cervix is drawn down, two hare-lip pins are passed through it at right angles to each other. The cervix is then constricted by an elastic ligature, and one flap is dissected up upon the outer surface and another upon the inner surface of each lip; the portion of the lip between them is then excised and the upper united to the lower flap with catgut sutures.

When the vaginal portion is but little if at all thickened, the hypertrophy being confined to the body of the uterus, the local and internal use of the preparations of iodine is indicated. A simple solution of the iodide of potassium 10 : 200 may be applied on cotton tampons each evening, or iodized glycerine tampons of the same strength, or an ointment of iodide of potassium, 3 grains to 45 grains of cocoa butter, may be substituted if desirable. This treatment must be continued for months, being suspended only when symptoms of iodism appear. The beneficial effects are seen in the diminution of the swelling and discharge, and lessening of the general hyperesthesia. Painting the portion with the tincture of iodine, as is recommended by Breisky, is very expensive in chronic metritis, for the application must be made by a physician or midwife; more-

over, it has no advantage over the tampon, and is not always well borne, exfoliation of the mucous membrane, erosions and pain not infrequently being caused by it. Internally, iodide of potassium may be administered in solution. A more agreeable preparation and, eventually, a more active form, is drinking the waters of different mineral springs containing this salt, as we find in Kreuznach, where the Elisenquelle is used with warm milk, or in the Thassiloquelle, at Hall, and in the Jahanngeorgen-quelle, at Tölz. In addition to the baths, compresses and vaginal injections are employed. Sitz-baths afford agreeable variety to many patients, but they are otherwise of little utility. They make a change in the monotony of the treatment, and are especially appropriate when the affection is complicated by vulvitis or hemorrhoids.

It is unnecessary to state that the diet, the bodily functions, bodily and mental employment, activity and rest, must all be regulated. The patients must be made to know that they are being treated by a physician who understands their complaint, and whom they must obey, for it is evident that they, during their protracted course of treatment and under different physicians, have become acquainted with a long series of remedies. Many, indeed, have a domestic apothecary shop about their beds, and quietly vary the remedies to suit their own fancy. They are especially liable to make free use of narcotics, and to them such agents are poison; these reduce their energy, slow the peristalsis, favor stasis in the pelvic viscera, and increase the irritability of the patient.

There are dozens of watering places which have been recommended for chronic metritis; indeed, there is scarcely one which has not worked wonders in this affection. I agree with C. von Braun in the opinion that during convalescence they are often of service, but that they can never be a substitute for rational treatment. The resort chosen will often be determined by the chief symptoms, especially chronic constipation, leucorrhœa, and menorrhagia, or dysmenorrhœa. It may be necessary to use several in succession, as Marienbad at first, and then Franzenbad. Again, anemic patients should first visit Elster, Pyrmont, Driburg or Franzenbad, and afterward the North Sea baths. But

few patients are so situated that such a course of treatment can be carried out; neither is one visit usually sufficient, but it must be assisted from time to time by local treatment. With respect to the latter, it may be stated that some have attempted to cure by energetic cauterization of the walls of the uterus, thus increasing the blood supply and promoting metabolism; chromic acid, Vienna paste, fuming nitric acid, and even the actual cautery have been employed for this purpose. Again, curetting the uterus and cauterization have been used, followed by injections of carbolized and corrosive sublimate solutions. Mitchell's cure, which is warmly recommended by Playfair, has seemed to me more effectual than those previously mentioned. Its chief characteristics are as follows: First, the patient should be removed from her old surroundings; secondly, she must be treated without the use of narcotics; thirdly, massage must be energetically employed to strengthen her muscles and increase their activity; fourthly, an appropriate diet must be ordered, this consisting chiefly of large quantities of meat, eggs and milk; and, finally, the induced current must be simultaneously applied to bring the patient out of bed and upon her feet. I have treated many patients by this plan, and can assure the reader that the results are very favorable. It does not always render local treatment superfluous, but it has a happy effect so far as constipation is concerned, and with the restored circulation, the uterus often perceptibly diminishes in size; the secretions are likewise profuse, and local treatment is not so essential as formerly. The patient finally has a suitable diet substituted for the host of medicines; the hysterical symptoms gradually disappear, the cold hands and feet grow warm, and new life arises from the ruins of the old.

CHAPTER V.

STENOSIS AND ATRESIA OF THE UTERUS, HYDROMETRA AND HEMATOMETRA.

We have, in previous chapters, considered the different varieties of congenital stenosis and total or partial atresia of the uterus, and will now discuss the acquired anomalies of this kind.

Among the numerous causes of these are, injuries, chronic catarrh and circumscribed inflammations, measles, scarlatina, and diphtheria, endometritis, especially of the puerperal form, injuries from blows, falls, or instruments, cauterization with too powerful agents, prolapsus of the uterus, and advanced age. In the slighter grades we have simply a stenosis; while, when severe, the occlusion may be complete.

Pathological Anatomy.—The most common seat of the affection is the lowest portion of the uterus, *i. e.*, at the external os; occasionally it is in the cervical canal, and still more rarely at the internal os, and at the internal orifice of the Fallopian tube.

Fig. 78.



Stenosis of the External Os uteri.

When the external os is affected, its border, which is covered with pavement epithelium may be adherent, or the adhesions may be firm, and formed by fibres of muscular or of connective tissue. The usual breadth being 1 centim. ($\frac{2}{5}$ in), it is obvious that an os which is hardly as large as a pin head, as shown in Fig. 78, is much narrower than normal.

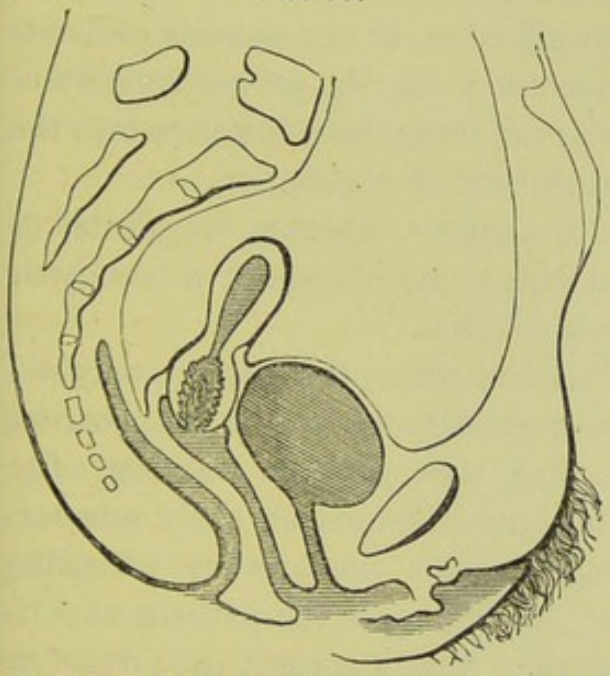
These stenoses are usually associated with displacements, the os forming a round instead of a transverse orifice, while the surrounding portions are more pointed or, as in prolapsus of the uterus with stenosis, more flat than in the normal condition.

Sometimes the cervical mucus is retained by the stenosis, as illustrated in Fig. 79; in other cases there are other cicatricial contractions near the small opening, or the os is divided into two portions by a partial atresia. In some the stenosed os is situated at the bottom of a depression, the adjacent tissues forming a wall about it. Small translucent cysts are occasionally found upon the lips. When the stenosis is extreme, an opening nearly resembling a point marks the site of the os, which grows smaller and gives place to an indistinct depression. The same conditions may exist in stenosis of the internal os, or of the cervical canal, though its occurrence in the latter is much less common than at the external os. The stenosis may be small and thin; it can also, however, be more than 1 centimeter thick;

stenosis in the region of the internal os often has a thickness of more than 1 centimeter ($\frac{2}{5}$ in.).

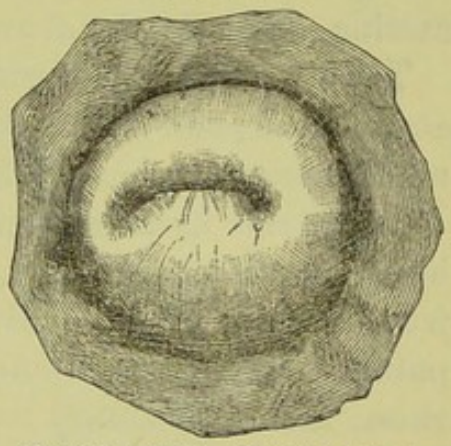
The **symptoms** of stenosis of the cervical canal are, first, accumulation of the cervical and uterine secretions, with dysmenorrhœa and sterility; later, chronic inflammation of all the organs in the true pelvis, pelvi-peritonitis. The dysmenorrhœa depends upon the condition of the cervical mucous membrane, especially upon the existence of a mucous catarrh with a thick viscid secretion, and also upon the profuseness of the menstrual flow, and the time required for its discharge. When the flow is scanty and

FIG. 79.



Stenosis of the External Os. Dilatation of the Cervical Canal from Retention of Mucus.

FIG. 80.



Partial Atresia. Two Openings.

occurs slowly, dysmenorrhœa may not be severe, notwithstanding the stenosis is very great. The symptoms of dysmenorrhœa are nausea, and a sensation of discomfort and tenseness in the abdomen. When large quantities of blood are rapidly poured out, the tenacious material in the cervical canal obstructs its passage, and extremely severe cramp-like pains occur, often lasting for hours. Hence dilatation of the uterine cavity is gradually produced; eccentric hypertrophy ensues, and the uterus takes an hour-glass form. Perimetritis is frequently present; pain and exhaustion continue after the menstrual flow. The patient becomes

emaciated and anemic, very nervous, and finally passes into the hysterical condition which was described in considering the effects of small myomata. Though not dangerous to life, such affections are exceedingly distressing, and, when neglected, may lead to inflammations and adhesions of the pelvic organs, the effects of which may continue long after the menopause. Sterility is very often attributed to stenosis of the os uteri. In my address on "Anatomische Untersuchungen zur Ætiologie der Sterilität," * I expressed my doubts in regard to this result and stated that the sterility was probably more frequently due to occlusion of the cervical canal by mucous plugs, as in Fig. 79, or to other uterine affections, and especially to diseases of the tubes. Cohabitation is, of course, incomplete in this affection, as the stenosis prevents egress of the uterine fluids necessary for the proper activity of the spermatozoids, and likewise prevents their entrance into the uterine cavity for the accomplishment of conception.

The symptoms of atresia of the uterus, whether congenital or acquired, depend chiefly upon the accumulation of a bloody or mucous secretion behind the obstruction.

When this accumulation does not occur, the patient may not have any discomfort; for this reason there are no disturbances from atresia during childhood;† they may be wanting after puberty, the patients marrying, notwithstanding their amenorrhœa, the rudimentary vagina or even the urethra becoming dilated from cohabitation, and in some cases the patients experience so little discomfort that they finally consult the physician only on account of their sterility.

The condition is different when there is a gradual or a rapid accumulation of secretion behind the atresia. When this retained secretion consists of mucus, it is called *hydrometra*, but when of blood, *hematometra*.

Hematometra, when the atresia is situated at the external os, first dilates the cervix and, afterward, the cavity of the uterus; this is seen in Fig. 81. It sometimes causes hypertrophy of the

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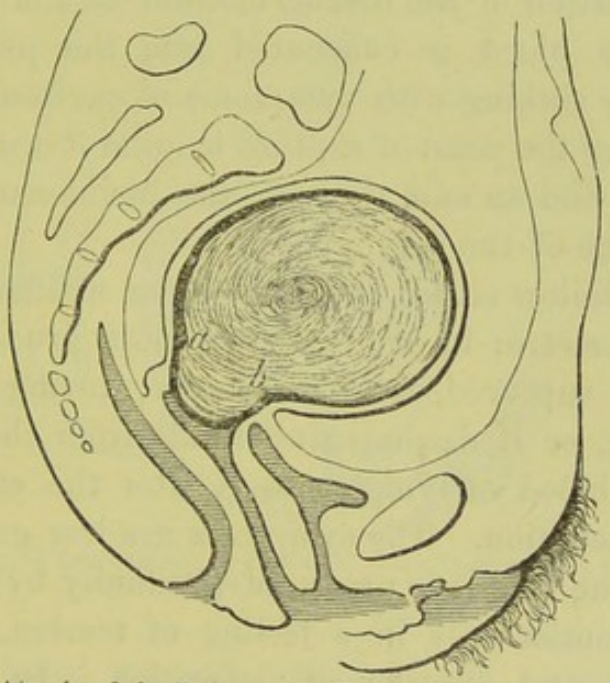
* *Deutsche Zeitschrift f. Prakt. Medicin*, 1877, No. 46.

† Exceptional cases have been reported by Breisky, Gervis and Godefroy.

walls; but when the dilatation is rapid, they may become as thin as paper (Scanzoni and Veit). The uterus may take the form of an hour glass, as, the entire cavity being dilated, the internal os still forms a prominence; this is shown at *a* and *b* in the illustration. Finally, blood accumulates in the tubes; in the normal tubes, or when the isthmus of the tube is abnormally narrow or closed, the point of accumulation is at their outer extremities, so that the blood does not enter from the uterus, but must come from the mucous membrane of the tubes.

The retained blood becomes thick and syrupy, as in cephalhematoma; the blood corpuscles are shrivelled; finally, the quantity may be quite large.

FIG. 81.



Atresia of the External Os Uteri. Hematometra.

When the atresia occurs subsequently to confinement, and before menstruation has reappeared, or if there is a retention of the uterine secretions after the menopause, the uterine walls are sometimes thickened, but not infrequently they are much thinner than usual. The quantity of fluid contained is generally small; its nature is either lochial, *lochiometra;* purely mucous, *hydrometra;* or purulent, *pyometra.*

Symptoms.—The gradual dilatation causes pains which recur at intervals of a few weeks, and which later become like

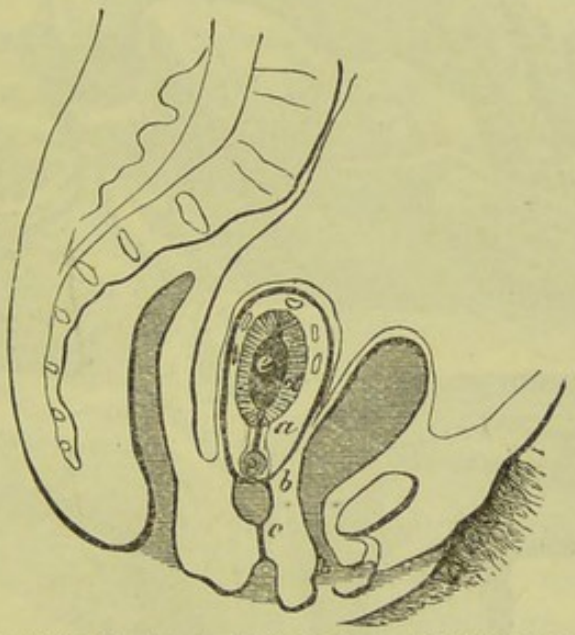
labor-pains, because each recurring menstruation increases the quantity of blood accumulated in the genital canal, the periodical addition being greater than that which has been absorbed during the intervals. These pains are often accompanied by such violent bearing down that the patient herself and her friends naturally conclude that something in the genital passage must hinder the escape of the blood. These symptoms gradually become more protracted, and evidence of pelvi-peritonitis or of general peritonitis is manifested. The abdomen is distended, and the bladder and rectum encroached upon. Vomiting, fever, insomnia and emaciation supervene; finally, rupture of the obstructing membrane permits the discharge of the accumulated fluids, thus ending in a kind of natural cure; or the rupture occurs at the thinnest portion of the uterus, oftenest at the cervix, and if posteriorly, the blood is evacuated into the peritoneum, the patient rapidly sinking with symptoms of peritonitis from perforation. When the point of rupture is lower down or anteriorly, the blood may find an exit through the bladder or through the connective tissue of the pelvic floor.

Death may follow either spontaneous or artificial evacuation of the hematometra, in spite of the most prudent measures, if the tube is ruptured, as, for instance, during the straining from vomiting, or if decomposing fluids from the walls of the sac enter the blood or lymph vessels after the entrance of air during the evacuation. The symptoms are less grave when the distention of the uterus is produced gradually by lochia, mucus or pus, and consist only in a feeling of tension, pressure and slight dysuria and disorder of defecation. In a woman 40 years of age, with uterine atresia caused by application of the actual cautery, Schroeder first noticed the discharge to be of blood after artificial evacuation of the retained secretion, and later of a purely serous fluid, *i. e.*, the hematometra changed to a hydrometra.

Diagnosis.—Stenosis of the external os may often be recognized by touch. Through the speculum a slight depression is seen or only a simple point in place of the normal transverse orifice. The vaginal portion is often conical. The head of an ordinary sound cannot be introduced, or can be passed only when force

is used. The retention of secretion may be recognized by pressing upon the fundus of the uterus, whereupon some thick, cervical mucus will be forced out. Stenosis of the internal os can be diagnosticated only by the sound; but one must remember that this condition does not always exist when some little hindrance is experienced in passing the sound through the internal os. Some experience in manipulation, attention to the position of the uterus, lifting it up before using the sound will often remove the apparent obstruction. A thick sound may pass more easily than a small one, for the latter may catch in the mucous folds.

FIG. 82.



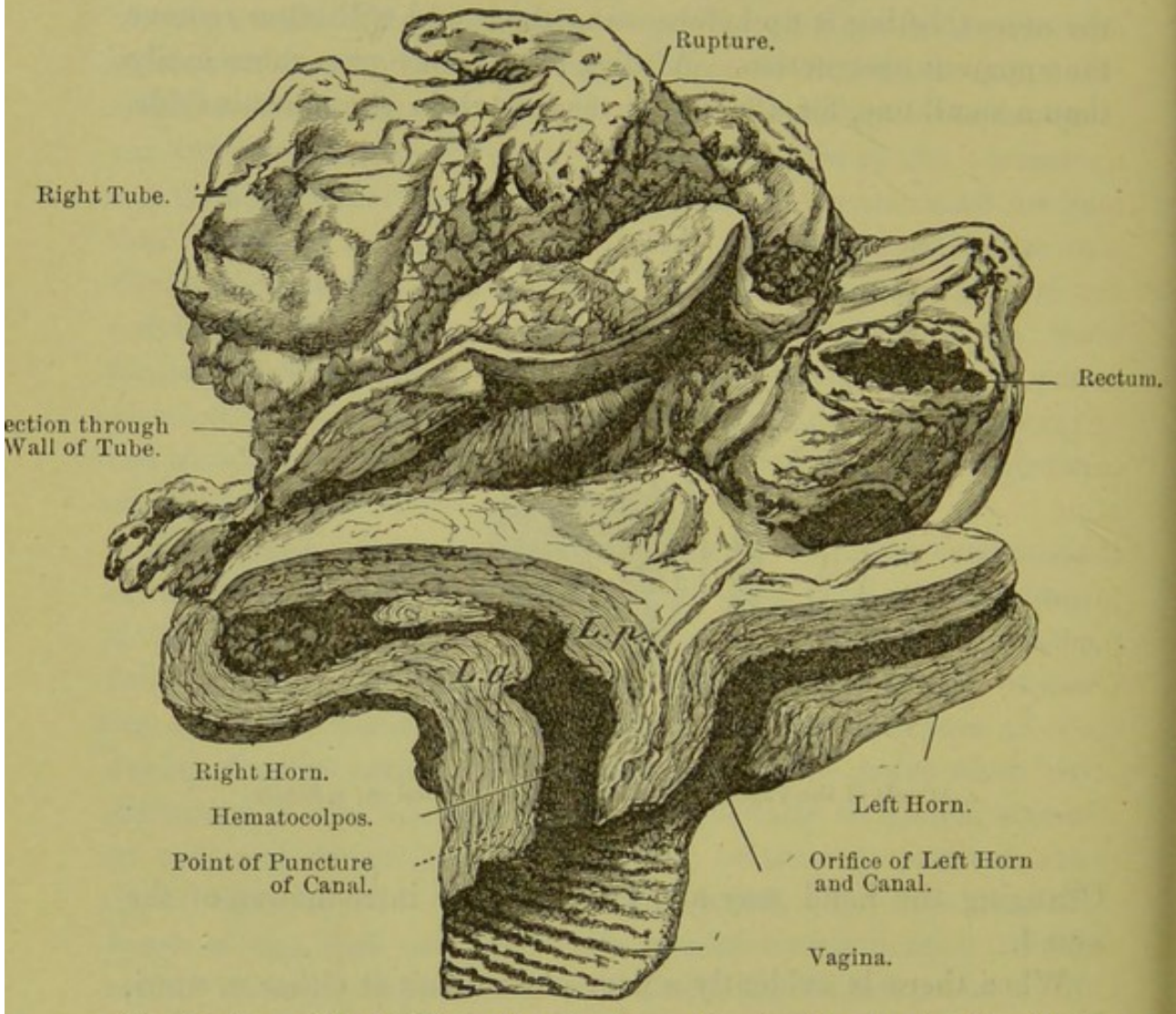
c, Atresia of the Vagina; *b*, External os; *a*, Internal os; *e*, Senile hematometra.

Changing the hand may also facilitate the introduction of the sound.

When there is evidently a firm obstruction at either os uteri, however, we must next ascertain the existence of any enlargement of the uterus, also its form, and as to whether it is firm and elastic or fluctuating. We must next eliminate pregnancy, by noting the absence of the usual signs. This accomplished, the exploration is completed by examination by the rectum or by the bladder, after dilatation of the urethra. Finally, any remaining doubt will be removed by puncture, under antiseptic precautions, with a small trocar through the vagina. In all these examina-

tions we should not forget that the pressure exerted must be slight, otherwise a distended tube may rupture, and death rapidly follow. Hematometra from atresia of the internal os may usually be differentiated from that due to atresia of the external, by the permeability of the cervical canal; I say *usually*, and not

FIG. 83.



Hematocolpos of Right Side. Hematometra. Hematosalpinx (ruptured). Atresia of the Right Side of the Vagina. Two-horned Uterus.

always, for in advanced age there may be hematometra with atresia of the internal os, with not rarely also closure of the external os, with dilatation, by a scanty secretion, as in Fig. 82. Finally, there may be hematometra with a double genital canal,*

* *Vide* Chapter on Incomplete Development of the Uterus.

existing on one or on both sides (Holst, Santesson, Nélaton, Breisky); as a rule, the uterus is two-horned, or it may be a uterus septus.

Hematocolpos and hematometra, with lateral atresia of the vagina, have already been described. In single vagina the uterus is double, as a rule, the one-half being closed; or a rudimentary horn, which has no connection with the existing fully-developed one-horned uterus, may become distended by a hematometra (Hofmann, Leopold, Hegar). The permeable half of the organ menstruates to a greater or less degree. The usual course of such an anomaly is rupture of the uterine septum, or the termination may be the same as in uncomplicated hematometra. The discomfort begins with the occurrence of menstruation, gradually increasing; sometimes disturbances do not appear until long after the onset of the menstrual flow, and the distress may be severe even when there is amenorrhœa of the permeable side (Freund, Freudenberg). The diagnosis is not very difficult; the tumor is closely adherent to the uterus, is firm, elastic or fluctuating. The os uteri is at the side of the tumor, projecting into the vaginal vault, or it may be crescent-shaped, the concavity toward the tumor. The diagnosis of hematometra of a rudimentary horn may be made by exclusion, by demonstrating the presence of a firm, elastic tumor, with a one-horned uterus, by the connection of the tumor with the horn by means of a cord or band, and by its growth, and the greater discomfort during menstruation; this probable diagnosis may then be confirmed by puncture.

Treatment.—1. Stenosis of the external os uteri. The narrowed os should be enlarged by means of sounds, dilators, the knife, scissors or metrotome, or by a special operation. I have had very unsatisfactory results from dilatation by the sound, by Ellinger's dilators and by laminaria or sponge tents; as a rule, the stenosis returned in a short time, and the dilatation, though continued, at intervals of eight to fourteen days, for months, had no favorable effect upon the dysmenorrhœa. I have had no experience with the more powerful dilators of Fritsch and B. S. Schultze.

No special knife is required for operative enlargement of

the external os; those introduced by Simpson, Ed. Martin, Greenhalgh, Matthieu and Coghill, have the one great disadvantage that the pressure cannot be controlled and modified to suit the individual case; they are also liable to slip and injure the adjoining tissues. The knife should not be used for stenosis of the internal os, because the depth and extent of the incision cannot be regulated, nor can one ascertain exactly where he is making it. The stenosed portion is usually missed, and injury has been done to the wall of the bladder and even to the ureter from this method of operating, so that it should be abandoned. There is no way of permanently preventing reunion; the conditions here are similar to those in dilatation of the external os; when the dilatation has been discontinued, the stenosed condition speedily returns.

When stenosis of the external os is associated with the presence of glandular cysts, these may be punctured and evacuated through the speculum, the os subsequently incised in four directions, and the small flaps removed by the scissors with but little loss of blood; next the catarrhal cervical mucous membrane should be thoroughly cauterized, and a small cotton tampon pressed firmly into the cervix.

When the vaginal portion is elongated and resembles a proboscis, it should be constricted by an elastic ligature, the latter fixed by a Carlsbad needle, and the part of the portion below the ligature amputated by the knife. The surface of the wound should be partially or wholly covered by uniting the cervical and vaginal mucous membrane by chromicized catgut. The patient will be confined to her bed twelve to fourteen days.

Amputation by the galvano-cautery is less successful, for the os is liable to remain too narrow, and even atresia may subsequently occur.

When the lips are thick and hypertrophied, the wedge-shaped excision described in a foregoing chapter, is to be recommended. Kehrer makes a stellate incision with six or eight radiations. I have performed a very satisfactory operation during the past ten years in the following manner: A transverse incision into the uterine walls is made on either side, beginning at the cervix and extending to near the vaginal vault. A small wedge is then ex-

cised from the wound made by these incisions, and then the edges of the wound in each lip, right and left, united by fine sutures of catgut or silkworm gut.

2. In atresia of the uterus, the treatment will be governed by the degree of distention and by the general symptoms. The distention, either from hydrometra or hematometra, being slight, the introduction of a trocar and evacuation of the contents will suffice. When the distention is great and there is constitutional disturbance, such as fever, rigor or evidences of peritonitis, we should adopt the treatment suggested for hematocolpos on pages 93 and 94.

Most authors agree that free evacuation of the retained blood or pus must be made, for the danger of septicemia is much greater when the incision is small and putrefaction of the contents is possible. After making a free incision, Emmet advised irrigating the uterine cavity with an antiseptic fluid.* He treated successfully twenty-two patients in this way, but Galabin, who has probably had more experience with these diseases than any other gynecologist, opposes this method. The treatment recommended by Breisky is described on page 110.

CHAPTER VI.

ANOMALIES OF MENSTRUATION.

The Anatomy and Physiology of Menstruation.

The terms menstruation, catamenia, menses, period and "Regel" signify a periodically recurring discharge of blood from the genital tract of adolescent girls and women, chiefly depending upon a peculiar action of the ovaries which we term *ovulation*. The close connection of these two processes is proved by the fact that castration of the female is, in the great majority of cases, followed by permanent cessation of the menstrual flow. The view hitherto accepted with regard to menstruation is as follows: From the twelfth to the thirteenth year the ovaries

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* "Principles and Practice of Gynecology," 1881.

are more vascular, aud the Graafian follicles gradually ripen, one or more slowly growing toward the surface of the ovary, the tension thus produced causing irritation which leads to congestion of the whole genital apparatus. With this congestion there is an increase in the quantity of fluid in the Graafian follicles, one of the latter finally rupturing at the thinnest non-vascular portion of its wall, and evacuating its contents, including the ovule, into the abdominal cavity. The latter is now carried into the hyperemic Fallopian tube and thence into the uterus by the action of the ciliated epithelium of the tube and its fimbriæ. In the meantime the tissue of the uterus has become relaxed, its mucous membrane thicker and darker, and a moderate quantity of blood appears upon its surface, apparently without lesion of its vessels, by diapedesis. Ruge and Moericke, however, have recently found intact ciliated epithelium upon the mucous membrane of the menstruating uterus, an observation which we have repeatedly confirmed, and this proves the falsity of the former views, that menstruation was caused by a fatty degeneration of the superficial layers of the membrane (Kundrat and Williams), that these degenerated portions were exfoliated and regenerated; and, furthermore, that even without the fatty degeneration from hemorrhagic extravasations, this blood may exude from the surface, the exfoliation occurring later (Leopold).

Different views are entertained concerning the connection between ovulation and menstruation with regard to time. According to Leopold's investigations, it is very probable that ovulation may occur between two menstrual periods, and it may be accepted as the general rule, that the rupture of the follicle and the liberation of the ovule usually occur at the time when the distention of the follicle is greatest from the new congestion, *i. e.*, just before the discharge of blood from the uterus. If conception does not occur, menstruation now proceeds in the usual manner. If the ovule be impregnated before the hemorrhage takes place, the latter is either entirely checked or is less and continues for a shorter time than usual. If impregnation occurs during the menstrual flow, the menstrual decidua becomes the *decidua graviditatis*, or, if the ovule is not impregnated until after the flow has ceased, the next menstruation does not appear.

Loewenthal has recently proposed an hypothesis which is not in harmony with the above.* According to this hypothesis, the ovule first reaches the uterus unimpregnated; its presence causes an irritation leading to the formation of the menstrual decidua, which is transformed into the decidua of pregnancy if the ovule be impregnated. If not impregnated, the ovule dies, and its death (!) causes an active congestion, as well as the degeneration of the menstrual decidua and the menstrual hemorrhage. The congestion produced in this way favors the ripening of younger Graafian follicles in the ovary, and so the circle is completed. This daring hypothesis has its weak point—its Achilles' heel, and this is certainly found in the assertion that the death of the ovule must cause the congestion.

It is beyond cavil that, while the ovule unimpregnated perishes, there is a return of the uterine mucous membrane to the normal condition during and subsequent to the discharge of blood, and also, that ovulation may occur independently of this discharge of blood. The proofs are, first, that conception is not infrequent before the appearance of the menstrual flow; second, a woman may conceive while nursing, and before the menstrual flow has reappeared subsequent to the last confinement; third, that ruptured follicles, from which the ovules have just been expelled, have been found in the non-menstruating female in cases of sudden death; and, fourth, that there are women who, having once menstruated, may conceive during a period of amenorrhœa (Petit). Finally, conception has occurred subsequent to the menopause, in which case ovulation must have outlasted menstruation.

In connection with the changes just described, in ovaries, tubes and the uterus, there is also hyperemia of the vulva, vagina and mammary glands. There is also an increased genital secretion, and the breasts may be so considerably enlarged at the first menstruation that numerous striæ appear upon their surface.

Symptoms, Course and Duration.—When a perfectly healthy girl menstruates for the first time there are no premonitions, and

* *Archiv f. Gynäkol.*, XXIV, p. 2.

she is usually surprised by a discharge of blood from the genitals. In Germany this occurs at the average age of sixteen years, very rarely before thirteen, and not often later than eighteen. It occurs earlier in girls who live in cities, and in strong, vigorous persons. In tropical climates it may appear as soon as the twelfth or even the eighth year.

The duration of the flow is from three to six days, but the variations in the same female are great, and often without apparent cause. It may last but one or two days, and at the next period be profuse and continue from six to eight. The quantity of the discharge is determined with difficulty; one is forced to make a general estimate. A discharge of more than half a pound of blood would warrant us in speaking of the flow as being profuse, less than this being a moderate quantity.

To the menstrual blood are added the secretions of the uterus and vagina in varying amounts, and upon microscopic examination the uterine and vaginal epithelium are found in the discharge. As a general thing, the menstrual blood does not coagulate, owing to the admixture of the acid vaginal mucus.

As to the time of recurrence, the type in this country is generally quite regular, *i.e.*, the intervals are about three and a half, four or four and a half weeks; in many women this date is so exact that they are enabled to calculate almost the hour of the reappearance of the flow. Nevertheless, the time is also subject to variations; the limits may be placed at from twenty-six to thirty days, though we must remember that there are women who have always menstruated at intervals of three weeks, this anomaly being apparently independent of any diseased condition. Subjective symptoms of various kinds occur during the flow in some, but in others they may be very slight or entirely wanting. Some experience a feeling of weakness, weariness, fulness in the lumbar region, abdominal pain or swelling of hemorrhoidal tumors. There may be slight diarrhœa during the flow, constipation being the rule in the intervals. Still others complain of headache or of migraine. Very many are decidedly uncomfortable or even prostrated. We occasionally observe an eruption on the skin similar to urticaria, and there is sometimes œdema of the external genitals. With regard to the temperature and pulse, our

observations are as yet by no means complete. While women are usually said to be more irritable at this time, yet, according to Rabuteau's researches, both the temperature* and the pulse are lowered. Hennig was enabled to confirm this statement in so far as it related to the pulse, but not as to the temperature. The excretion of urea is said to be increased, though this statement is still *sub judice*.

In many cases, the menstrual blood has a very unpleasant odor, which is probably due to increased activity of the sebaceous glands of the skin about the vulva.

In Germany the menopause occurs most frequently between the forty-fifth and fiftieth years; according to my experience, about the forty-eighth year. The average length of the menstrual life is, therefore, about thirty-three years. According to Louis Mayer, those who menstruate early in life menstruate longer than those who begin late, the proportion being 33.6 to 27.3 years. Marriage, confinement and nursing seem to influence the length of menstrual life. In some women the menopause occurs suddenly and in others gradually, being preceded by longer or shorter intervals of amenorrhœa. Again, it may disappear for a time and then return; finally, there are women who cease menstruating in winter, the discharge reappearing with the heat of summer. Louis Mayer calculates that the average date at which women of the better classes cease menstruating is 47.138 years, which agrees with my own observations.

The symptoms associated with the menopause are varied; some women experience no discomfort whatever, while others become fleshy or notice a great tendency to increased perspiration without other symptoms. Very many other anomalies take place, among these being the development of hemorrhoids, irregularities of defecation and urination and disorders of digestion; there may be meteorism and flatulence, congestion of the skin, flushes of heat and severe headaches.

It has been proved by many autopsies that abnormally early or late appearance of the menopause is generally accompanied

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* *Archiv f. Gyn.*, II, 300, and IV, 371.

by pathological processess in the ovaries, tubes or uterus. One must not attribute every discharge of blood from the genital organs during the menstrual life to the menstrual process, for it may depend upon various causes external to the uterus, *e.g.*, sudden, protracted and especially acute diseases may cause discharges of blood from the uterus during the menstrual interval. This non-menstrual loss of blood may influence menstruation to such an extent that the latter may be delayed or even fail to appear for a time.

Disorders of Menstruation.

1. *Amenorrhœa.*

When the periodically recurring discharge of blood from the genitals is absent in a virgin with normally developed sexual organs, or at least having a permeable genital canal, or in a woman who is not pregnant and who has not yet reached the menopause, the disorder is called amenorrhœa. As we have seen, menstruation essentially depends upon the condition of the uterus, ovaries and tubes, and we, therefore, look for the causes of amenorrhœa in connection with these three organs, singly or together. Probably the most common cause is non-ripening of the ovules, for the periodic congestion does not even appear. Again, the menstrual flow may cease in consequence of chronic perioöphoritis, the ovaries being enclosed in a firm exudation mass. It is not improbable that menstruation at an early age, and extensive cicatrices on the surface of the ovary, may hinder the subsequent development of the Graafian follicles. Remarkable smallness, defective development of the ovaries (see Part V) is likewise to be credited as a cause. It is easy to understand that cessation of the menses would be a consequence of the anemia caused by profuse hemorrhage from the puerperal uterus. Occurring more rarely and more difficult to explain, is the observation that in consequence of severe bleeding from the cervix, following an operation, the menses are absent for years, though the patient is not anemic. I observed such a case, in which incision for sterility had been done by a colleague; possibly the ovarian follicles were few and imperfectly developed in this patient.

Amenorrhœa may result from imperfect development, atrophy or hyperinvolution of the uterus or of the tubes; or, as before mentioned, from chronic catarrh which leads to atrophy of the mucous membrane. Energetic curetting of the uterus, as described in a previous chapter, causes temporary amenorrhœa. In rare cases, amenorrhœa exists without any apparent anomaly of the uterus, ovaries or tubes; the cause here may be some constitutional nutritive disturbance, *e. g.*, convalescence from severe diseases, such as typhoid fever, pneumonia or one of the acute exanthemata, or from chronic exhausting affections such as tuberculosis, or from generally defective hematosis, and also from indulgence in unsuitable food, neglect of the skin, severe intellectual occupation, without corresponding activity of the muscles, or without sufficient rest and recreation. Gastric catarrh predisposes to amenorrhœa. It should be here stated that young girls may intentionally take insufficient food or indulge too freely in acid beverages, especially vinegar, because of a morbid desire to appear pale and interesting. Finally, there is no doubt that intense mental impressions, fright, great anxiety, especially when of long duration, strong excitement, may cause amenorrhœa. When such impressions occur during the flow this often instantly ceases. The fear of conception, or, on the other hand, great desire to become pregnant, according to some authors, frequently causes either absence of the menses or a very scanty flow. Great accumulation of fat at an early age is frequently connected with amenorrhœa.

Symptoms.—When the various disorders which so often accompany menstruation disappear with the cessation of the flow, the patient having amenorrhœa may feel better than she previously did. This is often true when the amenorrhœa is due to great loss of blood. On the whole, the distressing symptoms associated with amenorrhœa are less frequently due to the amenorrhœa, itself, than to its causes. Amenorrhœa may appear suddenly or be developed gradually. Most patients and their families consider it a great misfortune, and attribute to it a long series of symptoms. Many a mother is greatly distressed by the fear that her daughter's menses will never return, and that she then cannot marry.

Sometimes, when the typical hemorrhage from the uterus has ceased, discharges of blood may occur at regular intervals from other organs, or parts of the body, as the lungs, stomach, intestines, kidneys, skin, mammæ, hemorrhoids; this condition has been called *vicarious menstruation.* When such patients are carefully examined, we will often find that the menses have ceased in consequence of the hemorrhages, (hemoptysis, hematemesis, bleeding from hemorrhoids) or else that the latter are by no means regular and occur only at the time when the menses ordinarily appear. However, hemorrhage from the nose or intestinal mucous membrane may occur simultaneously with a scanty menstrual flow, and, in this case, evidently acts as a substitute for the usual more profuse discharge from the uterus. Again, hemorrhages from the nose, mouth, stomach and lungs have been observed in connection with congenital atresia of the uterus and with premature menopause; the name vicarious menstruation is here peculiarly applicable.

Amenorrhœa is often diagnosticated when it does not exist, the menstrual discharge being obstructed by an atresia of some portion of the genital canal. Careful abdominal and rectal examination should be made to ascertain the existence of retained secretion, as hematometra or hematocolpos, before any treatment is prescribed for young girls who have never menstruated, and who appear pale and ill-nourished. The diagnosis of amenorrhœa depends upon the recognition of its cause; an accurate history is therefore indispensable. The anemia may be due to boarding-school life or to masturbation. The recognition of partial development of the uterus as a cause has already been considered.

Treatment.—This should really comprehend the treatment of those forms of amenorrhœa only which appear independently of defective development and of other diseases of the sexual apparatus; for in the latter case the amenorrhœa is merely a symptom, and the primary affection must be treated. In case general nutritive disturbances have resulted in amenorrhœa, the causes of these should be removed; excessive discharges are checked and reduced nutrition improved. The general treatment of anemic young girls thus first consists in a regulation of the mode of living: such a one ought to retire early, and not

sleep late in the morning; she should take, every three hours, light, easily-digested, nutritious food, both animal and vegetable, in appropriate proportions, and must not be urged to eat largely of meat, but she may have at first red wine, beer, bouillon, milk in large quantities, and be permitted to drink rather than to eat. Exercise in the open air is essential; regular evacuation of the bowels may be secured by simple injections of water. Mental employment is of great importance; the anemic female should not do as much thinking and studying as formerly, and household duties had better be substituted. Continued exertion, as in embroidery, sewing, knitting, piano-playing, singing, protracted standing and painting are to be positively forbidden. Most parents will protest against this course of treatment, but when the physician is positive in his direction, and can give a reason for the course ordered, they generally yield. It is often advisable to remove these patients from the influence of over-anxious parents, and to send them to friends or relatives in the country, directing them to run about in the open air, and when the appetite is good, to eat freely and to drink plenty of milk. After the lapse of some weeks, they will return home with red cheeks, and the menstrual flow will then soon reappear.

When this course is impossible, or proves ineffectual, we must resort to medical treatment, to check abnormal discharges, such as leucorrhœa, diarrhœa, or gastric catarrh, and to promote digestion and enrich the impoverished blood by the preparations of iron. The remedies of this kind which I have found most satisfactory are the *tinct. ferri pomata*, lactate of iron, iron by hydrogen and the albuminate of iron in the form of syrup. These preparations must be administered in large doses, and for months, or even years, until the cheeks and lips redden, the palpitation and headache disappear, the muscles are strengthened and the menses have returned. The dose of the preparation may then be reduced, and the remedies discontinued after two or three normal menstruations.

In case cerebral congestion or cold hands and feet are especially distressing to the patient, or pelvic congestion with a feeling of warmth and an increased mucous discharge appears at the time when the menstrual flow ought to occur, foot baths of salt water

will be of service; dry cups may be applied to the inner surfaces of the thighs, or mustard plasters at short intervals, in order to increase the existing congestion to the degree of producing a flow. Warm sitz baths, of a temperature of from 79° to 86° F., are both agreeable and useful.

Chlorotic girls who are easily chilled must be warmly clothed, and must not expose themselves unnecessarily to atmospheric changes. For this reason, river and sea baths are less suitable for them. Brückenau, Pyrmont, Driburg, Schwalbach, Franzensbad, Elster, Steben, Kohlgrub and St. Moritz may be recommended, and when the anemia has disappeared, a course of sea-baths may be tried. Over-exertion or resumption of the patient's former employment must not occur too soon.

The means of promoting the growth of the membranaceous atrophic uterus have been considered in a previous chapter. One class of medicines remains to be referred to, viz., the so-called emmenagogues, aloes, savine, borax, saffron, etc. As a rule, it is better not to use them; aloes, with iron, may remove constipation and flatulence, and improve the appetite and nutrition; for these indications, small doses of this combination may be of much service, but they must be used with caution. No good result can be expected from the administration of the other remedies mentioned.

In conclusion, I wish to call attention to the curative influence of energetic massage, as such patients, who cannot go to the country or to watering places, are by means of it, in combination with iron, rapidly strengthened and improved.

2. *Excessive Menstruation. Menorrhagia.*

Too profuse and too protracted menstruation are likewise symptoms of various genital affections, and as many of the latter have already been considered in connection with displacements and with benign and malignant neoplasms, these will not again be referred to.

Passive hyperemia of the genital organs, with menorrhagia, may result from various anomalies of other organs, *e. g.*, hepatic and renal diseases, enlargement of the spleen, chronic hyperemia of the intestinal mucous membrane and different cardiac

and pulmonary maladies. Similar effects are produced by strong mental impressions, chronic constipation and, finally, by abnormal deposition of fat in the skin and intestines. Women having Werlhof's disease almost invariably suffer from great hemorrhage at the menstrual periods. The term "menorrhagia" is quite comprehensive. In very anemic individuals the average flow of the healthy female may acquire the significance of menorrhagia. The term is therefore applicable to all cases in which the loss of blood at the menstrual period is so great that existing anemia is aggravated, and to those in which symptoms of too great loss appear, also in patients hitherto not anemic. The symptoms are paleness of the lips, cheeks, conjunctivæ and hands, ringing in the ears, *muscæ volitantes*, headache and vertigo, great muscular weakness, epigastric oppression, anorexia, eructations, constipation, etc. They are, as a rule, gradually developed, because women bear loss of blood remarkably well, much better than men. As a rule such hemorrhages are not associated with pain, but are followed by a series of painful sensations, included in the term hyperesthesia of all the organs of sense. Among them we notice cutaneous hyperesthesia, photophobia, headache, abnormal sensitiveness to noises, abnormal manifestations of taste, disgust for certain foods, especially the pungent and the bitter, and increased desire for others; above all, however, by marked increase of olfactory sensibility. With these there may be muscular pains of rheumatic character.

The treatment of menorrhagia and the consequent anemia is, of course, directed to the cause. In heart disease the tincture and the infusion of digitalis are of great service in regulating the tension; digitalis is also an excellent hemostatic, the virtues of which have long been known.

In renal affections, especially those characterized by the formation of calculi and the uric acid diathesis, the waters of Carlsbad, Vichy and Neuenahr are of great value.

I am acquainted with no better remedy than ergotin for Werlhof's disease; it should be administered internally for months and years in conjunction with a suitable local treatment.

In obesity, the methods of Banting, Epstein or Oertel, or the

waters of Marienbad (used for a succession of years) will be found of advantage.

In connection with all these plans of treatment local styptics must be used upon the abdomen, to the vagina and vaginal portion, directly to the bleeding mucous membrane, and to the rectum.

Externally, cold may be applied in the form of ice-bags, or for very anemic patients hot compresses may be substituted. An attempt should be made, by hot water injections, to produce contraction of the uterine vessels. Vaginal injections of solution of alum, tannin, sulphate of zinc and other astringents have long been employed; again, ice-cold injections may be thrown into the vagina through the speculum, or through tubes which admit of a continuous flow, or a colpeurynter filled with ice-water, or even small pieces of ice may be placed in the vagina. When the ice-bag is not well borne, hot injections must be substituted, and if both of these are inefficient tampons should be placed in the vagina and renewed daily.

When the hemorrhages are profuse and frequent, and symptoms of anemia appear, treatment must be directed to the bleeding surface, styptics being placed in contact with the uterine mucous membrane. These may be applied by means of syringes, the sound, or any other suitable instrument. The injections, as already stated, cause distention of the uterus, and may pass into the tubes or into the uterine walls, or they may flow away at once, and thus unnecessarily irritate the vagina. When they are not essential the direct application of the hemostatic by means of a sound wrapped in cotton, is therefore preferable.

In the case of Werlhof's disease under my care, I relieved the patient for a number of months by tamponing the uterus at each menstrual period with laminaria tents. The excessive hemorrhages ceased entirely and the patient recovered on the occurrence of the menopause.

Internally, the preparations of ergot, the dilute mineral acids, digitalis, Indian hemp (J. Brown) and manganese (F. H. Martin) have been recommended recently; the solid and the fluid extracts of hydrastis Canadensis, the latter in fifteen to twenty-five drop doses, three to five times a day, have been used with advantage.

If all of the above remedies prove ineffectual, we must adopt the treatment suggested for fungous endometritis, as directed on page 452.

3. *Dysmenorrhœa.*

Though most women suffer more or less discomfort during menstruation, marked pain should always be considered a proof of disease. It is usually associated with some evident disease of the uterus, ovaries or tubes, and is therefore simply a symptom of this disorder, but in a certain number of cases the mode and character of the flow itself may cause distress, though the uterus be otherwise healthy. Such cases are those in which the discharge of a menstrual blood of normal quality, and those in which blood coagulated or mixed with shreds of mucous membrane is hindered, made difficult or rendered almost impossible. The first variety may occur when the secretion is profuse and the os narrowed; the latter from abnormal coagulability or collection of the blood about separating fragments of mucous membrane. In either case the pains are caused partly by the distention of the uterus, partly by efforts to evacuate its contents, and may be like labor-pains, and be combined with intermittent discharges. They are therefore due principally to mechanical obstruction and are like the pains in cervical stenosis. But this mechanical explanation alone is inadequate, as that of B. S. Schultze for positional changes, for instance, has been proved. It is quite probable that mechanical dysmenorrhœa can in time produce a catarrh of the mucous membrane which will act in the same way without retention of blood.

Again, there are cases in which even this cause is absent, the only abnormality being a hyperesthesia of the entire organ. This form I conceive to be like that form of vaginismus which results from ineffectual attempts at cohabitation, and which is without any trace of anatomical change. The dysmenorrhœa might, therefore, result from unsatisfied sexual desire.

There is a form of dysmenorrhœa in young girls characterized by sudden and intense pain culminating in hysterical spasms, which attacks may recur at intervals for months and years. This condition, which may be called *uterine neuralgia*, may be caused by fright, mechanical violence or masturbation, other apparent

factors being absent. Furthermore, there are cases in which we are at first unable to assign any cause, but the pain is intense, and years of continued observation finally show that small myomata of the wall of the uterus are the real cause.

Some cases of dysmenorrhœa are to be referred to disease of the tubes, due to infectious catarrh, while others depend upon neuralgia and similar diseases of the ovaries. One of the most fruitful sources of dysmenorrhœa, and one which is recognized with difficulty, is pelviperitonitis in the form of a slight perimetritis, perisalpingitis and perioöphoritis; this is beyond question a more frequent cause of menstrual pain than has hitherto been believed. The adhesions may be inconsiderable and slight, but they still suffice to produce disorder of the circulation, lessen the movements of the uterus and cause a feeling of heat and painful urination and defecation.

The **symptoms** of uterine neuralgia and the resulting dysmenorrhœa are a feeling of heat, irregular circulation, cold hands and feet, cramps, migraine and finally hysterical convulsions. These symptoms usually develop slowly. After an attack the patient feels exhausted for several days, and then recovers until the time for the next menstruation appears. After having passed through a number of attacks the subjects look very miserable, are emaciated, irritable and during the intervals unable to attend to their usual duties. The appetite and digestion generally suffer, so that there is even a certain degree of chlorosis present.

We recognize simple non-mechanical dysmenorrhœa, first, by the absence of displacement or enlargement of the uterus and of increased secretion or disease of the mucous membrane, while the entire uterine wall and especially the mucous membrane is extremely sensitive upon the introduction of the sound. But if during menstruation, nothing abnormal can be discovered in the uterus, the ovaries and tubes must be carefully examined for anomalies of any kind.

Not infrequently parovarian varicocele or a movable kidney may be the seat of the pain. To guard against error the condition of the uterus and bladder must be carefully examined; also the presence of uric acid deposits, etc., must be sought, as calculous nephritis may cause attacks which are very similar to those of dys-

menorrhœa, the only difference being that the pain is situated in the neighborhood of the kidney and seldom or never in the pelvis.

It thus becomes evident that dysmenorrhœa is a symptom of a great variety of affections; also, that in the beginning of an attack none of these affections can be diagnosticated with certainty; and that, even after a diagnosis has once been made, the disease in question may possibly be simply an effect of the dysmenorrhœa. We are therefore forced to include a long list of complaints under the common term dysmenorrhœa and to treat them symptomatically.

The first indication consists in removing from the patient every cause which is by experience known to aggravate her suffering, *e. g.*, cold, movements, direct irritation and hyperemia of the uterus.

When possible she should remain in bed at the beginning of the flow, and at the same time avoid all mental effort and worry, for such patients are inclined to be nervous and excitable. Since cold increases their distress, most of these patients cover themselves with heavy bed-clothing, apply hot compresses and drink hot teas in order to produce free perspiration, and this affords much relief. We will add that thoroughly warming the cold hands and feet is to be recommended. Irritation of the uterus, and great pressure upon it, as from constipation, are to be avoided, and frequent examinations are unnecessary and harmful. Increased blood pressure, as from an overloaded stomach or distended intestines, must be prevented. Any existing bronchial catarrh must be treated, and the patient kept upon her back. We have many direct ways of relieving congestion of the pelvic organs and thus lessening the pain, as by sinapisms applied for ten or fifteen minutes to the most painful spots, or by bathing the hands in water as hot as can be borne.

When all other means prove unavailing, we can resort to the use of narcotics, of which there is a great variety. It is only too frequently the case that young physicians are prone to administer morphia in hypodermatic injections whenever their patients complain of violent pain. In the dysmenorrhœa of young girls, this treatment is very agreeable to the parents, because they

naturally are averse to examinations and at the same time do not wish to see their children suffer. It is in just such cases that the drug is abused, and that many a patient acquires the morphine habit. A knowledge of the method of employing the syringe must never be imparted to such patients or to their nurses. When a resort to the use of narcotics is unavoidable, one should begin with injections of hyoscyamus, and subsequently give extract of belladonna in suppositories, and finally, tincture of opium by the rectum. Later, fifteen-grain doses of chloral hydrate may be given by the rectum; inunction of the abdominal walls with narcotic ointments ordered; Dover's powder given internally as occasion demands; and, finally, but always as a last resort, morphine injected hypodermatically.

When there is much discomfort for days preceding the flow, and there is passive hyperemia of the uterus, depletion by scarification of the cervical mucous membrane is often beneficial.

In conclusion, the treatment should be directed to all recognizable causes: stenosis, catarrh, displacements, myomata and pelviperitonitis.

4. *Membranous Dysmenorrhœa. Endometritis Exfoliativa. Endometritis Dissecans. Decidua Menstrualis.*

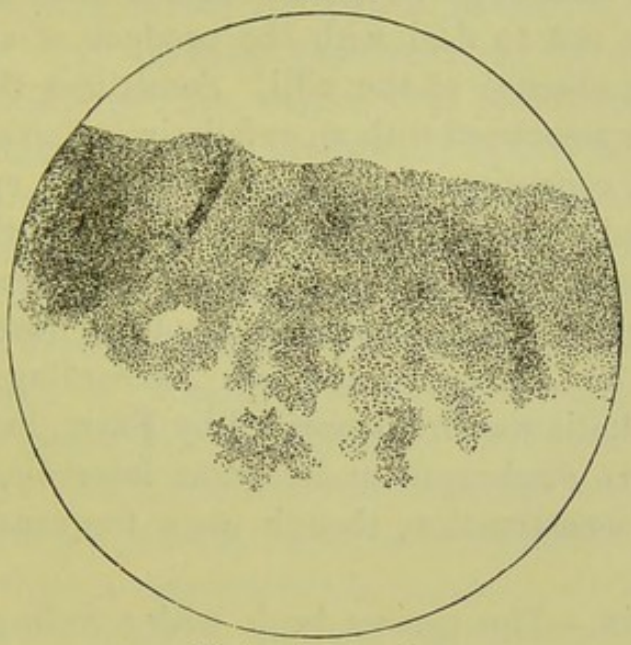
We have already stated that in healthy menstruation the mucous membrane remains almost intact, fatty degeneration and exfoliation being always exceptional. When, therefore, larger or smaller pieces or tube-shaped portions or, indeed, complete casts of the uterine mucous membrane are discharged at each period, and the process is attended with more or less pain, we designate the condition as *membranous dysmenorrhœa.*

As pointed out by Haussmann, Morgagni, in 1723, was the first to recognize this disease. His patient was a woman, aged 34 years, who had been repeatedly confined, had aborted and had suffered from leucorrhœa.

These membranes show a smooth, reddish inner surface, upon which the orifices of the utricular glands may be seen by the naked eye, and an external, rough, uneven surface, which appears as though torn from its connections, and at times contains small blood clots. The thickness is not everywhere alike; at the points

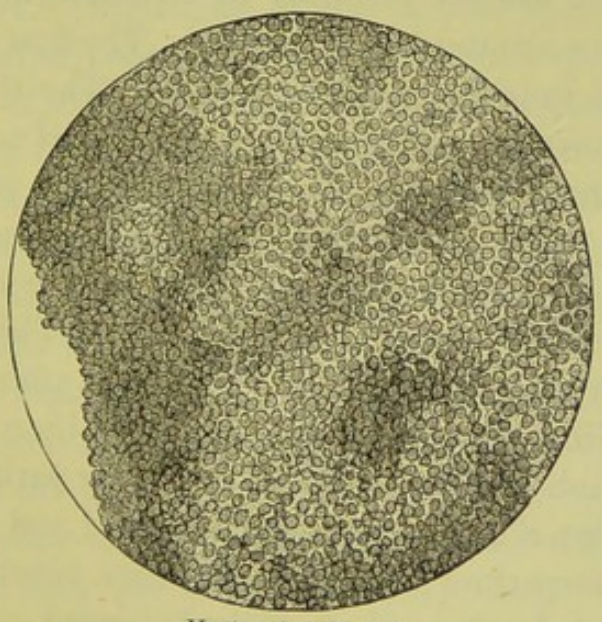
where the walls join each other it is very thin and almost transparent, at other places somewhat thicker; thus as may be seen with the naked eye the mucous membrane is not uniformly

FIG. 84.



Hartnack, s. 4, o. 2.

FIG. 85.



Hartnack, s. 7, o. 4.

exfoliated. In addition to this peculiarity, the membrane shows the changes characteristic of endometritis; therefore, the term *endometritis dissecans* is not inappropriate. In many cases the

discharged membrane is a complete sac containing three openings corresponding to the os uteri and the orifices of the tubes. Microscopically we see the utricular glands and the small-celled proliferation of the interglandular tissue, which is easily differentiated from the large irregular decidua cells of pregnancy. That we have not to deal with the product of an abortion is shown by the absence of the villi. Sometimes this exfoliative endometritis is associated with an exfoliative colpitis; large pieces of membrane, consisting of nucleated pavement epithelium, are discharged, and these are followed by tenacious fibrinous portions like those thrown off after the application of a concentrated solution of alum; yet, I have seen such a colpitis dissecans occur in a virgin who had not used injections. According to Cohnstein, exfoliative colpitis was first described by Farre, in 1858. These membranes are discharged at irregular intervals, wholly independently of menstruation, though more frequently during the flow.

Symptoms.—The menses begin with a feeling of heat and burning, discomfort, chilliness and occasionally with fever. The graver and more obstinate cases are attended with hysterical convulsions, and are usually preceded by circumscribed pain above the symphysis or around the umbilicus. The flow is by no means always profuse, indeed, it may be scanty. The time of the discharge of the membrane varies from the second to the fifth day. Occasionally, the exfoliation occurs almost with regularity, and is painless. In many patients the pains are developed gradually; in others, they are intense from the first, the severest paroxysms preceding the discharge of the membrane. The patient soon becomes very weak and miserable. For days after the discharge there is a feeling of soreness, and there is increased secretion mixed with blood. In one instance I cured my patient by employing scarification; she conceived, was confined and remained well during the puerperium; when her menses returned, however, the membranous dysmenorrhœa again appeared. I was not able to treat her after leaving Mecklenburg, and could not follow up the subsequent history. My patient, who had dysmenorrhœa combined with exfoliative vaginitis, suffered from the most distressing symptoms; there were pains in the region of the ovaries,

hyperesthesia of the skin, feeling of syncope without loss of consciousness, slowed cardiac action and scanty micturition; she also complained of heat and burning in the abdomen, extreme exhaustion, great sensitiveness to sounds, anorexia, constipation and occasional vomiting during the attack, but never had any fever.

Ætiology.—My personal experience by no means confirms the assertion made by some writers that membranous dysmenorrhœa and exfoliative colpitis are usually caused by constitutional diseases, such as anemia, chlorosis, scrofula, tuberculosis or hysteria. I have no reason to believe that it is hereditary, neither have I ever found the existence of syphilis in any case. One patient had a dermoid ovarian cyst, but none of the others had any genital affection. I find the condition as frequent in the married as in the unmarried. One patient attributed her condition to over-exertion and concussion from coasting in St. Petersburg; another, to lifting a patient, during her menstrual period, in consequence of which a membrane was expelled, and from this time the expulsion was repeated at every menstruation. The ætiology is still very doubtful. It is obvious that it might be caused by protracted catarrh. Many of my patients were parous women.

Treatment.—Dilatation of the uterine cavity, discission of the cervical canal, cauterization of the uterine mucous membrane with nitrate of silver, tannin, tincture of iodine and carbolic acid, curetting the uterus, scarifying its mucous membrane and the application of leeches to the vaginal portion have all been recommended, and used by the author. I have also had under my care the patients of colleagues, who had likewise employed all these remedies. but also without avail.

In several instances, however, my patients have been cured and have conceived after repeated depletion by the application of leeches to the vaginal portion. In one instance, as before stated, the disease recurred. In another, the discharges became less frequent, and the pain was diminished. Other remedies much employed are warm baths, narcotics, abdominal compresses, brine baths, warm sea baths, and the recognized remedies for anemia and hysteria, including the bromide of potassium. I have never seen a cure result from the sole use of these means.

SECTION IV.

MALFORMATIONS AND DISEASES OF THE FALLOPIAN TUBES.

A comprehensive idea of the most important affections of the tube may be formed from the following table, made by the author from anomalies observed in autopsies :—

	a. In 138 subjects between the 20th and 35th years of age.	*b.* In 575 subjects of all ages.
1. Unequal length . .	occurred 10 times ;	29 times
2. Angularity or displacement	" 14 "	27 "
3. Atresia	" 3 "	35 "
4. Cysts	" 6 "	23 "
5. Excrescences . . .	" – "	5 "
6. Carcinoma . . .	" 1 "	1 "
7. Fibroma	" – "	4 "
8. Tuberculosis . . .	" 2 "	5 "
9. Salpingitis . . .	" 7 "	10 "
10. Pyosalpinx . . .	" 1 "	1 "
11. Hydrosalpinx . . .	" 12 "	38 "
12. Hematosalpinx . .	" 2 "	4 "
	58	182

From the above table, it is evident that the tubes show a remarkably large number of affections and anomalies even in early life, and that they are predisposed to a great variety of affections at all ages, almost one-third of all female cadavers showing disease of these organs.

CHAPTER I.

INCOMPLETE DEVELOPMENT OF THE FALLOPIAN TUBES.

a. The tube usually participates in all malformations of the uterus; they are both derived from Müller's duct. Total absence of the duct implies total absence of the tube. Unilateral absence of the tube upon the left side is shown in Fig. 12, and upon the right side in Fig. 13, pp. 213 and 214.

b. As in the uterus, the canal may be permeable in some portions, and solid in others; the location of these constrictions with regard to frequency in not yet determined. In the one-horned uterus the tube may be a very short cord attached to the ovary, its uterine end being a free cul-de-sac.*

Another variation found by the author was the unusual size of the tube, it being, in one case, 13 centimeters (5 in.), and in another, 12.5 centimeters in length.

c. Again, the tubes may be of unequal length; this inequality, probably, depending upon the location of the ducts of Müller in the embryo, as described on p. 227. An unsymmetrical coalescence may be due to fixation of one duct, and the extreme length of the other from secondary traction after it has become adherent to the fixed tube. With regard to primary or congenital inequalities of the tubes, we recognize the embryonal causes to be an unequal original length, irregular position of the tubes, restricted motion from pressure of other organs, and increased traction from fœtal peritonitis.

d. I have twice found accessory ostia, the one being at least one centimeter ($\frac{2}{5}$ in.) from the usual orifice, and on the upper convex side of the tube. It was surrounded with fimbriæ like the normal ostium, was permeable, and seemed to be as capable of receiving the ovule as the former (see Fig. 86). Such anomalies are certainly easily overlooked. The one shown in the illustration I failed to discover, but it was found by one of my *internes* in Dresden, to whom I had assigned the task of searching for such anomalies. The second preparation was discovered in the

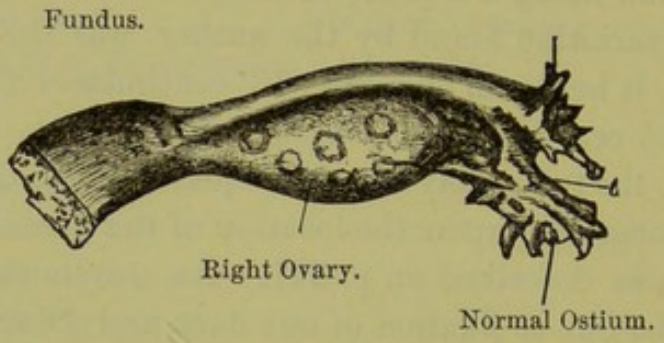
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* Schroeder, p. 39, Fig. 14.

same way, after it had escaped my observation. We cannot state with certainty the origin of this supernumerary orifice. In neither of these cases was the tube bent at a right angle, as in Merkel's case.*

e. There may be variations of Morgagni's hydatid, both as regards the length and the size of the pedicle. This body is present in about one-fifth of all cases. It was formerly regarded as the normal blind extremity of Müller's duct. Waldeyer believes it an elongation of Müller's duct, in that a portion of the pedicle is fixed to the ligamentum arcuatum of the primitive kidney. I have presented illustrations of two cases in which the pedicle was long, in one case 5 centimeters, and the hydatid as large as

FIG. 86.



Accessory ostium; normales.

a bean. I have seen one case in which the importance of this seemingly harmless anomaly was very apparent. The hydatid was attached to a very long pedicle, and had become adherent to the posterior wall of the uterus in the vicinity of Douglas's cul-de-sac. It had ruptured, and there were evidences of peritoneal exudates upon the uterus. We must therefore admit that it may possibly interfere with the movements of the tube, or eventually lead to the occurrence of abdominal pregnancy. It might also occasion local irritation, and rupture and cause circumscribed peritoneal inflammation, or become strangulated among the organs in the true pelvis.

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* Schroeder, p. 344.

CHAPTER II.

DISPLACEMENTS AND MALFORMATIONS OF THE TUBES.

Closure. Dilatation by Mucus or Blood. Dislocations of the Tubes. Atresia. Hydrosalpinx. Hematosalpinx.

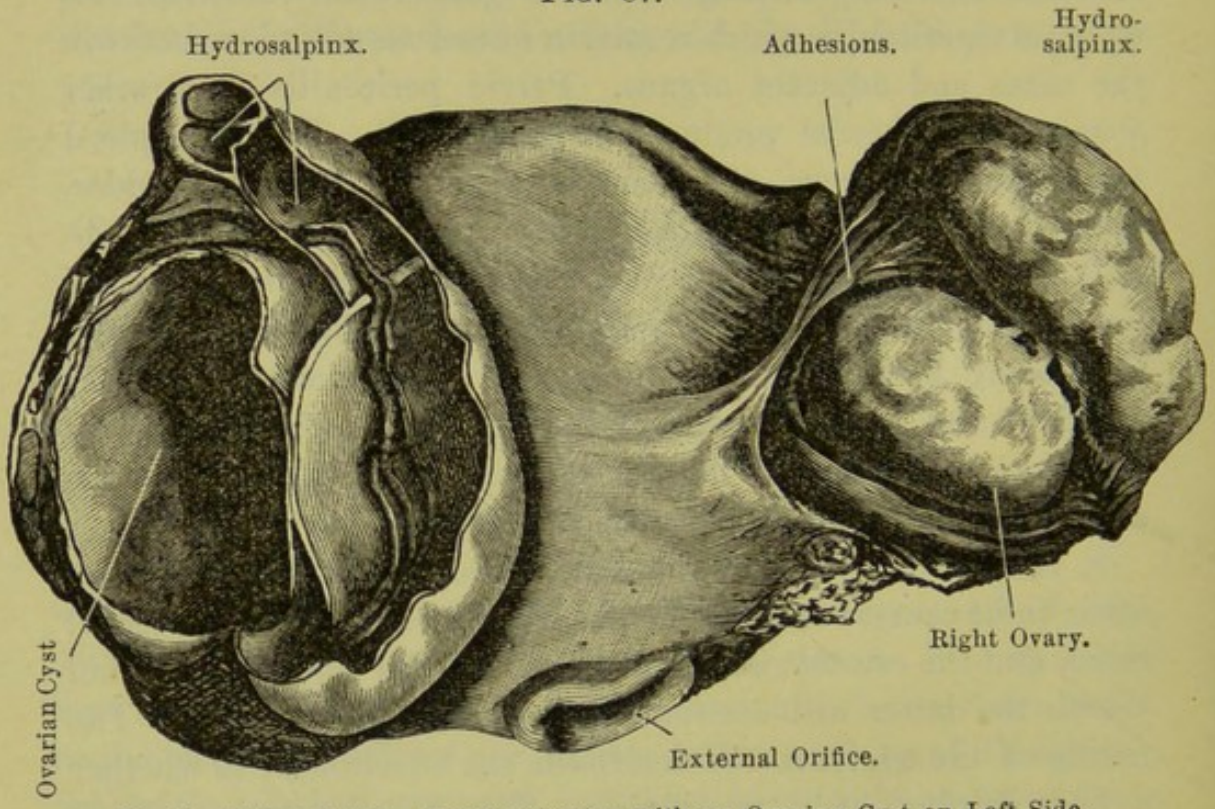
a. Displacement, hernia and angulation of the tubes are generally produced by the neighboring organs, such as the ovary, uterus, peritoneum, intestines or the omentum; but in all these cases the primary cause exists within the tube, in that disease of its walls, especially salpingitis due to gonorrhœal infection, sets up a pelviperitonitis which results in numerous adhesions between the tubes and adjacent organs. Pelvic peritonitis from other sources may likewise produce the same effect. For example, I have seen numerous adhesions between the uterus, bladder, rectum and other organs, caused by a peritonitis which probably originally proceeded from the uterus. There was also very great dislocation of one ovary from omental adhesions, the right tube being **S**-shaped, and elongated to 11 centimeters (4½ in.) and adherent to the fundus of the uterus and the ovary. In such a case the tube is impermeable at the angle, and the remainder of the canal becomes much narrowed.

b. Acquired closure of the tube, *atresia tubæ acquisita*, may occur in its course or at either end. If the atresia is in the external third, and the mucous membrane is catarrhal and the secretion viscid, the latter will accumulate and distend the tube. The nature of the contents will determine the affection, as to whether a hydrosalpinx or a pyosalpinx. The broad elastic portion will first become dilated, the right tube being shown in Fig. 87, and the median portion swelling later, under stronger pressure. The distention may be quite marked, and be in size from that of an apple to a child's head, and even larger. The form of the tube is much changed, as shown in Fig. 87. If the distention is partial, it appears widened at one point, the remainder being normal or nearly so. In other cases it is much bent, convoluted, some portions being thinned, and others hypertrophied. When the distention is great, the mucous membrane is perfectly smooth, has lost its epithelium and looks like a serous membrane;

when small, there are slight mucous folds. The muscular fasciculi are pressed apart, and the walls may become as thin as paper (Fig. 87, left side).

Klob and Thomas have seen hydrosalpinx as large as a child's head. Peaslee punctured the tube twice and evacuated 9 kilos (22½ pounds) of contents. The fluid is either serous, mucous or granular, and may contain plates of cholesterin. If it continues to accumulate, rupture of the sac may occur. If the wall gives way internally, a dropsy of the tube, *hydrops tubæ profluens*,

FIG. 87.



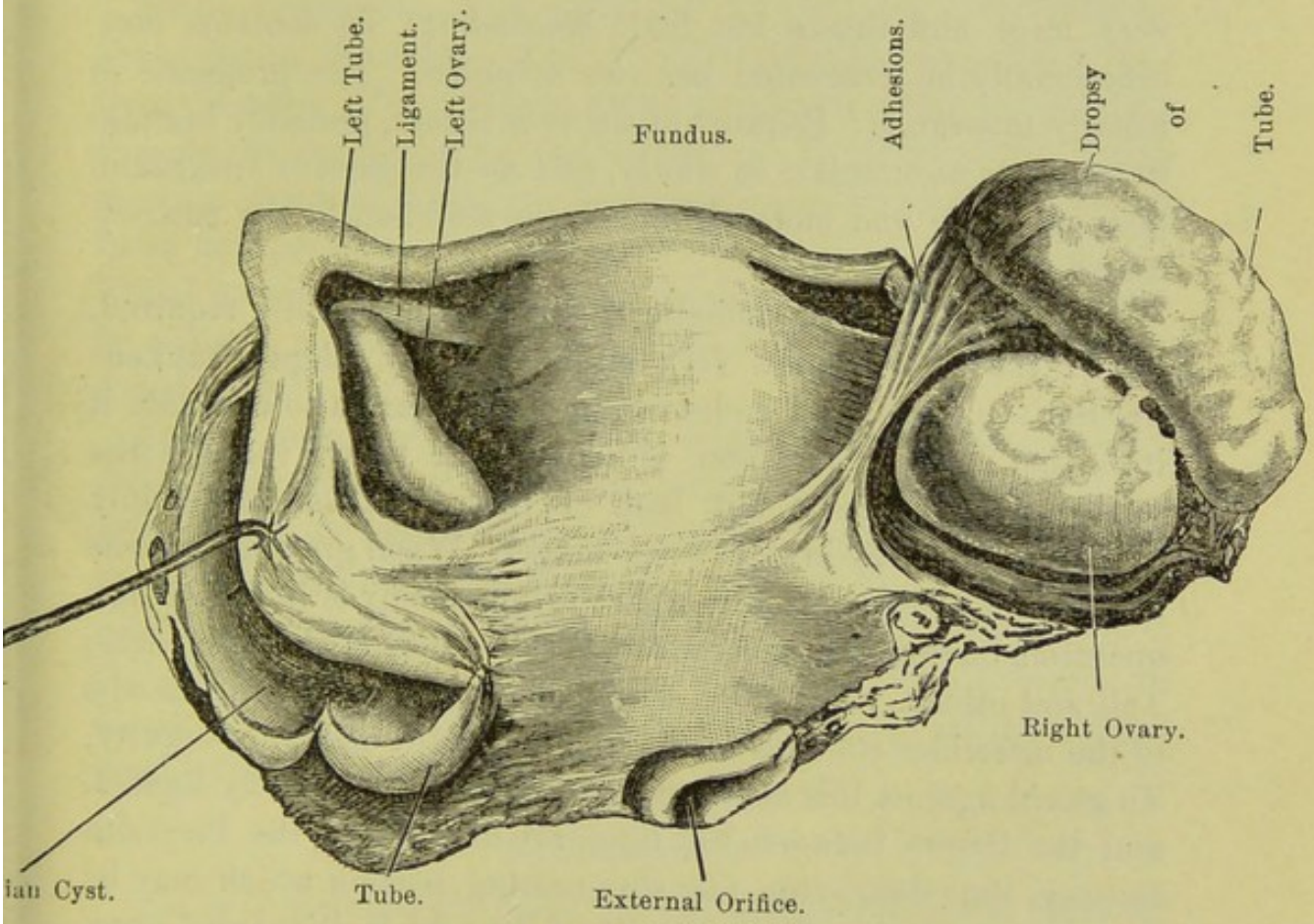
Double Hydrosalpinx. Communication with an Ovarian Cyst on Left Side.

may arise, as asserted by de Haën and J. P. Frank, and demonstrated on the dead subject by Rokitansky, Klob and Scanzoni. If the ovary be enlarged and diseased, a communication may arise between it and the hydrosalpinx, as shown in Figs. 87 and 88.

Diagnosis.—It would be possible to diagnosticate tubal dropsy during life if one could palpate the ovary on the corresponding side, if the latter were not connected with the tumor, and if a mucous or granular fluid could be evacuated by puncture; the latter would be necessary to exclude par-

ovarian cyst. Often the compartments of the sac can be distinctly felt, this being sufficient to warrant a diagnosis. I recognized a hematosalpinx in this way, and K. Schroeder a hydrosalpinx. The fluid evacuated by puncture performed through the vagina must be examined for ciliated epithelium, hyaline substance (paraglobulin) and pigment. The clear, thin fluid of most cases of tubal dropsy differs, in its yellow

FIG. 88.



Double Hydrosalpinx with Broad Adhesions.

color and large quantity of albumin, from the contents of parovarian and echinococcus cysts. It may also contain some blood.

The **symptoms** of dilatation of the tube will be considered here only in relation to hydrosalpinx. As the latter rarely becomes very large, the symptoms result from the condition to which it owes its origin rather than from its size and the pressure it causes. The chief symptoms of many of these affections are those of pelviperitonitis. In tubal dropsy each periodical evacuation

is preceded by violent pain which afterward subsides. As both tubes are usually affected the patient is sterile; this is also not rarely true when the affection is unilateral, for the other tube is either bent, fixed by adhesions or is catarrhal. We know but little of the menstrual disorders dependent upon this condition. When there is a history of gonorrhœal infection, the symptoms are dependent quite as much upon the disease of the uterine mucous membrane as upon that of the tube.

Prognosis.—Hydrosalpinx grows slowly, rarely becomes very large and causes but little discomfort; its contents may occasionally be evacuated *per vias naturales.* The prognosis is usually favorable. Rupture of the tube is rare, probably because its contents accumulate so slowly, and as the mucous membrane becomes more and more atrophied, the secretion finally entirely ceases.

Treatment.—Symptomatic treatment is generally required, but if the tumor grows very large, one may adopt Franken-haeuser's method, and endeavor by manipulation to evacuate it into the uterus. Simpson punctured the tumor through the vagina in eight cases, but both of these methods are simply palliative, and may involve some danger. When grave symptoms are present in large tumors, laparo-salpingotomy is indicated, the operation having been successfully performed by Hegar, Chapman, Tait and others. The chief source of danger lies in the escape of the infectious contents of the tumor into the abdominal cavity. To guard against this accident, the tube must be doubly ligated, and the tissues between the ligatures divided by the Paquelin cautery, thus destroying any suppurating portion which may be therein contained. When dropsy of the tube is discovered upon the side of the healthy ovary during an ovariotomy, the fluid must be evacuated outside of the abdominal cavity, if possible, or, as performed by Wallace, the tube must be catheterized, its contents evacuated, and an opening made at its outer extremity, so that the mucous membrane may be united to the peritoneum to prevent future occlusion. This method should always be adopted when the operation is performed upon young women or virgins, for it is a matter of much importance that they do not remain permanently sterile. In cases of bilateral tubal dropsy in hith-

erto sterile women, the question arises whether it would not be better to make the tubes permeable rather than to extirpate them. When the atresia has resulted from gonorrhœal infection, this operation would be attended with considerable danger, but when the contents are not infectious, an attempt would be advisable, as perimetritis due to escape of this kind of fluid from the ostia might be aborted, and permanent sterility thereby prevented.

c. Hemorrhage into and from the Tubes.

Small ecchymotic points are found in the tubal mucous membrane during the course of the various exanthematous and infectious diseases. They also frequently occur in patients suffering from burns and in cases of poisoning, *e. g.*, by phosphorus. I have recently observed a dilated tube containing reddish-brown blood in an autopsy upon a woman burnt by the explosion of coal oil. Tubal hemorrhages also occur in cardiac and renal diseases and in chronic pulmonary affections, but they seldom acquire any significance.

During menstruation or when there is much inflammatory swelling, considerable blood may escape from the ruptured tubal vessels through the fimbriated extremity, so that a retro-uterine hematocele results, as in Johnson's case. If this blood contains infectious material, a diffuse peritonitis might be developed. Sudden rupture of the tube accompanied by extravasation of blood into the peritoneum is usually the result of hematosalpinx or of extra-uterine pregnancy.

*Hematosalpinx.**

An accumulation of blood in the tube, even when large in amount, will remain there if it is coagulated, though the tube be permeable, the numerous folds in the mucous membrane causing its retention. It does not usually coagulate, but remains as a thin fluid which distends the tube, the free extremity being closed.

Blood has also been found in the tubal pouches, the lining membrane of which communicated with the surface of the ovary;

* *Vide* Fig. 83, p. 468.

here the blood may have been derived from the latter organ, just as ovarian cysts sometimes discharge their contents through the adherent tubes, into the uterus and vagina. Again, cases have been reported in which there was a free communication between the utero-vaginal canal and the tube; the former being closed by atresia, the blood would most likely flow from the uterus into the dilated tube. In the majority of cases of this affection there exists no such communication, and the blood comes from the mucous membrane of the tube. In Kiwisch's case there was an accumulation of blood in a rudimentary tube with total absence of the uterus; here, again, as in the cases of Johnson and others, the mucous membrane must have been the sole source of the blood. Many authorities, among them being Bandl, maintain that blood escapes from the tubal mucous membrane and, the inner end of the tube being patulous, is discharged into the uterus during every normal menstruation; when this opening is narrowed, retention of the fluid must result.

As the distention of the tube gradually increases, its walls become eccentrically hypertrophied; with yet greater distention some parts become very thin and, its inner surface resembling that of a glandular ovarian cyst, it may finally rupture into the peritoneal cavity, thus causing sudden death. The size of the sac is variable, and also its form and position; it may attain the size of an apple or of a large fist. The tube usually becomes adherent to the adjacent tissues, and the rupture is not the result of simply thinning of the wall, but usually of its simultaneous fatty degeneration or ulceration; or it may be ruptured by traction during the evacuation of a coexisting hematocolpos or hematometra. The ulcerative process may lead to adhesions and subsequent evacuation into neighboring organs.

The position of the hematosalpinx depends upon the size of the hematometra and upon existing adhesions; small collections will lie by the side of or behind the uterus, and large ones above it. In my own case just described, the tumor consisted of the tube of the right side, dilated to the size of the fist; it lay to the right side and above the uterus, and extended to near the umbilicus. The form of the tumor is similar in every respect to hydrosalpinx. The non-coagulability of the blood is due to its retention in the closed

tube and to its admixture with the mucous secretion. The dark-brown tarry color and consistence result from absorption of a portion of its fluid constituents. It remains a debatable question as to whether a cure of hematosalpinx will occur from discharge of the tubal contents into the uterine cavity, with subsequent emptying of the hematometra. I do not know of any such case having been reported, but the possibility of this event cannot be doubted from the not rare dilatation of the tubo-uterine canals. In cases of retro-uterine hematocele, the uterus may have a discharge, lasting for months, and an examination will show its source to be the hematocele.

The **symptoms** of hematosalpinx are very similar to those of hydrosalpinx, differing only in that the exacerbations of the affection from recurring menstruations are more regular. As it generally occurs in connection with hematometra, its symptoms are insignificant compared with those caused by the latter, and are usually isolated only after the hematometra has been evacuated. Hematosalpinx ruptures more frequently than hydrosalpinx, on account of the more rapid accumulation of the contents of the sac.

It can be diagnosticated with certainty only when associated with hematocolpos and hematometra. But that even in such cases difficulty may exist is demonstrated by the case of Bandl, in which there was a hematometra in the left horn of a uterus bicornis, and the left tube, as large as a goose egg, lying in the left iliac fossa was not recognized, probably because on account of the sensitiveness the examination was not made carefully enough, and the existence of the tumor was not suspected. Percussion should be employed to ascertain the border-line of dullness, for repeated or too forcible palpation may cause rupture. An irregular, lateral tumor is probably hematosalpinx. A distended uterine horn is nearer the median line, and is more or less crescent-shaped.

Treatment.*—When possible operative measures are to be avoided. Evacuation by abdominal puncture is, in many respects, dangerous; this must also be said as to puncture through

* For treatment of Hematocolpos and Hematometra, see pp. 94 and 469.

the vagina, for the tumor is usually fixed above the true pelvis. Laparotomy would be indicated when recovery did not follow the operative cure of hematometra if rupture seemed imminent. Laparo-salpingotomy might not be too late, even though perforation had already occurred.

CHAPTER III.

NEOPLASMS OF THE FALLOPIAN TUBES.

The structure of the uterine and tubal walls being similar, all tumors which affect the uterus may be found in the tubes, affections of the uterine glands being excepted. Neoplasms of the tubes are much rarer and also usually much smaller than those of the uterus. Again, they are usually secondary, primary being extremely rare. It is a remarkable fact that, at the fimbriæ of the tubes from which the epithelium passes directly to that of the ovaries or of the peritoneum, where therefore proliferations of a pathological character might be readily expected, neoplasms of any kind are most rare.

a. Tubal cysts are found in the peritoneum, in the muscular coat, and in the mucous membrane. They are most common in the first, and appear as small vesicles the size of a poppy seed and larger. The hydatid of Morgagni has been described (see page 492). The small peritoneal cysts contain a clear serum or a thick colloid fluid, and occasionally form a pedicle. Rokitansky found they had a delicate capsule of fibrillated connective tissue. The cysts of the muscular tissue are seldom larger than those of the peritoneum, and probably result from slight extravasations of blood. In the mucous membrane numbers of small vesicles are found in the ampulla, usually; more rarely in the isthmus. Kiwisch found submucous cysts, the size being from a pea to that of a walnut; I have found them, in about 4 per cent. of my autopsies, from the size of a bean to that of a hazel nut.

In general these growths have but little importance, for they

never attain great size. They may rupture and cause a varying amount of perimetritis, as may happen in Morgagni's hydatids.

b. Fibromata or myomata of the tube seldom become large; there are generally several, and they vary in size; I have seen them as large as a pea, Rokitansky as large as a bean, and Simpson reports one the size of a child's head.

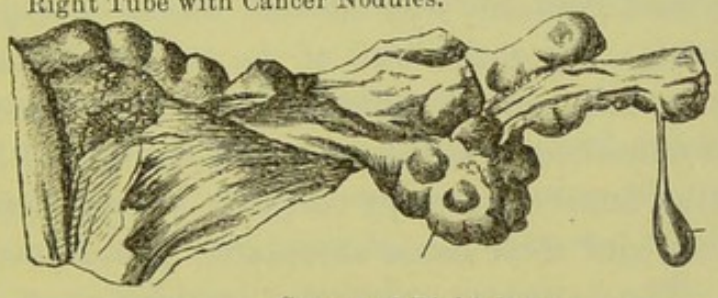
Their structure corresponds to that of uterine myomata, in the presence of smooth muscular fibres and connective tissue, though the latter appears to preponderate. The majority are subserous, and hence may sometimes form a pedicle. Intra-parietal tumors may also occur.

Henning has reported cases of papillary tumor of the tubal mucous membrane.*

c. Rokitansky saw a lipomata the size of a bean to a walnut

FIG. 89.

Right Tube with Cancer Nodules.



End of Tube.

Cancer of Right Ovary.

on the lower border of the tube in a woman 47 years old. Lipomata have no practical significance because of their small size. We will hereafter refer to the much larger tumors of the broad ligament.

d. Cancer of the tubes Kiwisch found in 73 cases, 18 times with cancer of the uterus. Secondary involvement is therefore infrequent, and this is probably due to the fact that the lower portion of the uterus is commonly affected. The tubes rarely become affected in cancer of Douglas's cul-de-sac. I found isolated cancerous nodules in the tubes in a case of medullary cancer of the uterine fundus and ovarian carcinoma (Fig. 89). Scanzoni reports a case of primary cancer of the tube, but the

* *Loc. cit.*, p. 73.

author believes it to have really been secondary. A carcinomatous tube may rupture, causing fatal peritonitis, as in Dittrich's case. Such affections are usually discovered post-mortem. As they are commonly secondary and associated with coexisting disease of other organs, no especial treatment will be repeated.

CHAPTER IV.

INFLAMMATIONS AND TUBERCULOSIS OF THE TUBES.

a. Catarrh and purulent inflammation of the tubes may be acute or chronic, and, as a rule, appears simultaneously on both sides. The mucous membrane of the fimbriæ is reddened and swollen, and presents elevations having a sago-like appearance. The secretion, which is abnormally abundant, is at first clear, neutral or acid and contains hyaline and mucus, but gradually becomes purulent. The entire wall of the tube is thickened and curved; the extremity chiefly affected becomes adherent, perisalpingitis and adhesions to adjacent organs ensue, and the accumulated secretion finally causes pyosalpinx. Constrictions form at various points, and these cause sacculated pyosalpinx, *pyosalpinx saccata.* The mucous membrane is thick, and contains polypoid villi; the epithelium is swollen, sometimes flattened, and its ciliæ often absent. Continued pressure causes atrophy of the mucous and muscular tissues, and perforation of the wall from ulceration may follow, as shown in cases of puerperal salpingitis by Ed. Martin and Förster. When there is no atresia of the fimbriated extremity, the pus may be discharged into the abdominal cavity; in either case, pelviperitonitis is the consequence of the evacuation.

Ætiology.—Tubal catarrh occurs most frequently about the age of puberty and during the child-bearing period. It is very seldom primary, but usually secondary to analogous affections of the uterus. Its most frequent causes are gonorrhœal and puerperal infection, though it may occur, however, with myomata, carcinomata, displacements, ovarian disease and exanthematous and other infectious diseases, such as cholera and typhoid fever.

The menstrual colic of many prostitutes is solely due to salpingitis, and the same complaint in young married women may be attributed to sexual excess during wedding tours and to imprudence during menstruation—dancing, riding. In parturient women it may be either primary or secondary. In isolated cases, an example of which recently came under my notice, the fimbriæ may be swollen, œdematous and of a cherry-red color, while the inflammation does not extend to the canal proper, and the lumen is neither dilated nor does it contain any abnormal material.

The **symptoms** of tubal catarrh are menstrual colic and the manifestations of pelviperitonitis, which will subsequently be more carefully discussed.

The terminations may be recovery, thickening of the pus to a caseous condition, perforation into the rectum (Andral), or the abdominal cavity (Förster, Ed. Martin, Burnier, Cerné and Janeway), or hemorrhage (Chase). Sterility always follows when the case ends in recovery.

The **prognosis** is very uncertain.

Treatment.—If there are adhesions and atresia at the outer extremity while the uterine ostium remains permeable, washing out the tubes might be tried for the removal of the fluid. The use of the sound, as in tubular dropsy, to effect drainage of the stenosed tubes has been proposed. In one case only* was it possible, as proved by post-mortem examination, to easily reach the cavity of the tube; in this patient the presence of an ovarian tumor had enlarged the cavity of the uterus, which allowed of ready access to the distended and dilated tube. All other authors, as Albert, Hennig, Wagner, never succeeded in the dead body in sounding from the uterus the tube in normal conditions, and the views of Veit, Duncan, Hildebrandt and C. von Braun, that upon the living woman they sounded the tube is not proved. Furthermore, it has been shown that the wall of the uterus, just after delivery or during an extrauterine pregnancy, may easily be perforated by the sound as no febrile symptoms follow, and this could very likely have been mistaken for

* Bischoff's case, Bandl, *loc. cit.*, p. 25.

sounding the tube. Against sounding the tube in case of catarrh is the danger of perforation, and thence a fatal peritonitis. When a fluctuating tumor is found, the contents of which appear to be purulent, judging by the fever, hypersensitiveness and redness of the skin, an exploratory puncture is indicated, to be followed by a free incision and evacuation through the abdominal walls, vagina or rectum; the cure will be hastened by thorough disinfection of the cavity. Hegar* performed the first laparotomy for pyosalpinx. When this disease attacks both tubes, laparo-salpingotomy was performed by Lawson Tait, and this operation has supplanted all other methods of treatment. Recently, many favorable results from its performance have been reported by Lédiard, F. A. Martin, Saenger, Tait, Thomas, Wallace and others.

b. Tuberculosis of the Tubes.—Since it has become known that tuberculosis is caused by a specific bacillus, and is only a local tubercle-formative inflammation, we no longer include this affection with the neoplasms. The bacillus has been demonstrated by Maier in the cases of tuberculosis of the tubes reported by Wiedow. Primary tuberculosis of the tube is rare. When thus affected, the tube is usually no more in a horizontal position, but drawn down by the side of the uterus, as shown in Fig. 90, and attached to it by pseudo-membrane. It is generally much thicker than normal, and as distention is hindered by the broad ligament, it becomes convex and shows sinuous dilatations, as in Fig. 90. Both ostia are usually closed, more rarely the outer one open, or the inner one pervious. The tube is dilated and filled with caseous material; its walls show evidences of caseous inflammation, the epithelium having disappeared to be replaced by a caseous layer, beneath this follows granulation tissue, which also penetrates the muscular tissue, and is collected in little masses. The muscular layer is often somewhat hypertrophied, the vessels are large and their walls thickened, the hyaline membrane very distinct. The bacilli may be readily demonstrated, in these elevations, by the usual methods of staining.

The tubes are always involved in tuberculosis of the genitals,

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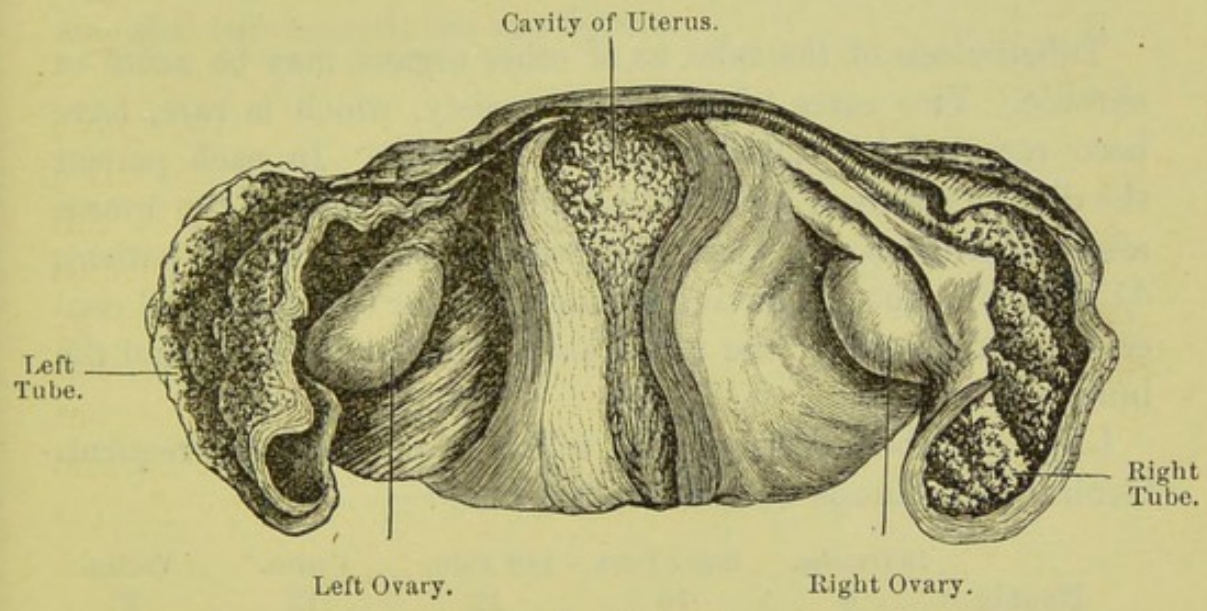
* Wiedow, *loc. cit.*, p. 145.

and in about one-half of all cases they alone are affected; in most cases the affection begins and shows its greatest intensity in them; usually it proceeds from the external ends, in which, also, our preparation shows the severest disease.

With regard to the frequency of genital tuberculosis, I find it present in 1 per cent. of all autopsies; Namias, once in every 8; Kiwisch, in every 40; Puech, in every 50; Louis, in every 66; Cless, in every 70, and A. Courty, in every 100.

One of the most interesting cases I have ever seen is described on pages 409 to 413 of my *Pathologie der Weibl. Sexualorgane*:—

FIG. 90.



Tuberculosis of Both Tubes.

The abdominal incision was already made in a case which had been diagnosticated as an ovarian tumor complicated by pelviperitonitis, when it was agreed not to proceed further with the removal of the new growth for the following reasons: The walls of the tumor were bounded posteriorly by the intestines, which were matted together; by the abdominal parietes in front, and by the internal genitals below. The lining membrane of this cavity and the surface of the bowels were studded with caseated nodules. The right ovary was deeply imbedded in adhesions which were fully separated and the organ isolated; it presented a bulging sac filled with cheesy masses. The wall of the uterus likewise contained these caseous bodies. Both tubes were distorted by rigid, many-angled enlargements containing caseous granulations, and the walls showed tubercular degeneration.

A similarly interesting case was published by Gehle from Czerny's Clinic in Heidelberg.

In his case, too, acting upon the conclusion that the tumor felt per vaginam was a papilloma or a colloid cyst, laparotomy was performed; then, however, the tumor was recognized as a closed sac, separated from the remainder of the abdominal cavity, which possessed a firm wall with membranous deposits and masses of caseous fibrin. As, however, at the fundus of the sac, the posterior wall of which was formed by adherent loops of intestine, there lay an irregular mass of tissue of moderate firmness, with villous processes, which proved to be the much enlarged and thickened right tube, and was removed, the diagnosis was easier than in our case in which at the autopsy the separation of the individual pelvic organs was difficult, and from above impossible.

Tuberculosis of the tube, as of other organs, may be acute or chronic. Two cases of the acute variety, which is rare, have been reported by Rokitansky and Wernich. In each patient the disease involved both tubes, and in Rokitansky's the uterus also. Wernich's case was an interesting one, because the patient, 41 years old, though having amenorrhœa for two years, had conceived and aborted; the tubes were primarily affected and the lungs secondarily.

Chronic tuberculosis of the tubes is much more frequent. Genital tuberculosis was found altogether:—

	In Ovaries.	Right Tube.	Left Tube.	Uterus.	Vagina.
Hennig.....	6	15	12	12	2
Geil.....	–	44	42	35	1

Secondarily, tubal tuberculosis follows uterine tuberculosis, and tuberculosis of the urinary passages.

Diagnosis.—Chiari and Veit were able to palpate the dilated tubes through the vagina and the abdominal walls; Courty, likewise, diagnosticated this condition by bimanual examination. Hegar made the diagnosis in four cases; the tubes were abnormally fixed, adherent to the pelvic wall, uterus and broad ligament, and were beset with a rosary-like mass of firm nodules, from a bead to a walnut in size.

The uterine secretion should be examined for tubercle bacilli. Naturally the entire organism and hereditary predisposition are to be considered.

Treatment.—Tuberculous amenorrhœa and dysmenorrhœa do not require any treatment. Salpingotomy will not often be indicated, even in isolated primary tubal tuberculosis, as it is almost impossible to exclude constitutional involvement. Hegar has published the results of four such operations, but, as three of them were performed in 1885, it cannot be proved that the patients were benefited thereby; and in the patient operated upon in 1883, the apex of the left lung was found infiltrated a year and a quarter later. Moreover, the tube is liable to be lacerated in the operation; the vessels must be secured in the depth of the abdominal cavity, and it is very difficult to remove all affected parts. I do not, therefore, believe that salpingotomy for tubal tuberculosis has any future.

SECTION V.

ANOMALIES AND DISEASES OF THE OVARIES.

CHAPTER I.

The ovaries may (1) be entirely absent; (2) be rudimentary; (3) be deformed by constrictions, and (4) be supernumerary.

a. Absence of One or Both Ovaries.

Absence of one ovary occurs in conjunction with uterus unicornis; absence of both, with total absence of the uterus.* When one side seems to terminate abruptly, either in the normal or malformed uterus, tube and ovary, the ovary of that side which was originally present may have been destroyed by torsion, constriction, and subsequent atrophy. The ovaries may also be found abnormally high in the abdominal cavity, being nourished through adhesions with other organs, and may, indeed, show cystic degeneration, according to Klob. Traces of fœtal constriction will be recognized in the form of pseudo-membranous formations, usually most numerous at the end of the tube belonging to the ovary. The two most interesting cases of this class are those of Rokitansky and Heschl, which have been reported in full by Klob.† Both were examples of fœtal constriction. A case of ovarian displacement due to omental adhesions will be referred to in the following chapter, in which the constriction of the ovary might have occurred in adult life, from the firm fixation of the organ, and the elongation of its pedicle and the corresponding tube.

Morgagni and Cripps have observed absence of the ovaries in connection with a fœtal uterus. Figure 91 is an illustration of unilateral absence of the ovary in primary atrophy of the uterus,

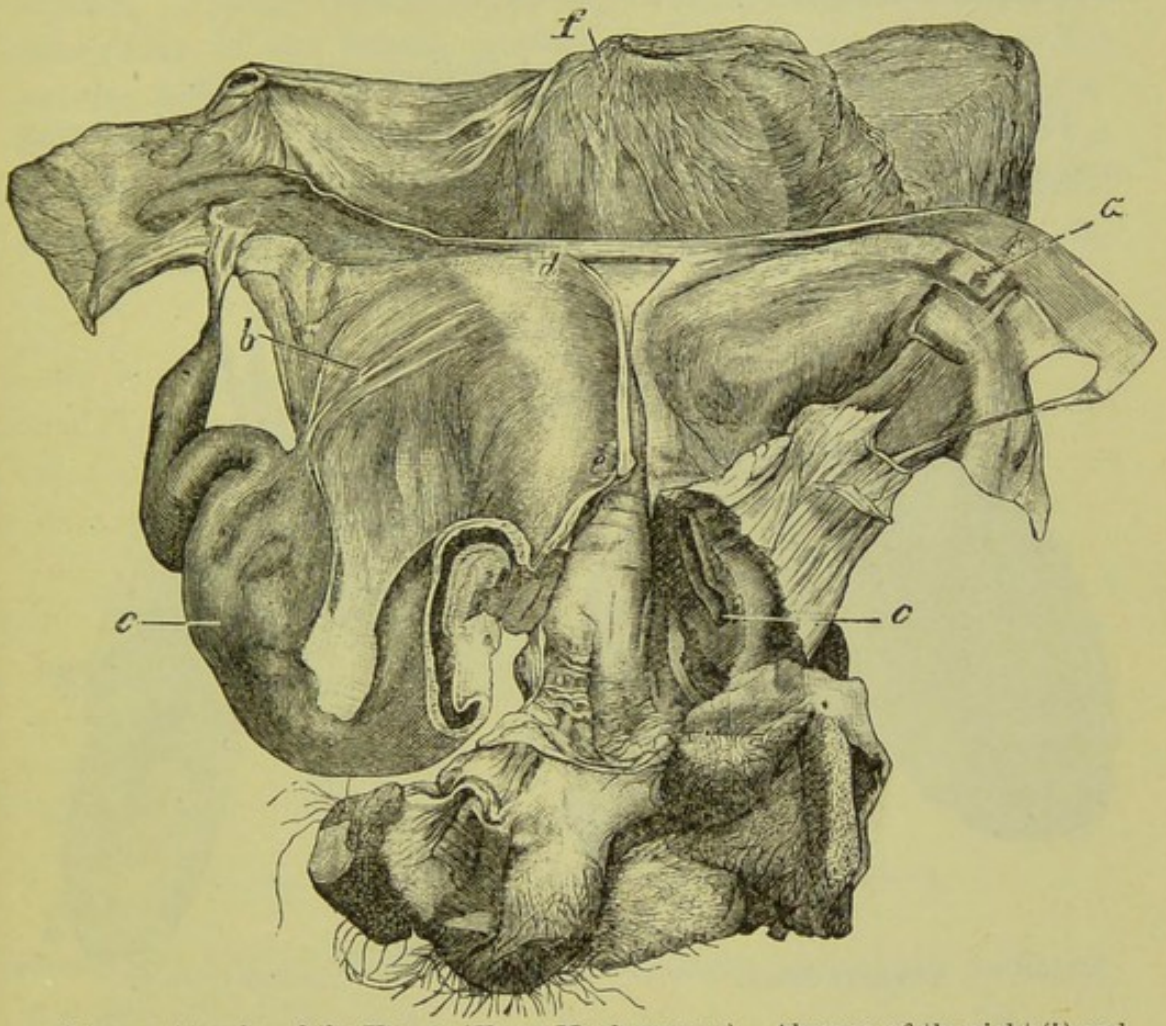
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* *Vide* Section III, Chap. I, Figs. 12 and 13.

† *Loc. cit.*, pp. 328–329.

a condition which has been fully described upon page 230. Here in the place of the right ovary is only a connective tissue adhesion extending to the rectum, and without any trace of ovarian tissue. The preparation was from a girl, fifteen years old, who died from phthisis and extensive glandular suppuration.

Fig. 91.



Primary Atrophy of the Uterus (*Uterus Membranaceus*). Absence of the right (*b*) and atrophy of the left (*a*) ovary. *d*, fundus; *e*, external os; *f*, bladder; *c*, rectum, transversely divided.

b. Rudimentary Development of the Ovary.

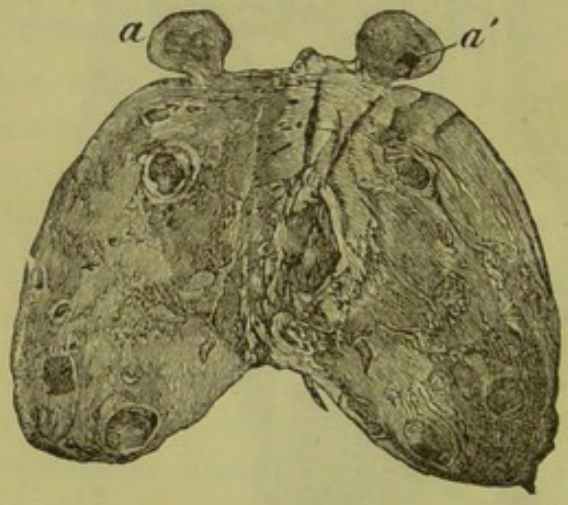
This may consist in complete absence of the Graafian follicles, the ovarian stroma being present; or, in the disappearance, either partial or complete, of the follicles after having once been developed. In the first class, we find the rudimentary ovary flattened, and composed solely of connective tissue with traces of muscular fibres and vessels. Fig. 91, *a*, is the left ovary thus rudimentary. It may be associated with absence of the uterus,

with double uterus, or with fœtal uterus (Lobstein, Lauth, Pearse). In the second class of rudimentary formation, the germs of the follicles are present but have not been developed, as in the ovaries of hermaphrodites, further, in the cases of Eppinger, de Sinéty and Siredey ; in all such cases the ovaries are much smaller than usual, and show only a few remaining normally developed follicles.

c. Accessory and Constricted Portions of the Ovary.

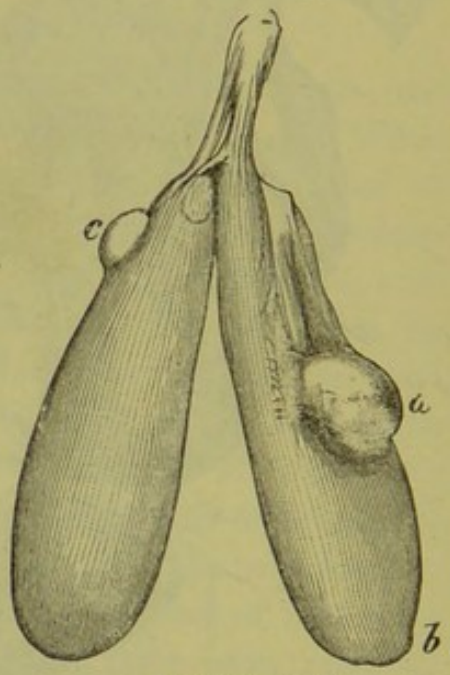
H. Beigel has called attention to an anomaly which he terms accessory ovaries.* He found at the boundary line of the

Fig. 92.



Accessory Ovary.

Fig. 93.



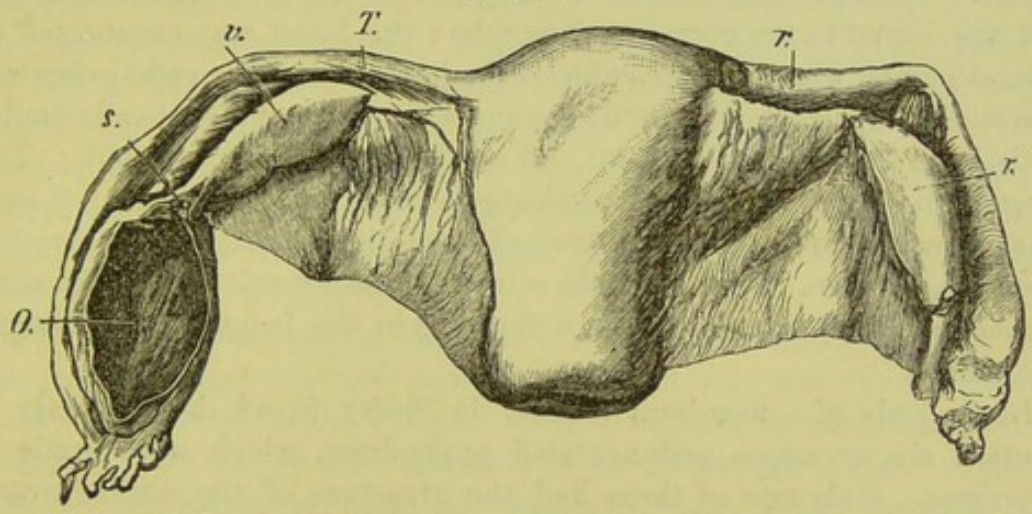
Accessory Ovary.

peritoneum and the ovary small structures which he thought were more frequently considered small fibroids. These were found eight times in the genital organs of 350 female cadavers, always upon that boundary line, measuring in size from a millet-seed to a cherry, 8 millimeters in diameter, generally provided with a slender pedicle, and never more than three on an ovary. Their stroma was of normal ovarian tissue and contained follicles. Fig. 92 shows the inner surface, and Fig. 93 the exterior of such

* *Wiener Med. Wochenschrift*, No. 12, 1877.

an accessory ovary; on one-half the divided ovary is a small accessory ovary attached to its surface by a slender pedicle *a*. At the lower portion of the same half there is a beginning constriction (*b*), as is also seen on the other half near the pedicle of the ovary (*c*). This preparation was taken from a virgin, nineteen years old, who had a uterus planifundalis, containing also the trace of a septum. I found this anomaly eighteen times in five hundred dissections of the female genitals. It may be mistaken for ovarian fibromata, for prominences formed between deep ovulation cicatrices, further for small carcinoma nodules, or for nodules such as are found in *Oöphoritis chronica corticalis senilis*. In Fig. 92, of a section of an accessory ovary, there is to be

Fig. 94.



Cystic Degeneration of a Constricted Portion of the Left Ovary.

seen also a divided follicle, which necessarily would not be found in a fibroma of the ovary.

A case of partial constriction of the left ovary with cystic disease of the constricted portions, I have previously described; it is represented in Fig. 94. The continuity of the sac with the extremity is distinctly shown (*s.*), and sections of vessels can be seen near the ovary. This pedicle of the cyst distinctly differentiates it from any parovarian cyst, or cyst of the Wolffian body or broad ligament. The case, therefore, represents at the same time a neoplasm and an anomaly of development. The right ovary is single (*r.*), and the left double or divided (*v.*, *o.*), the outer half forming a cyst. Nothing could be

found which would indicate that the constriction had resulted from peritonitis.

I have inserted all the cases which have been reported up to the present time:—

In the cadaver of a woman, 40 years of age, examined by Grohe, in 1863,* the following condition was found to exist. The right ovary was the larger in size: two smaller ones occupied the other side, of which that nearest the uterus was connected with it by an ovarian ligament, while the more distant one was contained in a fold of the peritoneum. All three ovaries exercised their function, and the woman had borne three children. The reporter stated his belief that the anomaly was due to a separation of the left ovary at an early date of life, or, perhaps, to the formation of a fissure during the period of development.

The case reported by Klebs† was that of a married woman who was sterile. The left ovary had been changed into a sac as large as an apple, and was united to the corresponding tube; the latter was constricted at several points, whereby tumors had been developed. The right ovary was represented by two smaller bodies, connected by a whitish band, similar in tissue to the ovarian ligament, 1.5 centimeters ($\frac{3}{5}$ in.) in length. The outer right ovary had undergone change similar to that of the left one, being a multilocular cyst; it contained beneath its albugineous covering numerous corpora fibrosa. Klebs attributed the constrictions to the same causes that produce such great differences in the length of the ovarian ligaments.

In the body of a new-born female, de Sinéty found the one ovary to contain six or seven pedunculated appendices, which were cystic in character. Only one of them had the structure of the normal ovary, with follicles and ovules.

A woman, aged 36 years, was operated upon by Olshausen for a large multilocular tumor, resembling an ovarian cyst, which he extirpated. It was then discovered to consist of both ovaries, encapsuled by a thick layer of connective tissue; its pedicle was as thick as the thumb, and lay upon the posterior wall of the uterus, though without affecting the structure or shape of this organ. Olshausen believed that, as the tumor presented a similar structure to that of an ovarian cyst, and as its uniformly thin outer wall was firmly united to the uterus only, there was no doubt but that constriction of part of the left ovary had occurred through peritonitis, of which traces could be seen upon the other ovary.

Having had occasion to perform ovariotomy twice upon the same

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* *Monatsschrift für Geburtskunde*, Berlin, XXIII, p. 67.

† *Monatsschrift für Geburtskunde*, XXIII, p. 405.

patient,* I found two cysts at the first operation, and took out another at the second. The left ovary was disorganized, and entirely removed at the primary operation, while only a portion of the right one was found to be cystic and therefore excised. The more recent cyst had been developed from the constricted outer portion of this ovary.

A triple ovariotomy was likewise performed by N. Winkler.† He found a double cyst upon the one side, due to a constricted double ovary.

The occurrence of pregnancy after a double ovariotomy was observed by Hoëgh.‡ In this patient, the anatomical conditions must have been quite similar to those just described, or a portion of an ovary must have been overlooked and allowed to remain at the operation ; or, there were actually three ovaries (as in a case of my own, of which an illustration will be given later), each of these ovaries having been separate bodies and distinct in origin.

Another interesting case is that of Kocks,§ in which he simultaneously extirpated three ovaries, the locations of which were peculiar, differing from any previously reported. He found the third ovary in question in the left broad ligament, containing a recently collapsed follicle and a corpus luteum in the vicinity of the latter. The patient was thirty-nine years of age, and had carcinoma of the cervix, for which the uterus was extirpated. It is well to remember the possibility in this case of constriction of the intraligamentous third ovary, that a partially intraligamentous cyst might be developed.

The case of Mangiagalli‖ was that of a fœtus delivered by craniotomy. The supernumerary ovary lay between the right ovary and the uterus, and was almost as large as the normal ovary, containing the same histological tissues. There was no other anomaly of the genital apparatus. Neither from the illustration nor from the descriptive text of the report of the case was it possible to understand the relation of the ovary to the broad ligament.

In all the cases hitherto reported, with one exception (Grohe's case), the so-called accessory ovary was situated near the normal one, either behind it or in the broad ligament.

d. Supernumerary Ovaries.

The only well-authenticated case of this kind hitherto observed is the one reported by the author. It differs from all

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* *Vide* "Path. d. Weib. Sex. Org.," p. 365.

† *Archiv f. Gynäk.*, XIII, p. 277.

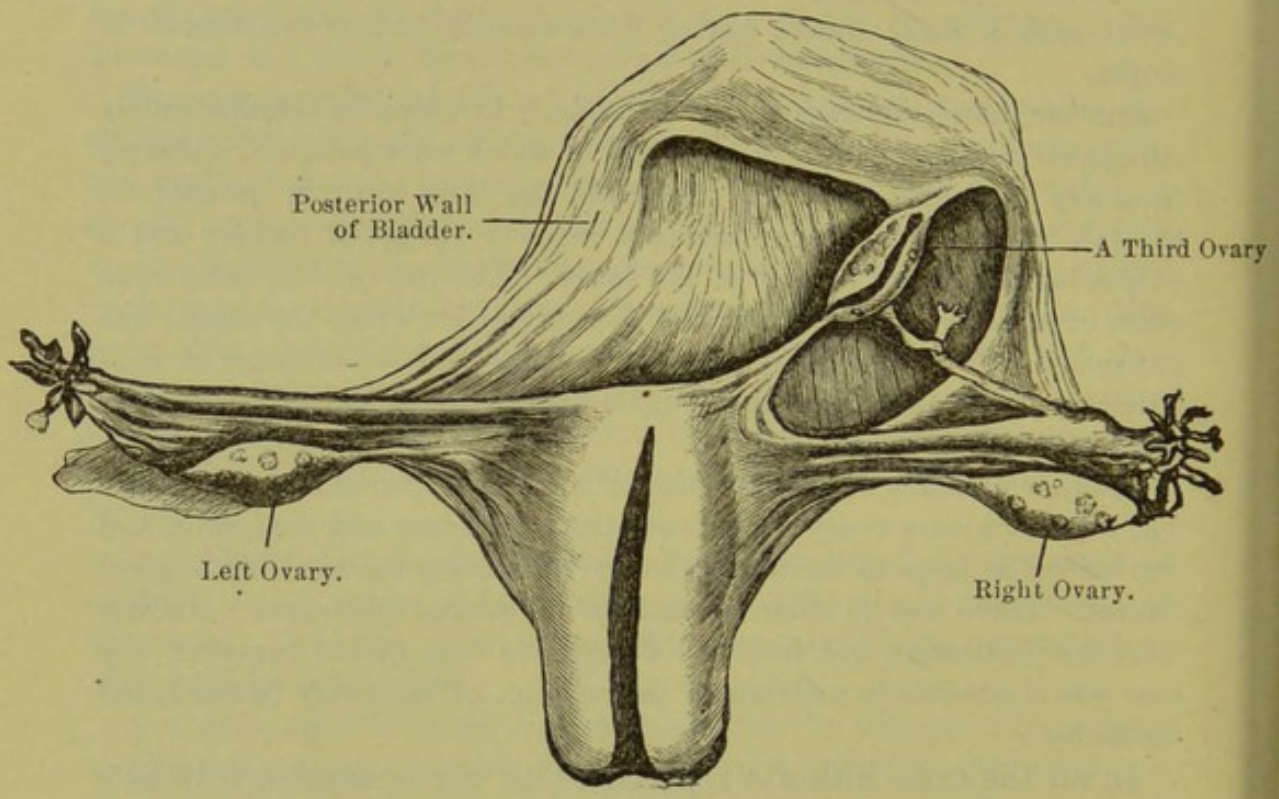
‡ *Centralbl. für Gynäkologie*, III, 378.

§ *Archiv*, XIII, p. 469.

‖ Mailand ; ref. *Gynäk. Centralbl.*, 1880, p. 91.

others in that the third ovary was not situated behind the uterus or near either normal ovary, but in front of the uterus. Furthermore, the third ovary was connected with the anterior portion of the fundus of the uterus by a strong ovarian ligament, 17 millimeters ($\frac{2}{3}$ in.) in length, which began about 1 centimeter ($\frac{2}{5}$ in.) anteriorly to the insertion of the tube and near that of the round ligament. Again, the two normal ovaries were of the same size, though the ligaments were of unequal size, the one

FIG. 95.



Two Normal Ovaries in the Normal Position, and a Third situated in Front of the Uterus.

measuring 2.7 centimeters (1 in.) and the other 4.7 centimeters (1.8 in) in length. There was not the slightest trace of peritonitis near these two ovaries. Finally, the third and largest ovary, also free from signs of peritonitis, was connected with the posterior wall of the bladder by a broad triangular fold. The preparation was taken from a woman, 77 years old, who died from cirrhosis of the liver and ascites; she was sterile, although having three ovaries. The posterior wall of the

uterus contained a small calcified myoma, but there were no other anomalies of the genital organs. The bladder was very large and relaxed, its walls thin, and posteriorly there was a diverticulum at that part where the triangular fold was inserted. From the middle of the lower and outer edge of this ovary there passed to the fimbriated extremity of the right tube a strand, 6 centimeters (2.3 in.) in length, and 1 centimeter ($\frac{2}{5}$ in.) from this ovary a small nodule hung from the strand. This body was fimbriated and seemed to be united to the strand by a true nodule. The explanation of a constriction of the third ovary is obviously not applicable to this case; first, because there was no trace of peritonitis; again, because the three ovaries were separated from each other by the uterus and the broad ligaments; because of the presence of the third ovarian ligament, and finally, because the two normal ovaries were of the same size and corresponded to the age of the patient, while the third ovary was about twice the normal size.

In this case the rudiments of three distinct ovaries must be presupposed, and I would view the seat of the supernumerary third rudiment, the development of the third anterior ovary, in accordance with the investigations of E. van Beneden, as having proceeded from that portion of the intestinal layer which formed the original blind extremity of the rectum, the allantois. In this way the close relation with the bladder and the resulting diverticulum are best explained.

The significance of the anomalies considered under *c* and *d* is thus at once apparent. As Klebs's case and my own demonstrate, it is possible to extirpate two isolated ovarian tumors and then afterward find the patient suffering from another cyst. The case reported by Hoëgh teaches that a patient is by no means always castrated when two ovaries have been removed. Again, our fourth case shows that in the differential diagnosis of tumors found between the bladder and uterus a supernumerary ovary should not be forgotten. It might also be confounded with tumors of the posterior vesical wall or of the anterior wall of the uterus.

Finally, remembering the possibility of dislocation of one

ovary over the broad ligament, and its adherence to the bladder,* we again emphasize the fact that our case could have been due to no such accident, for the normally situated ovaries were nowhere adherent in the specimen, and all traces of peritonitis were wanting. The presence of follicles admits the possibility of cystic degeneration and perforation through the bladder. Our case is thus, in every respect, unlike any one heretofore described.

CHAPTER II.

DISPLACEMENTS OF THE OVARIES.

The ovaries like the uterus may be displaced in almost every direction or may protrude into almost any of the hernial sacs. We may have, therefore, descent and elevation of the ovary, dislocation to the right and to the left or toward the anterior or posterior wall of the pelvis; we further meet with inguinal, crural, ischiatic, obturator and umbilical ovarian hernia.

Ætiology.—These dislocations presuppose a certain elasticity of the infundibulo-pelvic ligament, and in many cases, also, a certain lengthening of the corresponding ovarian ligament. For example, when the ovarian ligaments are unequal, that ovary will be more easily displaced which has the longer ligament.

A large proportion of ovarian dislocations are congenital, notably inguinal ovarian hernia, from the formation during intrauterine life of a vaginal process of the peritoneum, a condition analogous to descent of the testicles results. Usually, only the tube accompanies the ovary, but the intestine, omentum or uterus may also be dislocated. In 33 per cent. of all cases such a hernia is bilateral. Puech found 54 congenital cases in a total of 78.† It may also be acquired, in which case it is usually secondary, and a consequence of displacement of a neighboring organ. The most common dislocation of this variety is, perhaps, descent of the ovaries with retroversion and

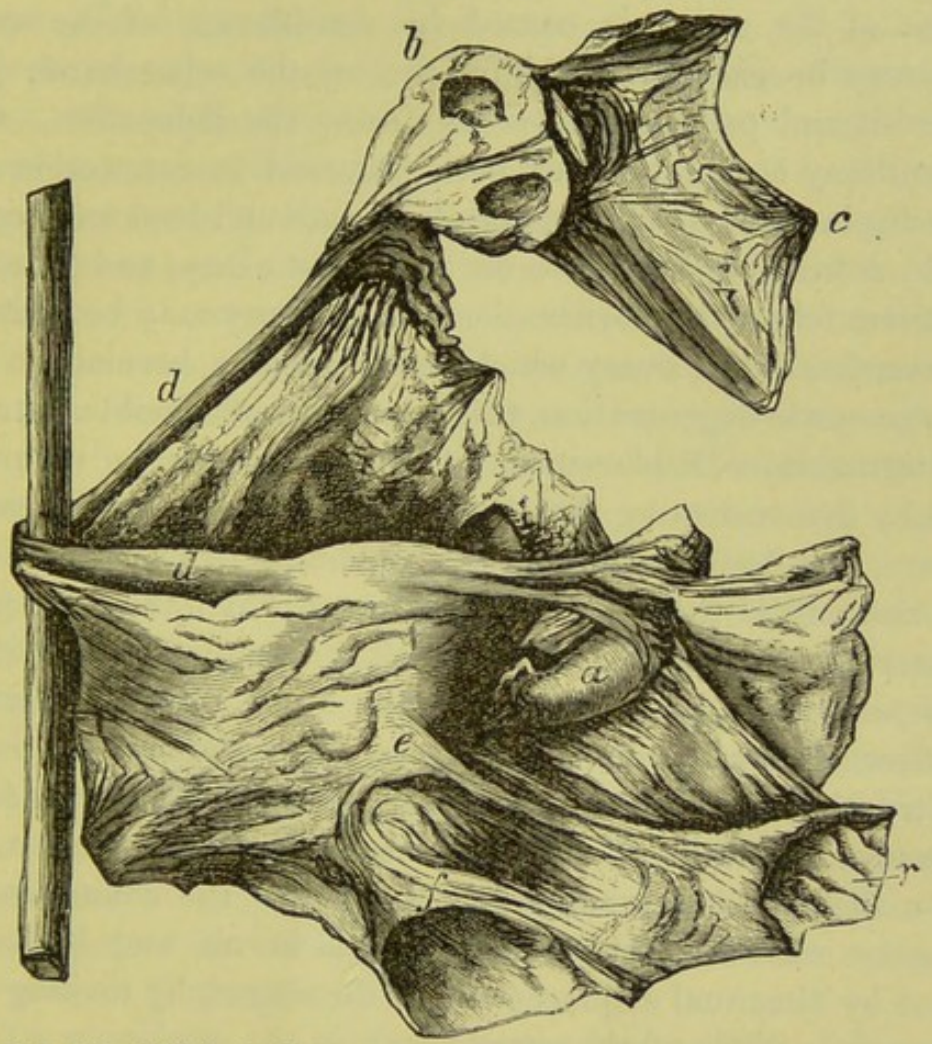
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* *Vide* Perforations of Dermoid Cysts into the Bladder, "Path. d. Weib. Sex. Org.," pp. 326–330, plates VI and VI *a*.

† *Annales de Gynécol.*, Nov., 1878.

retroflexion of the uterus, one or both organs being found under the displaced uterus (see p. 315). Moreover, displacements and distortion of the intestines or bladder, enlargement of the ovaries and adhesions between them and neighboring organs, perimetritis, parametritis, peritonitis, undue pressure from above, falls, blows and violent concussions may aid in causing displace-

FIG. 96.



Dislocation of the Left (incised) Ovary (*b*) and the Left Tube (*d*, *d*) from Omental Adhesions to the Ovary (*c*). Other Peritoneal Adhesions (*e*) of Posterior Wall.

ment of the ovaries. I have described a case of ovario-vaginal hernia in a hernia of the posterior labium (see p. 26), and the specimen illustrated in Fig. 96, belongs to this class. The dislocation was due to omental adhesions. Dermoid cysts of the ovary may become adherent to the walls of the bladder. Under circumstances one or both ovaries may be incarcerated

in the pocket formed by an inverted uterus, gradually being replaced as the inverted puerperal uterus becomes smaller.*

Symptoms.—Most displacements cause vascular disturbances, such as hyperemia, œdema and inflammation, and these produce many important symptoms (see the chapter on Oöphoritis). But without the inflammation, there will be a fulness felt in the pelvis and hips, pains like those accompanying menstruation, dysmenorrhœa, menorrhagia and hyperesthesia. When descent of the ovary is caused by retroflexion of the uterus there may be pain in cohabitation; on the other hand, perioöphoritis and pelviperitonitis may cause the dislocation. Ovarian epilepsy is said to have been observed in connection with these displacements. Dislocation downward and backward causes pain in defecation, from pressure upon the ovary, and tenesmus sometimes follows the evacuation. The ovary may be contused by pessaries, or an ovary which has entered a hernial sac may undergo cystic degeneration, thus becoming irreducible.

Diagnosis.—Displacement of the ovary may be diagnosticated by demonstrating the absence of the organ from its normal position, and finding a tumor corresponding in size, consistence, form and sensibility, in the position toward which the corresponding uterine appendages are drawn. The size, surface, consistence and sensitiveness of the ovary must be taken into consideration in differentiating it from other tumors; its increase in size during menstruation will also have much significance. When the tumor fluctuates, is nodulated, and shows evidence of increase in size, it is a dislocated ovarian cyst. Sometimes the connections of the tumor with the uterus in an inguinal hernia may be demonstrated by bimanual displacement of the uterus, by making traction on the pedicle of the ovary.†

Crural hernia is of less common occurrence, according to Englisch forming only 26 per cent. of all ovarian herniæ.

Kiwisch mentions a case in which the tube and ovary of the right side had entered and passed through the foramen ovale.‡

In abdominal hernia the ovary may have passed into a hernial

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* Klob, *loc. cit.*, pp. 98–100. † K. Schroeder, *loc. cit.*, p. 366.

‡ *Kl. Vortr.*, II, Aufl., 2 bd., p. 39.

sac resulting from ovariotomy or from the Cæsarean section. In my case of hernial dislocation of the right ovary into the labium, shown in Fig. 1, p. 27, the tumor caused by its presence could not be returned through the opening in the pelvic fascia, obviously because it had become too large; its passage into the sac before the right broad ligament might have been due either to adhesions with the hernial sac, or to accidental displacement by the distended rectum, especially when the uterus was low in the pelvis and the abdominal pressure great.

Treatment.—When the dislocated organ has become inflamed, the oöphoritis must first be properly treated, before reduction or manual treatment is to be thought of. There are exceptional cases in which the reposition will do more to reduce the inflammation than the internal use of antiphlogistics. When associated with retroflexion, the reposition of the uterus is of the first importance. Dislocated ovaries, even without dislocation of the uterus, may often be brought into a better position and have their swelling reduced by the application of suitable pessaries.

Reposition will be found impossible in congenital inguinal hernia of the ovary, so that a suitable hollowed pad must be worn, to protect the organ from injury. When pain, swelling or cystic degeneration occurs, ovariotomy is indicated. In acquired irreducible hernia of the ovary into the inguinal canal, herniotomy with reposition of the ovary may be indicated, the operation having been successfully performed by Loeper and Neboux. The same advice as just given for inguinal hernia will apply under like conditions to the crural variety; one successful operation is reported by Oettingen. The ovary should be extirpated only when it is diseased.

After reposition, the oöphoritis must be treated by appropriate means, and a suitable truss will often be found useful.

Torsion of the ovary is described in the chapter on "Ovarian Cysts."

CHAPTER III.

NEOPLASMS OF THE OVARIES.

I. Cystic Tumors.

a. Anatomy, Classification and Histogenesis of Ovarian Cysts.

All of the structural elements of the ovary from the earliest development of the organ to the menopause, undergo metamorphoses of various kinds, which contribute in greater or less degree to the formation of cysts. The latter are classified according to their anatomical nature and point of origin, as follows:—

1. Cysts of the follicles—*hydrops folliculorum*—affecting fully developed Graafian vesicles. The ovule is found in the follicle at the beginning of the affection, but is dissolved with increasing accumulation of the *liquor folliculi*. This dropsy is either isolated, or a series of follicles become involved; in the latter case the ovary may be so changed as to resemble a compound tumor. These changes are shown in Fig. 97, the rounded prominences (*a*, *b*), with a depression (*a*), representing such follicles; the large cysts (*c*, *d*, *e*) seen in section of the same ovary belong to the same variety of tumors. Collectively they rarely cause much enlargement of the ovary, yet isolated they may grow as large as or even larger than a man's head. The contents are pale, thin and serous, rarely brownish or bloody. The interior is lined with follicular cylindrical epithelium, and a fine network of capillaries may often be seen on the more prominent portions of the wall. When the number of degenerated follicles is large, the ovary appears to be composed of a conglomeration of cysts, many of which still contain ovules. This anomaly is always bilateral, and it is this fact which is the chief support of the theory that perfect Graafian follicles may be the starting point of proliferating cystomata.* This theory, while improbable, has not yet been disproved.

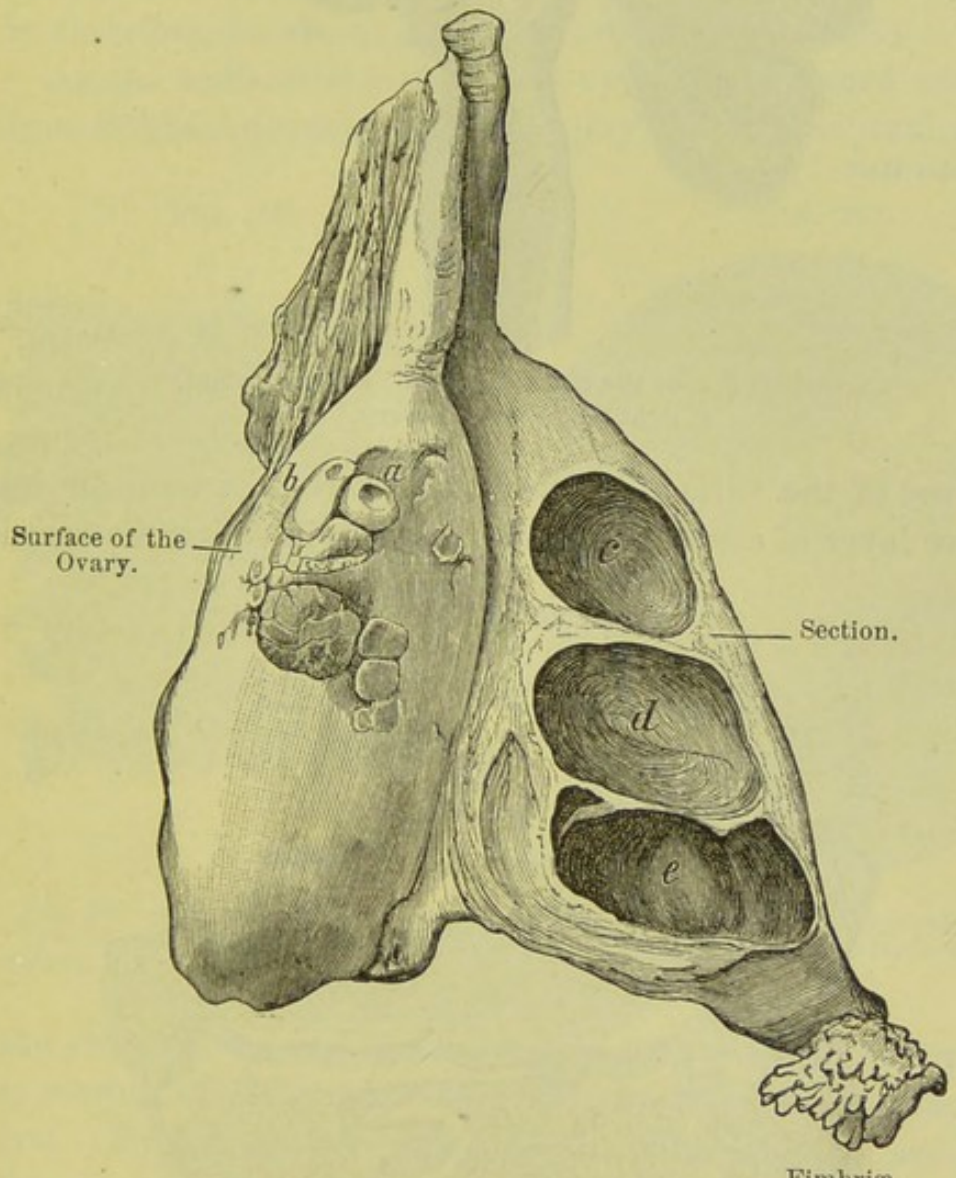
2. The varieties of the compound multilocular cysts of the ovary are colloid and myxoid cysts and cylindrical-celled adenomata.

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* Olshausen, *loc. cit.*, p. 35. Cases of Ritchie and Webb, Lawson Tait and Rokitansky.

These neoplasms, according to the opinion of most recent authorities, as Waldeyer and Klebs, are developed from the epithelial tubes of the ovary. They may be congenital, as shown in Fig. 18, on page 225, and in Fig. 98, and form globular nodulated tumors, having a smooth, pale or reddish surface, often with large vessels.

FIG. 97.

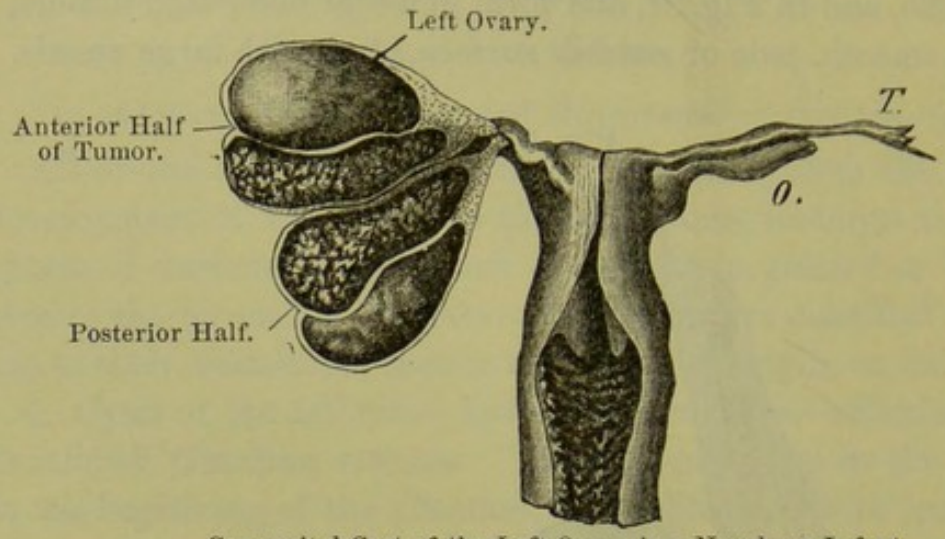


Ovary with Dropsical Follicles. (Natural size.)
a, *b*, three large cysts; *c*, *d*, *e*, section.

When the walls are thin, the character of the contents can be seen through them, while other portions of the walls are whitish, shining and almost like tendon in structure. Sometimes they grow so large that they weigh more than the patient's body, and

contain 40 or 50 kilos. (from 100 to 125 pounds) of fluid. Their anatomical construction is as follows: Beneath the cylindrical

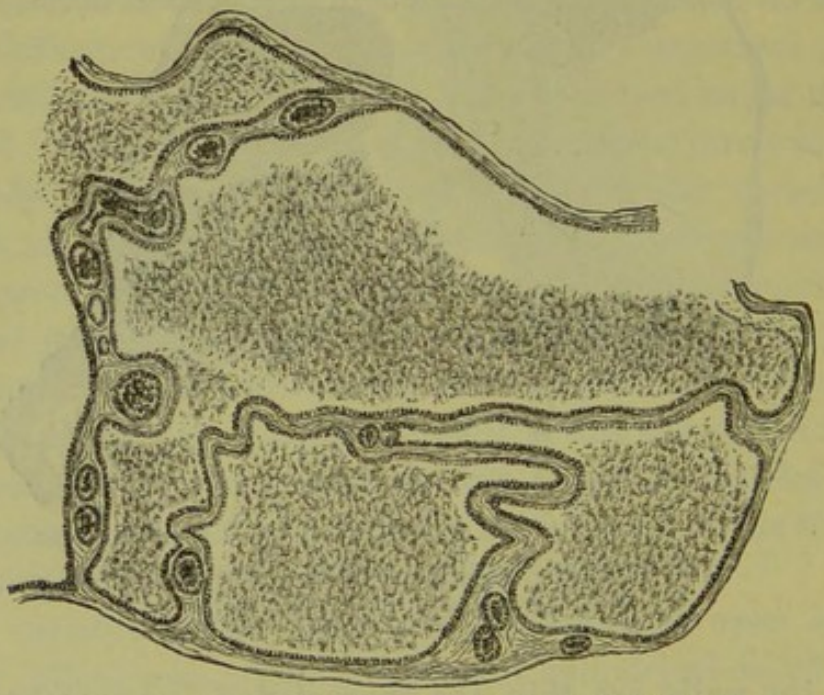
FIG. 98.



Congenital Cyst of the Left Ovary in a New-born Infant.
T, right tube; *O*, right ovary.

epithelium of the surface of the ovary there is a more or less extensive layer of connective tissue, Fig. 99, in which the vessels

FIG. 99.



Multilocular Ovarian Cyst in a New-born Child, × 30 times.

are imbedded. This tissue is covered by the cylindrical epithelium of the cystic spaces, arranged in one (Waldeyer) or more

layers (Rindfleisch, Böttcher and others). On the inner surface of the larger cysts there are now formed new epithelial tubes, generally single, not divided, which, after the closure of their orifices, become distended by the secretion of their cells and are thus converted into secondary cysts. Before this stage is reached, they often give the inner surface a cribriform appearance resembling that of the gastric mucous membrane (Klebs). This form is, therefore, known as glandular cystoma (Fig. 101).

As the walls of the secondary cysts grow toward each other from different directions, they atrophy under the mutual pressure,

Fig. 100. Fig. 101.

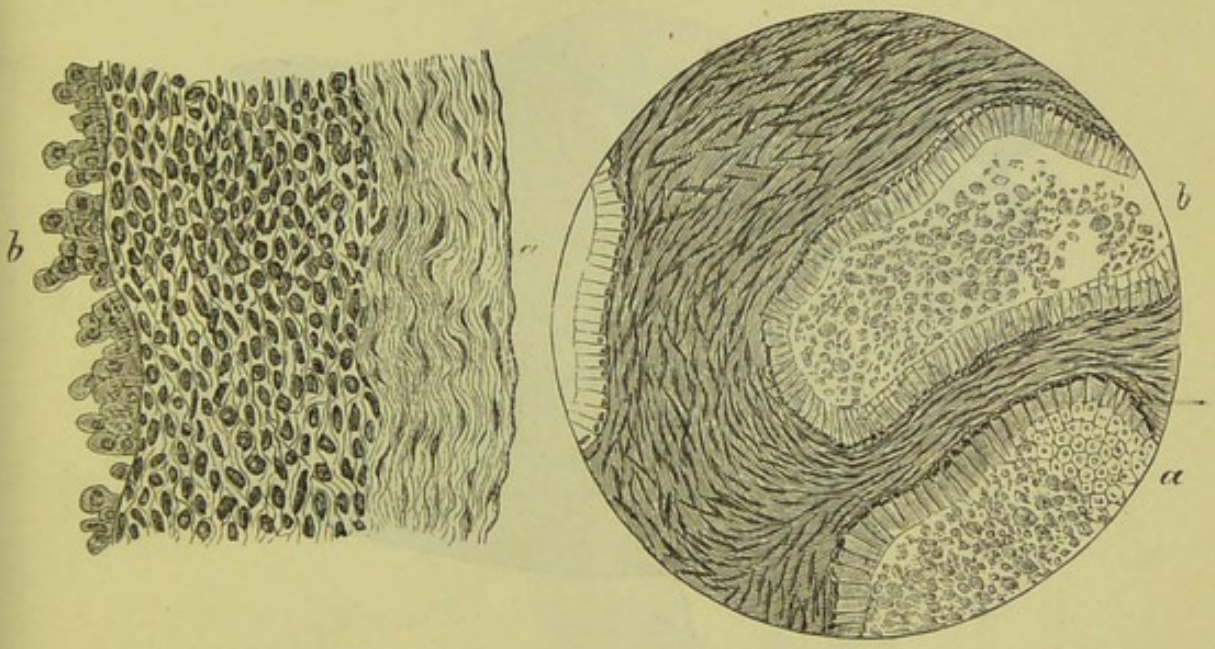


Fig. 100.—*a*, external surface; *b*, stratified epithelium in congenital cystoma.
Fig. 101.—*Hartnack*, s. 7, o. 4. Single layer of cylindrical epithelium (*a*) in a glandular cystoma with granular contents (*b*).

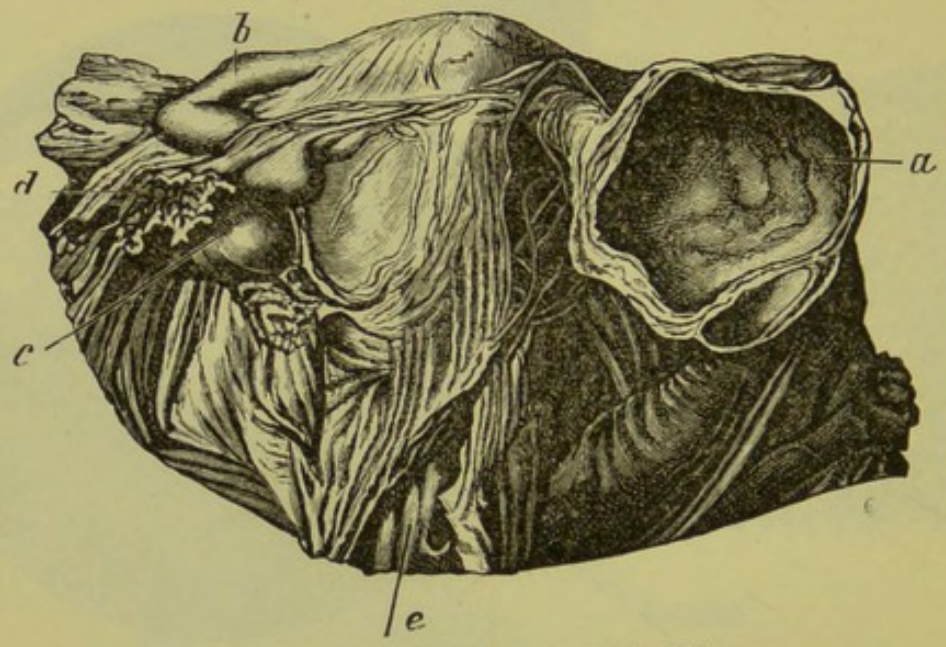
and the cysts become confluent, the remnants of the cyst walls appearing as slight ridges upon the inner surface of the larger cyst. By the union of smaller cysts, large cavities are formed, thus a transverse section often showing their previous separation. This boundary line is formed of degenerated epithelium, fat drops, granules and fat crystals. In some few cases, isolated vessels have also been found in the gelatinous masses seen in the cyst, which proved to have been remnants of the cyst walls (Cruveilhier and Virchow).

Though the glandular cystomata of the ovaries are thus closely

related to true adenomata, still the large cavities which are always present in the former do not occur in adenomata; for this reason Waldeyer prefers to call them by the name of *myxoid cystoma*. On the other hand, the atypical epithelial proliferation in the ovarian stroma is precisely like that of beginning carcinoma, except that it does not affect the glands, forms no metastases and does not recur. It may thus be clinically, but not always anatomically differentiated.

The secondary cysts cause the wall of the principal cyst to be thickened and prominent on the inner surface, while in time

FIG. 102.



Ovarian Myxoid Cyst on the Right Side.

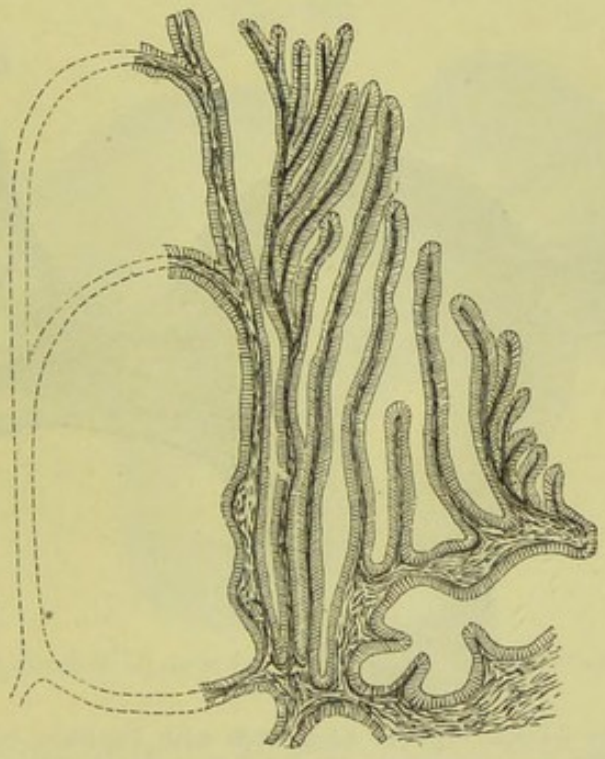
a, numerous adhesions fixing the left tube, and causing its angulation; *b*, left ovary; *c*, *e*, rectum.

deposits are formed on the outer one. Adhesions between the cyst and the abdominal organs are not formed for a long time, on account of the cylindrical epithelium covering the outer surface of the cyst, but they are finally produced by its continued growth and friction. The latter destroys the epithelium, and adhesions are formed which unite the cysts to all adjacent organs. The first adhesions are usually with the uterus; then with the walls of Douglas's cul-de-sac, as in Fig. 102, with the rectum and with the small intestines, and often with the omentum, as shown in Fig. 96, and with the colon and liver. The larger the

vessels of the adherent organ, the sooner do they communicate with the walls of the cyst, thus giving a new source of nourishment; they may even become the sole source of nutrition, if constriction of the tumor should occur. In one case I found adhesions of this kind with the vermiform appendix, large vessels passing in all directions from the latter to the cyst wall. Firm and gradually increasing peritoneal exudates are deposited by the side of and between the vessels which the tumor receives from neighboring organs.

3. *Papillary Cystomata.*—When the development of an ovarian

FIG. 103.

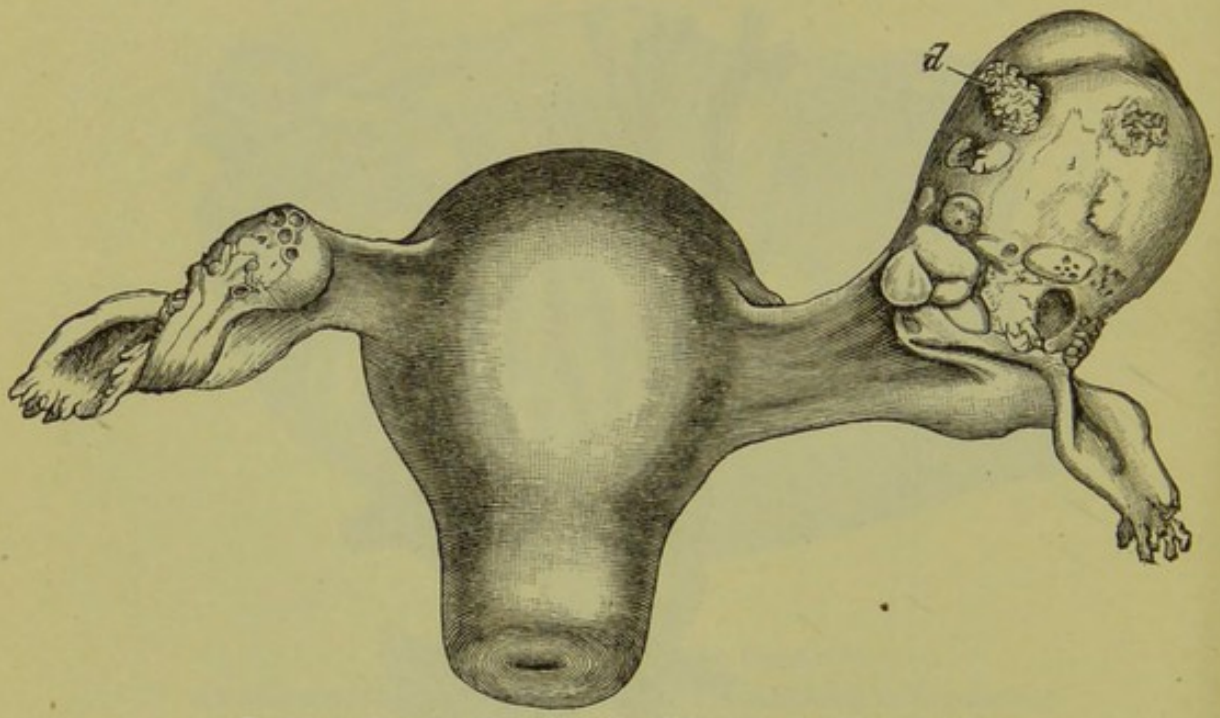


Portion of a Papillary Cystoma with Long, Slender Papillæ, × 30.

cyst is due to a uniform increase of connective tissue and epithelium, papillæ soon begin to appear, and project into the cavity of the cyst. These resemble placental tufts, but are covered with cylindrical epithelium, are of various sizes, may be single or double, contain a variable number of vascular loops, and are pointed or end in knob-like bodies. When the development of these papillæ is extensive, they may fill the cyst, and even perforate its walls, then appearing as highly injected, granulating plaques upon the pale, smooth surface of the tumor as shown in

Figs. 104 and 105. It has been proved that the presence of these excrescences on the surface has a close connection with the ascites which often complicates this affection. Such tumors are designated as proliferating papillary cysts of the ovary (*cystoma ovarii proliferum papillare*). The glandular formation previously mentioned as occurring upon the inner surface of the tumor, may be associated with this condition. In 23 of Olshausen's recent ovariotomies, he found 7 papillary cystomata; he formerly held that these tumors might be derived from the parovarium, but Marchand conclusively showed them to be of ovarian origin.

Fig. 104.



Papillary Ovarian Cyst of Right Side with Papillary Surface.

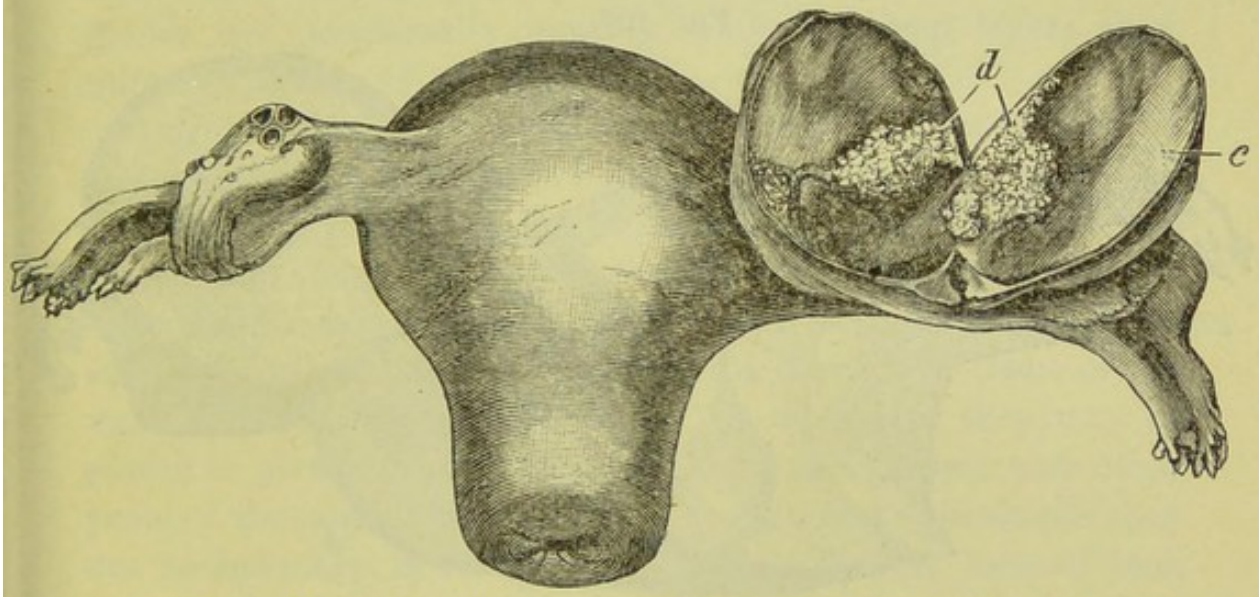
According to Olshausen no other ovarian tumors, excepting somewhat advanced carcinomata, are so difficult to extirpate as the papillary cystomata.

4. Another form of ovarian cyst, of which two examples were recently described by Olshausen, is the following: The tumor is not globular, but has masses of vesicles upon its surface, as shown in Fig. 68, p. 396, which are sometimes so nearly separated from the cyst-wall that only a slender pedicle serves to connect them; their walls are extremely thin, translucent and easily lacerated. They are remarkably similar to vesicular moles with very large

vesicles, or to an echinococcus after rupture of the principal sac. Their contents are clear, yellowish, thin, contain much paralbumin, and the fluid may be viscid and strongly alkaline, the specific gravity being 1011 to 1014. Some walls have cylindrical, and others ciliated epithelium. Olshausen observed only two such tumors in 300 ovariotomies. I have met with three cases, in one of which I performed ovariotomy on account of the size of the tumor (in 1865); in the second, there were two small tumors (Fig. 68), and the third I found in a patient dead from diffuse carcinoma of the genitals (1885).

The contents of proliferating cystomata are variable and de-

FIG. 105.



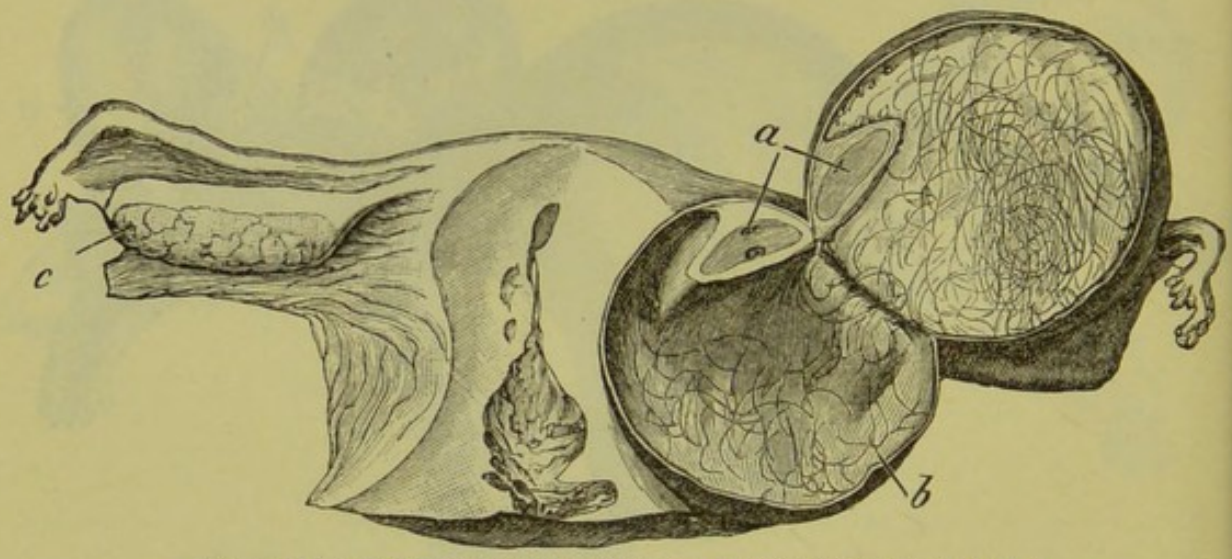
c, Papillary Cystoma of Right Ovary; *d*, its inner surface, showing Papillary Proliferation.

pend upon the size of the individual cavity, the vascularity of its walls and the nature of its inner surface. In the smaller cysts the contents are usually viscid, and of the consistency of syrup, jelly, honey or gelatin. The larger the tumor becomes from confluence, the thinner the contents. There are cysts, however, the contents of which remain gelatinous, as shown by Olshausen in an address before the Magdeburg Congress of Scientists, in 1884. This fluid is not colorless but is usually pale green, grayish-brown, opaque or transparent. Microscopical examination shows its homogeneous character; the specific gravity is usually from 1015 to 1025, but varies between 1005 and 1070.

The most important and characteristic constituents are the short cylindrical epithelial cells, generally but not invariably present. Other constituents are colloid cells, nuclei, finely granular masses of fat, granular cells (fatty epithelium), pigment, blood corpuscles and rhomboidal plates of cholesterin often in such quantities that the fluid has a glistening appearance.

Chemical examination invariably reveals paralbumin, as proved by the fluid becoming cloudy when boiled with dilute acetic acid. When no paralbumin is present, the solution above the sediment becomes clear, mucin being insoluble in dilute acetic acid. If the ovarian fluid is mixed with a large quantity of 70 per cent. hydrochloric acid, digested over a water bath and

FIG. 106.



Dermoid Cyst of Right Ovary containing Hair and Sebaceous Matter.

filtered, the filtrate, if it contain paralbumin, will reduce an alkaline solution of copper or bismuth. As paralbumin is found in parovarian cysts, in ascitic fluid and also in urine, too much importance should not be attached to its presence. The fluid when boiled often shows no perceptible quantity of proteids, but always becomes cloudy if acidulated, and the addition of alcohol causes a sediment. According to Olshausen it contains about 1 per cent. of salts. Urea has been found in it by Professor Siewert. The solids may vary between 5 and 10 per cent. The reaction is either neutral or slightly alkaline. It does not coagulate upon standing as constantly as ascitic fluid, but spontaneous coagulation

has been observed by Virchow, Westphalen, Martin, Schroeder, Scanzoni and Olshausen.

5. *Dermoid Cysts of the Ovary.*—These tumors are analogous to myxoid cysts, in that they originate from the epithelial elements of the ovarian stroma, but in the former the epithelium takes on an epidermoidal character, the inner surface of which closely resembles the skin upon the external surface of the body. The walls are generally very thick but may be thin and delicate, the inner surface being either perfectly smooth or covered with flat or nodular warty prominences. The roughness of the surface is due to hypertrophy of the papillary bodies which are covered by several layers of pavement epithelium. The cysts may contain numerous sebaceous glands and hair follicles with hair; sweat glands are occasionally wanting, while the deep layers show numerous masses of fat cells.

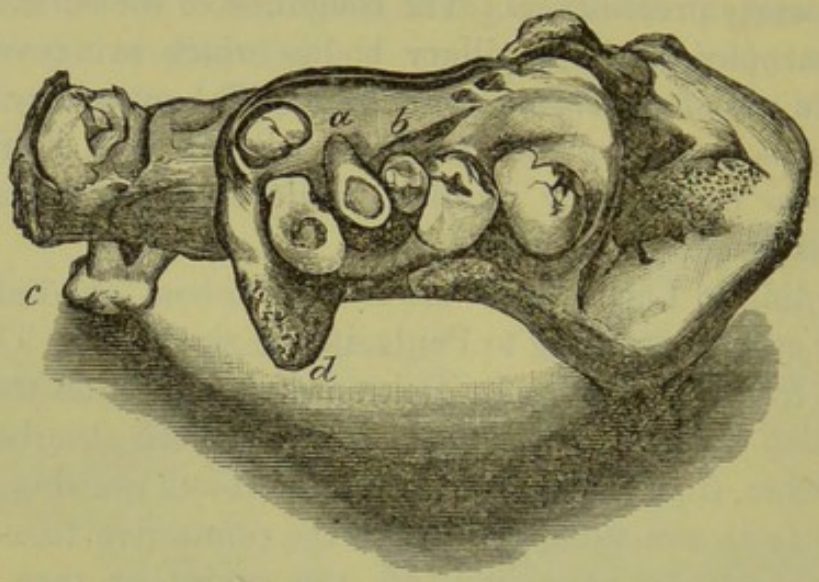
According to Lebert, teeth are found in about one-half of all dermoid cysts; according to Pauly, in one-sixth only. They may number from 1 to 300. In Rokitansky's collection there is a preparation showing a milk tooth which has been absorbed as far as the crown, from the pressure of another tooth growing beneath it. The teeth are usually found in the connective tissue of the wall, their crowns projecting into the cavity, or they may be placed in alveoli in the bones; the root, neck, crown and other parts of the normal tooth are present. In some specimens they are rudimentary, in others they show the distinct form of incisors, cuspids or molar teeth as in Fig. 107.

Dermoid cysts usually contain a large quantity of hair which is matted together by the sebaceous material, but is in every way like normal hair. It is situated upon the skin-like portions of the inner surface, arises from hair follicles, has all the constituents of other hair, and is supplied with sebaceous glands, many of the latter opening just beneath the epidermis. The color of the hair is usually red or light blonde, rarely dark. Its length varies from a few inches to four or five feet, though it sometimes grows in great tufts (Reynaud, Busch, Pauly). Dermoid cysts also contain cholesterin crystals, urea, oxalic acid, leucin and tyrosin, nerve and brain substance and non-striated muscular fibres; nails and striated muscles have not been found.

Dermoid cysts may be isolated and are usually unilateral, rarely bilateral. As a rule, they vary in size from a walnut to a man's head. They may coexist with glandular cysts in the same ovary, or even form portions of glandular proliferating cysts.

The dermoid cyst originates either from the glandular tubes of the ovary—not from the perfect follicles, as stated by Waldeyer—or from fœtal inclusion of the cortical layer, medullary canal or the middle germinal layer.*

FIG. 107.



A Bone Resembling the Lower Jaw, *d*, taken from a dermoid cyst of the left ovary. It contained an incisor (*a*), a cuspid (*b*), four molars in a row, and an isolated one with three roots (*c*).

b. Formation of the Pedicle. Intraligamentous Development and Transformations of Ovarian Cysts.

If the diseases just described have proceeded from the ovary, the connection of the tumor with the uterus will consist at first of the broad and ovarian ligaments. The continued growth, however, soon carries the tube with and over the tumor; it becomes elongated and finally forms a portion of the pedicle which continues to grow longer and thinner.

If the neoplasm originates from the parovarium, or the ovary is located more deeply than usual between the folds of the broad ligament, no such pedicle is formed, but the tumor becomes subserous and intraligamentous.

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* Heschl, Olshausen, *loc. cit.*, p. 406.

The transformations which may occur in these five forms of ovarian cysts are quite numerous. There may be hyperemiæ, hemorrhages into the cysts, fatty degenerations, the various inflammatory processes, atrophy and perforation, strangulation, torsion, constriction of the pedicle and calcification.

The most important is strangulation of the pedicle from rotation of the tumor upon its axis. This condition was observed by Ribbentropp, Hardy, Willigk and Patruban, but Rokitansky first called attention to its occurring in about 15 per cent. of all cases; Spencer Wells found it but 12 times in 500 cases, and Olshausen 3 in 56 cases. The tubes, ovarian ligament and that portion of the broad ligament included in the pedicle take part in the torsion, which may be one-half or six turns. It is probably due to the unequal growth of tumors, or obstructions in its vicinity, as the intestines, bladder or sacral promontory, or to adhesions with, and displacements of adjoining organs, or from violent concussions of the body. The consequences of torsion are hemorrhages into the cyst, inflammation, suppuration, decomposition, shrivelling, thickening of the contents, fatty degeneration, cessation of growth and calcification, thus a mode of cure. The nourishment may be from vessels of other organs in the manner previously mentioned. When adherent to the rectum or intestine, torsion of the latter with a fatal result may ensue, as in the cases of Hardy, Henry, Satterthwaite, Rokitansky and Ribbentropp.

The author recently diagnosticated sudden torsion of the pedicle of a previously very movable ovarian cyst, and at the ovariotomy found the pedicle twisted almost three times. The cyst wall showed hemorrhagic extravasations, yet the contents were bloodless, of a bright yellow color, not stringy, but quite liquid and neutral in reaction. The boiling test of Hammarsten gave an almost clear filtrate; the reduction test, adding muriatic acid after boiling, showed distinctly a reduction of the oxide of copper and bismuth. The specific gravity was 1001, the proportion of albumin 0.12 per cent., and upon the addition of alcohol there was a slight, not shreddy, precipitate.

The lime salts may be deposited in the form of simple round bodies, as in papillary cystomata, or in the form of bones, teeth,

or in calcification, as the result of retrograde metamorphosis. The latter is uncommon, and usually slight in extent, but in exceptional cases it may involve the whole cyst, forming a bony capsule as thick as that of the human calvarium.

In a large multilocular cyst, in which the pedicle had been twisted some half dozen times, Leopold found a mass as hard as stone near the pedicle, and scaly calcification upon various parts of the surface. Waldeyer found numerous concretions in juxtaposition to epithelial cells, the former being partly in the shape of small cavities containing epithelial cells; this he held to be due either to calcification of the epithelium, or to a calcareous deposit from the contents of the cyst. The calcification may thus be like that in psammomatous tumors, cases having been reported by Olshausen, Beigel and Baker-Brown; Waldeyer's case differed from this variety, in the absence of the rounded shape of the deposit, and the concentric stratification.

In the museum of the gynecological clinic in Dresden, is a very interesting specimen of an ovary which had attained the size of a man's head, and was completely ossified. During life, the tumor was thought to be an extrauterine gestation-cyst that had become calcified; it measures 40 centimeters (16 in.) in circumference, and 15 centimeters (6 in.) in diameter. There are a number of flat depressions on the surface, which is whitish in color, and fibrous in consistence. Under the sac wall of connective tissue, there is a shell of chalky substance, from 2 to 3 millimeters ($\frac{2}{26}$ to $\frac{3}{26}$ in.) in thickness, which almost completely surrounds the tumor. When laid open at the thinnest part of the wall, the contents were flocculent, grayish and traversed by remnants of delicate septa which crossed the cavity in all directions, the inner surface being quite smooth. There was a nest of small cysts around the hilus, near which the calcified tissue had been deposited in the form of plaques, easily loosened from the cyst-wall. The wall of the principal cyst was enveloped in a fibrous layer 6 or 7 millimeters ($\frac{6}{26}$ to $\frac{7}{26}$ in.) in thickness. Its inner surface was covered with a mosaic of calcified, flattened, cylindrical epithelium, the latter being a veritable ossification. At the thinner portions one could see star-shaped bodies communicating with each other, and embedded in a

homogeneous substance, also apparently containing Haversian canals; these bodies reminded one of bone corpuscles. The fibrous envelope was stratified like an onion, and showed blood vessels developing in the deeper layers, with occasional deposits of lime salts. The remnants of the septa in the larger cyst consisted of strong fasciculi of connective tissue arranged in a parallel manner, and fusiform cells. Upon their surface were degenerated cylindrical cells, blood corpuscles, débris and shining mucous bodies. Secondary cysts had begun to develop in some of the smaller ones, as shallow, gland-like inversions of the walls, and opaque spots, caused by impregnation with lime salts, were seen in many places.

In a recent ovariotomy, upon a patient 63 years old, Fürst found the surface of the tumor covered with calcareous plaques, varying in size from a lentil to a dollar, with an external calcified connective tissue with small central bone nuclei.

Should an ovarian cyst rupture into the abdominal cavity, its gelatinous contents, deposited upon the other organs, may gradually organize delicate membranes which are infiltrated with cylindrical cells; thus, according to Olshausen, new tumors may be developed. Werth states that a kind of diffuse pseudo-myxoma of the peritoneum, caused by peritonitis from the presence of a foreign body, may occur, as the masses poured out are not absorbed on account of the large quantity of mucin which they contain. Existing as firm masses, they are soon traversed by delicate connective tissue and vessels, as a result of which the whole mass appears to consist of small cavities. Sometimes the gelatinous masses form polypoid appendages (Werth), enveloped in delicate layers of connective tissue, agreeing with our description of the illustration of malignant ovarian tumors.

c. Symptoms of Ovarian Cysts.

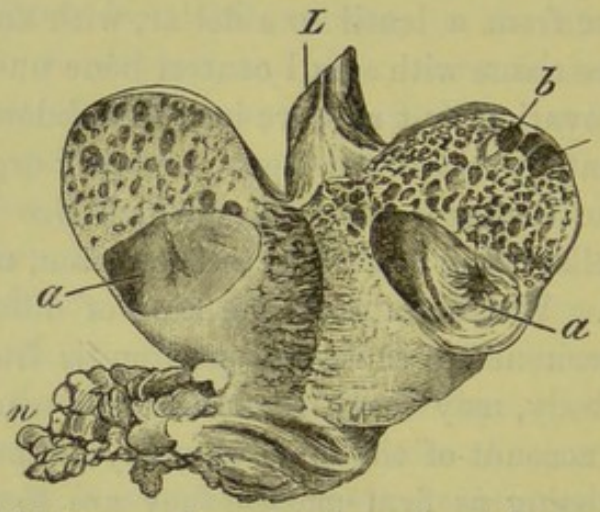
An ovary may be degenerated into a glandular cystoma, its stroma having been materially altered, without any appreciable change in form, size or surface; this is clearly shown in Fig. 108. It is obvious that these changes will not be without influence upon the menstrual process. The menses may become painful, and irregular as to their appearance and duration, but in many

cases they remain perfectly normal. Amenorrhœa occurs when the tumor is malignant, and the degeneration bilateral. Menstruation presents no pathognomonic symptom dependent upon an ovarian cyst.

Abnormal sensations are frequently associated with various movements of the body, such as walking, sitting, standing or defecation; when defecation is difficult it is often succeeded by a feeling of bearing down and great exhaustion.

Patients who carefully observe their bodily sensations, complain of a feeling of heat and inflammation in the abdomen, which appears seven or eight days after each period, though the latter may have been scanty and painless; these sensations

FIG. 108.



Beginning Myxoid Cystoma.—*a*, large cyst; *b*, small cyst, in an ovary of normal size; *L*, ligament of ovary; *n*, fimbriæ.

often confine the patient to bed, and are manifested without any apparent external cause. I have observed patients for years who suffered thus, and whose symptoms were very constant as to recurrence and duration; I believe that the so-called inter-menstrual pain was due to the ripening and rupture of follicles in the diseased ovary. The pains were located in the sacral and in both inguinal regions. From observing the paroxysms, I have been convinced that they are solely dependent upon the ovarian tumor; and, as is often the case in toothache, the pain was just as much or even more severe upon the sound side. It is described by the patient as burning or boring in character, and

must at times be very intense, as the sufferers so often resort to the use of mustard poultices and applications of iodine in order to obtain relief. In many cases suffering is caused by coexisting perimetritis and perioöphoritis, but then it is not so typical.

Quite in the first period difficulty in evacuating the bowels, and disorders of digestion appear. Constipation is very frequent. It is not always purely a consequence of compression, as it may occur when the tumor is upon the right side, and not pressing on the rectum. When the tumor is very sensitive, it may be possible that the patient avoids defecation on account of the pain caused by bearing down during the act. The results of reflex contraction of the sphincter ani muscle must also be remembered. Constipation is caused, too, by want of exercise, and by the pelviperitonitis which is so often present. Adhesions resulting from the latter may displace or even produce angulation of the rectum, while distortion and compression from the exudation interfere with its movements.

When the tumor is small, the discomfort may be so very slight that the patient consults the physician solely on account of her being sterile. Sterility often results from small unilateral tumors, when, for example, the tube corresponding to the sound ovary has been bent or dislocated by perimetritis or perisalpingitis, as shown in Fig. 102. The sterility is also due to dislocations of the uterus, menstrual anomalies, diminution in the number of ripened ovules, and to the frequent complication with catarrh and tumors of the uterus. But if conception occurs, a tumor in the true pelvis will interfere with the enlargement of the uterus, cause irritation, and finally produce abortion. Yet pregnancy may exceptionally occur when bilateral tumors or even malignant disease of the ovary are present—a proof that healthy follicles may be found in the diseased ovary.

Dysuria is uncommon in small tumors; when present, it is due to compression of the neck of the bladder or ureters; it also occurs from impaction of the tumor, and its adhesion in the true pelvis.

Other symptoms complained of by these patients, often are pain in the lower limbs, weariness on slight exertion, and coldness of the feet.

Although the appetite and digestion are often good in the early stages of the disease, yet the woman has a distressed appearance, is pale and dejected. She gradually becomes emaciated, and finally acquires the *facies ovariana* which has been so well described and illustrated by Spencer Wells. Its characteristic features are the prominent cheek bones, the sharp nose, the clearly-defined nasal alæ, the firmly-closed lips, the depression of the corners of the mouth and the furrows about it and upon the forehead; these manifestations are especially distinct if symptoms of inflammation occur. The latter are often accompanied by decided fever and severe pain. The tumor can be less sharply defined at such times, and it is enveloped in and fixed by exudations. It cannot be determined in every case whether this oöphoritis is purely parenchymatous in character, or whether it is caused by the rupture of thin-walled cysts on the surface. The latter is doubtless present in many cases from the fact that the patient is comparatively comfortable until the occurrence of violent perforation symptoms, and also from diminution in the size of the tumor after absorption of the exudate. In this connection, I recall the case of one of my patients, a native of England, who had been repeatedly treated by English gynecologists for sterility and dysmenorrhœa. Nothing had been said to her as to an ovarian tumor. When I first examined her I found symptoms of vaginismus combined with obstinate constipation. When, however, the finger or speculum was slowly introduced the spasm of the constrictor and levator muscles was avoided, and an examination showed that the uterus, while higher than normal and nearer to the symphysis, was not painful or enlarged, but that all the distressing symptoms manifested themselves at once when an ovarian cyst the size of an apple, situated directly in front of the rectum, was touched. My diagnosis was made at the first exploration, but the patient's physician remarked that he had been unable to convince himself of the existence of such a tumor, and that it appeared strange to him that none of the English physicians had been able to discover it. I nevertheless held to my opinion, and subsequently treated the patient several times for symptoms of perforation. Once an accident occurred suddenly from her bending over while in the garden, very exten-

sive extravasation ensuing, and she was confined to her bed for months. A periproctitis was at last developed after a number of these attacks; amyloid degeneration of the kidneys ensued and the patient died from uremia. At the autopsy we found such a multitude of adhesions and encapsulated collection of pus in the vicinity of the compound ovarian cyst, which had remained about the size of an apple, that there could be no doubt as to the origin of the disorders.

The slower or more rapid growth of these tumors depends upon the nature of the pedicle and the walls, the size and vascularity, the character of the tumor, and other complications; as a rule, movable, non-adherent tumors, which are not encapsulated, grow more rapidly than those which have a short pedicle, are firmly embedded or incarcerated in the pelvic cavity. The more vascular the tumor the greater is the liability to hemorrhages and transudations, and secondary cysts or other neoplasms will be developed in its walls. Papillary cystomata grow more slowly than glandular, and seldom reach the large dimensions peculiar to the latter; unilocular dermoid cysts undergo less alteration than any other variety, often remaining stationary for years.

Symptoms of compression arise when the tumor has reached the size of a child's head, and remains in the small pelvis, either because the pedicle is too short, because it is partially subserous, or because it is bound down by adhesions. The uterus is pushed upward, downward or to one side; when elevated, the vaginal portion is effaced and the vagina elongated, or if depressed, the vagina is inverted and prolapsed. Hemorrhoids appear at the anus, defecation and micturition are painful and accompanied by tenesmus, while evacuation affords no relief. Walking is rendered difficult, the vulva and lower extremities may be œdematous, partly from pressure upon the hypogastric veins, partly from pressure of the distended rectum upon the left common iliac vein, and also partly indirectly, from hydremia and from uremia caused by pressure upon the ureters. An example of this complication is given in my *Pathologie der Weibl. Sexualorgane*, p. 229. The tumor in connection with an irreducible prolapsed uterus caused the uremia. A proctitis was also present in this case, as in the one above mentioned.

Neuralgia in one or the other lower limb, the result of pressure, is seldom seen. The intensity of the pressure exerted by the tumor, sometimes the size of a child's head, is subject to variations, congestion causing the tumor to become larger, while free passages from the bowel, diarrhœa or profuse menstruation cause a reduction in size. Other early complications are adhesions to the rectum with secondary perforation into the latter, through which discharges from the tumor occur from time to time, these evacuations putting a certain limit to its growth. One of my patients, an unmarried lady, discharged bunches of brown hair from the rectum at varying intervals for a number of years; sometimes they passed easily, but at others they were firmly attached so that defecation or a direct attempt to remove them caused severe pain. At the autopsy I found an opening into the rectum the size of a dollar, through which the wall of a dermoid cyst projected. The latter was about the size of an orange, and formed a portion of a very large glandular cystoma. Another patient, who had been tapped through the umbilicus in Riga, subsequently evacuated about a tablespoonful of colloid fluid through this opening daily; as long as the discharge occurred regularly, she was quite comfortable, but suffered as soon as the passage became occluded. A form of ileus repeatedly developed itself in this patient; she vomited, suffered with the most obstinate constipation, and it was often days before she could evacuate the bowel, the stools being hard and ribbon-shaped, and the discharge attended with the severest distress. In this case the rectum had firmly adhered to the cyst, and was compressed by the latter. This view was confirmed some time later by a discharge of blood, membranous fragments and fecal matter, followed by large portions of the inner surface of the glandular cystoma and several complete cysts as large as a pigeon's egg.

As perforation into the intestine is not very rare, it might be supposed the contents of the intestine entering the cyst would cause suppuration. I know no case of this kind, and the non-occurrence of the accident is to be explained partly by the canal-like nature of the perforation, similar to the entrance of the ureters into the bladder, and its small calibre, partly that in extensive direct communication a portion of the cyst wall is

forced into the lumen of the bowel as an obturator of this ovario-intestinal fistula.

When the pedicle is long enough and the ovary not fixed in the pelvis, or when it has been situated above the uterus from the first, it may grow upward into the abdominal cavity, where it has room enough to become very large without causing much distress. It is by no means uncommon for such a condition to go unrecognized in young girls until the abdomen suddenly begins to enlarge, as though they were in the last months of pregnancy. Many a woman who has borne children may from a similar cause arrive at the conclusion that she is pregnant, although her menses have been regular. It may also occur that able practitioners may make the mistake of believing that they feel parts of the fœtus in the tumor.

With the increase of the tumor disorders seldom fail. The upward arching of the diaphragm and displacement of the heart, with the compression of the lungs, produce apnœa, shortness of breath and stases in the peripheral veins. The consequences are œdema of the vulva, the abdominal wall and the extremities. In greater compression, the common iliac veins and the inferior vena cava may be almost entirely closed by the tumor, and then the blood is returned from the femoral and saphenæ veins through the superior and inferior epigastric veins, finally causing their enormous dilatation. It is obvious that such an obstruction to the circulation will greatly tax the heart, its muscular structure being weakened, and death often follows in a short time from cardiac paralysis.

Compression of the ureters by large ovarian tumors is generally unilateral. In one instance Scanzoni found a ureter dilated until its diameter measured from 1½ to 2 inches. Diminished flow of urine, hydronephrosis, hydremia and uremic symptoms may ensue, though, in general, they are rare in unilateral compression.

Very large tumors compel the patient to change her carriage when in the erect posture; the upper portion of the body must be thrown backward to counterbalance the enormous weight. When the patient sits down the tumor rests upon her thighs, and if it be lifted up, a thick œdematous fold of skin will be seen upon its lower surface corresponding in breadth to the interval

between the thighs. Finally, the patient becomes unable to walk, can scarcely sit upright in bed, can no longer lie upon her back, but only on her side, and requires the assistance of the nurse when she desires to sit up. The itching and burning in the enormously distended and swollen skin cause great suffering, so that her sleep is disturbed and the scratching produces inflammation; large portions of the skin may even suppurate when there is considerable fever. One or both legs may be so swelled from the thromboses caused by compression that it becomes almost impossible to move the patient in bed, and the severe neuralgia, which sometimes appears, makes her condition a very pitiable one.

The occurrence of ascites in connection with the larger ovarian tumors is of varying frequency, depending in many cases merely upon the surface of the tumor, and with their extirpation disappears. In large tumors it may result from the hydremia, hydronephrosis and uremia, or it may be produced by the rupture and evacuation of cysts into the abdominal cavity. Finally, as I have seen in one instance, the opening produced by spontaneous perforation may remain permeable, and a secretion thus be poured continuously into the abdomen; the ascites disappeared after extirpation of the tumor. Again, I once found in an ovarian cyst an oval opening about as large as a pigeon's egg which communicated freely with the abdominal cavity; this patient, 48 years old, had died after a herniotomy. Ascites is most common in papillary cystomata. The appearance of ascites and the quantity of fluid are, of course, influenced by the unavoidable disturbance of the portal circulation.

In consequence of displacement and compression of the liver and biliary ducts, there is sometimes seen in large ovarian tumors jaundice, though this is not frequent. A tawny, pale yellowish hue is oftener present.

d. Course and Terminations of Ovarian Cysts.

1. The ovarian tumor may grow but slowly, or even remain stationary; this is often the case in simple dermoid cysts and in oligocystic tumors.

2. After the first puncture a cyst which by its contents is

known to be undoubtedly ovarian, shrinking and complete cure of it may occur. The clearer, thinner and more transparent the fluid, and the less albumen it contains, the greater the probability of a radical cure. In 200 cases I have seen recovery follow tapping in only one instance. Olshausen has discussed the cases of this description recorded in the literature of the subject, pages 179–184 of his text-book.

3. The pain and discomfort caused by both large and small ovarian tumors may be greatly aggravated during the menses. The tumor becomes tense and painful, and the patient is feverish, the pulse being remarkably frequent and small compared with the fever; these symptoms gradually disappear a few days after the menstrual flow has ceased. They result from hemorrhage into the cavity of the larger cysts, as I had an opportunity of ascertaining at my first ovariotomy, performed a few days after their disappearance. It is not an infrequent occurrence. Parry observed so great a hemorrhage into a cyst that in a few hours its diameter in every direction was increased from 1 to 1½ inches. The location of the hemorrhage depends upon the development of the vessels in the wall, and also upon external influences and disordered circulation from pressure upon prominent portions of the tumor. Hemorrhages are, furthermore, often caused by torsion of the pedicle.

4. Repeated puncture of the tumor subsequent to the menopause sometimes checks its growth, the patient's condition and nutrition being thereby improved, and further medical attendance can be dispensed with. This is a very rare occurrence; I have met with but one example.

5. The tumor may rupture, become encapsulated by a process of adhesive inflammation, and its further growth thus prevented.

6. An ovarian cyst may adhere to the fimbriæ of the corresponding tube and evacuate its contents through the latter, causing *hydrops ovarii profluens*. Cases have been reported by West and Lachse (Figs. 87 and 88).

7. Death may result from strangulation of the pedicle, from peritonitis caused by rupture, from uremia, exhaustion, or cardiac paralysis, but less frequently from inflammation and decomposition of some parts of the tumor, and still more rarely from such

secondary disease of adjacent organs, as periproctitis, nephritis, pleuro-pneumonia, etc. The rapidity with which a fatal termination occurs depends upon the rapidity of growth, upon ascites as a complication, and upon the strength of the patient. There are many cases in which women survived for more than twenty years. The patient treated for cystoma, spoken of in this chapter, from whom I evacuated 40 kilos (100 lbs.) of fluid, had carried the tumor for more than twenty years. The one who was described as having discharged hair from the rectum, had the tumor punctured through the vagina ten years previously. Olshausen reports similar cases on page 114 of his book; according to his investigations, 60 to 70 per cent. of all patients with proliferating cystomata die within three years from the time of the first symptoms; a further 10 per cent. die during the fourth year. We must remember that the exact time when the disease begins can rarely be determined, for years may elapse before the discomfort is such that it leads to the discovery of a tumor by the patient herself, or by the physician whom she consults.

8. Metastases may occur even in benign ovarian myxomata. Werth has asserted that when these supposed extensions take place from an ovarian myxoma to the peritoneum, they are not metastases, but simply chronic localized inflammation of the peritoneum (new vessels being formed) and of the gelatinous masses which have been discharged from the tumor and become intimately connected with the peritoneum. Olshausen observed a case in which total extirpation of a proliferating ovarian cystoma had been performed, little or none of the contents escaping into and remaining in the abdomen, yet, however, in the course of two years, a new tumor weighing over seven pounds was developed in the abdominal cavity. This tumor could have proceeded neither from the remaining healthy ovary nor from the stump of the extirpated one; the contents were of the same gelatinous character as in the tumor first removed, and were traversed by a great number of thin membranes covered with epithelium identical with that of the ovarian cyst. Olshausen's view of the case is that exfoliated portions of the tumor are pushed about by the movements of the intestines until they

become attached elsewhere; organic connections are formed with an adjacent tissue, from which time they grow independently.

Baumgarten's case, cited by Olshausen, is also very interesting: A patient, forty years old, died from marasmus and ascites four weeks after an ovariotomy; at the autopsy the omentum was found adherent to the abdominal walls, and newly-formed connective tissue contained a grayish, viscid fluid, confined in cavities which varied in size from a pin-head to a pea. The walls of these small cysts were sharply defined from the lax newly-formed connective tissue around them. Several cysts, varying in size from a cherry to a plum, were found external to the peritoneum. Microscopical examination of both the subserous and intraperitoneal cysts revealed the histological character of newly-formed colloid cysts. Olshausen regards this case as unique, so far as the subserous cysts are concerned, and remarks that those which were near the cicatrix might be explained by supposing transplantation from some portion of the ovarian cyst, but that in other respects they cannot be explained, being entirely different from metastases into the abdominal cavity.

9. Excepting the possible complications of ovarian cysts already described, death does not usually ensue from the original tumor, but from some affection subsequently developed, such as carcinomata of other organs or of the intestines, or from pulmonary embolism,* although embolisms appear to be less frequent in cysts than in fibromata of the ovaries.

10. Dermoid cysts which by the irritation of their presence excite inflammation and form adhesions with neighboring organs, can, as a considerable number of published cases proves, after perforating the bladder, and by their evacuation cause peritonitis, and death may result. Cases of this kind have been reported by Obrien (1834), Seutin (1838), Civiale (1860), Robert Lee (1860), Humphrey (1864), Blackman (1869), Gluge, Blich-Winge, Marshall, Larrey, Hamelin, Philipps, Delarivière, Morelle (1878), de Gonelles and Vidoni, and I have given an illustration of a preparation belonging to this class, in which a number of teeth from an ovarian cyst were evacuated through the bladder.†

* Dorn, *Zeitschrift f. Gebh.*, XI, heft 1.

† Atlas, pp. 325 and 326.

e. Diagnosis of Ovarian Cysts.

When the tumors are small and movable, and are still in the true pelvis, they may be known as ovarian by their lateral position, their separation from the uterus, a band passing from the tumor to the uterus, their mobility, their elastic consistence, globular form and sometimes by demonstrating their sensitiveness to pressure. The uterus may be neither enlarged nor much displaced, nor otherwise affected, although there may be an ovarian tumor as large as a billiard ball on each side.

The diagnosis is more difficult when the tumor is closely adherent to the uterus, so that it cannot be lifted from it, and when its consistence seems to be firm like that of the uterus. A longer period of observation is usually the only means of arriving at a positive conclusion in such a case; we may then recognize the growth of the tumor, and its varying consistence, and finally, the occurrence of fluctuation. Fluctuation may apparently be very distinct, however, and yet the tumor contain no fluid, for a fatty myoma or a gelatinous carcinoma may give this sensation.

When the tumor extends above the pelvic inlet, we must first determine by palpation, percussion and auscultation whether the resistance which is felt is convex above, and also what its general contour is when its position is changed, as by the patient turning from her side to her back. It is always advisable, the patient being upon her side, and upon her back, to mark the results of the examination upon the skin of the abdomen with a colored pencil. The vascular souffle may be heard upon auscultating an ovarian tumor, though it is far less common, and generally weaker and heard over a much smaller area, than in myomata of the uterus.

Numerous cases of fluctuating tumors of the internal genital organs, which grow more or less rapidly, will require an exploratory puncture to establish an accurate diagnosis, before attempting the radical operation. The puncture is demanded, because, in the first place, the color of the evacuated fluid will indicate the nature of the tumor. If clear, it is probably from a parovarian cyst; further, should the tumor be really of this nature, puncture alone results in cure in the majority of cases, thus making the more dangerous ovariotomy quite superfluous;

recovery may follow puncture, thus obviating the necessity for extirpation, and finally, the presence of malignant elements in the fluid is usually regarded as a contraindication to laparotomy. Certain dangers are, of course, liable to result from puncture, and these will be more fully considered when describing the treatment. One mistake connected with puncture, often made by the inexperienced practitioner, which leads to error in diagnosis, is this: When a discharge of fluid does not occur immediately after the stylet is withdrawn, the canula is at once extracted and the tumor believed to be solid; but, if one will wait only a few minutes, and gently compress the tumor, a thick, tenacious, colloid substance may often be evacuated. This precaution is of especial importance in cases of dermoid cysts, because their contents are often mixed with a sebaceous material which clogs the canula. Should the contents only flow drop by drop, it suffices to confirm the diagnosis of a dermoid cyst, and also warrants certain conclusions as to its growth. A trocar of medium calibre usually answers for the puncture, and a Pravaz syringe, or an exploratory trocar, will not rarely serve every purpose.

If the tumor be unilocular fluctuation is equally distinct in all directions, and complete evacuation of the contents will so reduce its size that globular prominences can no longer be felt upon the surface. It may, nevertheless, be multilocular, provided the secondary cysts do not project outward but into the lumen of the cavity, in which case they will not form prominences on the cyst wall. Furthermore, when a number of such prominences are distinguished upon the surface of a large cyst, and these persist after puncture and evacuation of the latter, we are enabled to recognize its multilocular character, and know that the walls separating the larger and smaller cysts must be entire.

That puncture may fail as a means of diagnosis, however, was made painfully evident in an important case treated by me. I had recognized a very large fluctuating tumor which was of gradual development, the patient was a virgin, and I was certain that the uterus could be pushed away from the tumor. Her brother, who was a physician, had diagnosticated myoma, while I believed it an ovarian cyst. In his presence, therefore, I punc-

tured the tumor with a medium-sized trocar in several places, but only a few drops of blood containing no specific elements were evacuated. In consequence of the patient's menses being occasionally very profuse, we finally concluded that the tumor was a myoma. Some time after, she suddenly died with symptoms of internal hemorrhage; the autopsy showed that the anterior portion of the tumor consisted of a hard, firm, fibrous tissue, which the trocar had not penetrated, while behind this were a number of large cysts from whose inner surface profuse hemorrhage had occurred.

Of especially great importance in the examination of large ovarian tumors is the condition of the pedicle. If the tumor lies deeply in the true pelvis, the uterus displaced forward and upward, and the latter is not to be separated from the tumor, neither with the finger nor with the sound, the tumor is probably closely adherent to the uterus and has a very short pedicle. If the tumor does not project into the true pelvis, or if the pedicle be posterior to the tumor, B. S. Schultze's method of examination will often be of great service in determining the character of the pedicle.* The patient is chloroformed and placed in the dorso-coccygeal position; the index and middle fingers of one hand are passed into the rectum and over the posterior surface of the uterus, while the thumb of the same hand presses on the vaginal portion. The other hand is placed upon the abdomen, an attempt is made to pass it under the tumor to the fundus of the uterus, and to reach the pedicle between the tumor and the uterus; an assistant, standing near the patient's head, at the same time with both hands pushes the abdominal wall over the tumor downward as far as possible, and then moves the tumor up and down and from side to side. The pedicle of the tumor, or any other connection between the latter and the uterus, may be distinctly recognized by this manipulation; on the other hand, the absence of such connections is plainly demonstrated. Schultze in two instances has proved that extensive peritoneal adhesions between the tumor and the abdominal walls do not necessarily interfere

* *Centralblatt für Gynäkol.*, 1879, No. 6; 1880, No. 1.

with the success of this method, and that it is still possible to determine with certainty the character of the connections between the tumor and the uterus.

Much may be learned in regard to ovarian tumors by rectal examination; as a rule, two fingers alone are necessary. Like Hegar and Kaltenbach,* I have abandoned Simon's method of examination by inserting the hand, as it is not without danger, and, in most cases, furnishes less information than examination with the two fingers. It is obvious that œdematous abdominal walls and the presence of ascitic fluid will make this method of examination less satisfactory.

The existence of adhesions between the tumor and adjacent structures may be ascertained in several ways besides the one just mentioned. Adhesions are recognized in case of small tumors by their fixation and immobility, and by the impossibility of moving the abdominal walls over them. In repeated examinations of a case, palpation and percussion will often show the presence of loops of intestine which may have become attached to the fundus or sides of an immovable tumor, and which always have the same contour when distended. Recognition of the presence of intestines will sometimes warrant the conclusion that the tumor is chiefly subperitoneal, and that, having formed attachments with the mesentery, total extirpation will be impossible. Repeated attacks of peritonitis and obstinate constipation with flattening of the fecal masses always indicate the presence of such adhesions. Crepitation which can be felt and heard when the tumor is moved about suggests irregularities on its surface, but adhesions are not necessarily present. Adherences of loops of intestine may be distinctly felt by examination through the rectum. Notwithstanding their large size and firm consistence one will occasionally find tumors that are entirely free from adhesions. When the dislocation of the uterus is of long standing, the vaginal portion may be effaced, the body elongated, and still the peritoneal surfaces of the uterus may remain perfectly smooth and without the slightest adhesions to the tumor. We may generally conclude, however, that there are numerous adhesions when the

* "Op. Gyn.," II, aufl., p. 52.

tumor is fixed in the true pelvis, and the opposite when there is much coexisting ascites. An attempt to demonstrate the presence of adhesions by drawing the uterus away from the tumor by the sound will rarely be successful.

We cannot rest assured that the tumor has not been developed from the uterus simply because it is possible to slightly move the latter when the sound is introduced. I have on at least one occasion extirpated a fibro-sarcoma of the uterus and right ovary, in which the displaced uterus, measuring 9 centimeters (3.6 in.), could be easily sounded, and in which the fundus, through which the head of the sound was distinctly felt, could be lifted away from the tumor; nevertheless, the tumor was attached to the right side of the posterior wall of the uterus. Whenever bimanual examination fails to show the exact relative position of the uterus to the tumor, and when it becomes absolutely necessary to exclude the existence of pregnancy, it is usual to resort to the sound to reveal accurately the position, length and width of the uterus, together with the extent to which it can be moved about the tumor. It will be at once evident that the direction of the sound must correspond with that of the os uteri, and that all violence in its introduction should be avoided. The extent to which the sound can be introduced will not always necessarily indicate the real length of the organ, for dislocation may render the use of the sound difficult, the cavity may be abnormally narrow or bent, or it may be occluded by prominences in the mucous membrane. Repeated examinations by the sound may be necessary before a positive conclusion is reached.

The question as to whether one or both ovaries are diseased is easily decided when the tumors are small and still within the pelvic cavity, the uterus near or between which swellings may be felt. The larger the tumor, the more difficult the decision, for the position of such tumors may vary greatly; one may lie before, the other behind the uterus. Sometimes we will find both tumors resembling two balls, one above the other; and again, one will be on the right side and low in the pelvis, while the other is on the left side and higher up, so that their axes almost cross each other. Or, as shown in Fig. 96, the ovaries of normal size may be found on one side and near each other, being

fixed by adhesions to adjacent organs. Furrows on the surface have no diagnostic value so far as recognizing bilateral tumors is concerned. Only when two movable tumors, each having pedicle, not connected with one another, can be distinctly separated from the uterus, is the diagnosis of bilateral ovarian disease free from doubt.

The following conditions and anomalies may be mistaken for ovarian tumors :—

Pregnancy.—This confusion is possible and explicable at a time when the fundus of the uterus has not ascended half-way to the umbilicus, and when certain signs of pregnancy are, therefore, not yet present. When the abdominal walls are tense, the tumor sessile and firmly connected with the uterus, about in the median line, and of elastic consistence, as when one cyst is greatly developed, the diagnosis will rest mainly upon repeated examinations and close observation, and especially upon the rapid growth of the tumor ; in such cases the sound cannot be employed. As the tumor continues to grow, however, we can usually feel nodules upon its surface. In any case, every method of examination at our command should be employed ; we must be particularly careful in the examination and withhold a decision for a time, especially when the patient is old or very young.

Muscular Tumors.—These are often found in combination with ovarian cysts and are then very difficult to differentiate. They vary from ovarian cysts in their closer connection with the uterus, in their firm consistence and uniform hardness, provided the cysts be very elastic or fluctuating ; but in the early stages the latter are often so hard and immovable that the confusion is excusable, and continued observation alone will show the diminished firmness of the walls and the fluid character of the contents. Exploratory incision and puncture may finally be resorted to to determine the nature of the tumor. When puncture is employed, the canula must not be too short and it must be inserted in several places, provided nothing is discharged from the first punctures. We may, finally, have recourse to auscultation. In two-thirds of all myomata coming under treatment, the vascular souffle can be readily detected ; but it is present in scarcely 1 per cent. of

ovarian cysts. Myomata grow much more slowly than cystomata, and are oftener associated with profuse menorrhagia.

Cysts of the Uterine Wall.—Such cysts are shown in plate viii, p. 370, of the author's *Pathologie d. Weibl. Sexualorgane.* They are usually small and would scarcely be mistaken for ovarian cysts. With echinococci of the true pelvis the case is different, as these tumors and the ones affecting the peritoneum of Douglas's cul-de-sac are differentiated from ovarian cysts by their fixation and immobility, by the displacement of the uterus forward, by its elevation without alteration of the direction of its lips, and by the existence of numerous similar nodules above the pelvis. The diagnosis will become clearer by the examination of the liver and by the presence of fluid in the abdominal cavity, by the history of the case, by finding similar tumors in the pelvic connective tissue, and the ovaries in their normal position. But this differentiation is more easily described than accomplished, and in many cases we will be compelled to resort to exploratory incision to remove all sources of doubt.

Retrouterine Hematocele differs from ovarian tumor in its irregular form, and in the consistency of the tumor in Douglas's cul-de-sac, which is first elastic and then becomes firm and hard, while the converse is true of ovarian tumors. Again, hematocele usually occurs suddenly, being accompanied with violent pain and symptoms of local or general anemia ; but it is possible that perforation and evacuation of small cysts may cause like symptoms. In retrouterine hematocele the uterus is generally pushed forward close behind the symphysis, is somewhat elevated and compressed. The continuous sanguinolent, brownish discharge, and its origin subsequent to menstruation, are also characteristic of hematocele. In all cases in which there is a possibility of the tumor being a retrouterine hematocele, the exploratory incision should not be attempted, for the evacuation of even a small quantity of the contents may cause a recurrence of the hemorrhage, with decomposition and death from infection.

Parametritis is differentiated from ovarian cyst in a manner similar to that just described.

Hydrops Tubæ.—Dropsy of the tube, as has been stated, may assume such dimensions as to be mistaken for an ovarian cyst,

nine quarts of fluid having been evacuated from such a tube. Its extramedian position, the thinness of the walls, the compound nature of the tumor, the presence of the ovaries elsewhere and, finally, puncture revealing the non-colloid nature of the contents, are characteristic of the dropsical tube. This tumor may, however, contain cylindrical cells, and the fluid may be very similar to that of ovarian cysts. In doubtful cases the diagnosis will rest upon an exploratory incision.

Parovarian Cysts are even more easily mistaken for ovarian cysts. These tumors are generally thin-walled and unilocular. Their connection with the uterine appendages must be ascertained; they usually contain a very clear fluid of low specific gravity, which is either free from or contains but little albumin; ciliated epithelium and a few blood corpuscles are the only formed elements present. Here, as elsewhere, there are exceptional cases, in which the contents cannot be distinguished from those of an ovarian cyst. Palpation of an ovary which lies upon the cyst is likewise not conclusive, for we occasionally find cystomata with a remnant of the normal stroma still present, and it is extremely difficult to isolate the ovary from the cyst.

Tumors of the Rectum and of the Bladder are much less common; they are usually firmly seated in the walls of the respective organs, and, when adherent to ovarian cystomata, might appear to be primary affections of the bladder or rectum until the diagnosis is made by evacuation of its contents. Of tumors of the bladder we need mention only the extremely rare myomata of the wall and primary carcinomata, the latter causing such characteristic symptoms that they ought not to be mistaken for anything else. Nevertheless, I know of one case in which a large papilloma of the posterior wall of the bladder was thought to be an ovarian tumor, though papillomatous masses in great quantities had for a long time passed away through the urethra. It was believed that an ovarian papilloma had perforated the bladder. In such cases a positive knowledge of the condition can only be obtained by dilatation of the urethra and palpation of the inner surface of the bladder.

Tumors of the Pelvic Bones.—Fibromata, enchondromata and carcinomata of the bones of the pelvis are recognized by their

slow growth and immovable connection with these bones, which are always enlarged. Bimanual examination will show the ovaries to be in their normal position and of normal size. In our own experience there occurred the following mistake: A patient had been treated for years in the clinic and polyclinic of this city for a tumor which was closely adherent to the right ilium, and which suppurated and was evacuated by puncture. The woman stated that it had resulted from a contusion. The pus contained no specific elements. Palpation of the uterine appendages on the corresponding side gave negative results. The tumor seemed to have grown from the bone or periosteum, but the autopsy revealed a suppurating ovarian cystoma.

Tumors of the Kidney.—Hydronephrosis, echinococcus and floating kidney have often been confounded with ovarian cysts, but these tumors have no pedicle which can be followed down into the pelvis, and their position is extramedian. With complete anesthesia they can be lifted out of the pelvis. They will generally have been present for a long time; the patient first notices them to the right or left of the umbilicus, and growing from above downward. The intestine lies either in front or passes diagonally across them, while it would be at the side of or behind an ovarian cyst. Should the diseased kidney still be in communication with the bladder, then it is often possible, after evacuating the latter, and exerting strong pressure upon the tumor, to force some purulent urine through the catheter left into the bladder. I had such a case under my observation for a long time. The urine in such cases must be carefully examined as to its quantity, color and odor, and the proportions of blood, pus, cylindrical casts, etc., contained in it. Sometimes the diagnosis will be established by exploratory puncture, especially when the fluid thus obtained contains either large quantities of urea, or is clear, colorless, of low specific gravity and contains a minimum of albumin, grape sugar, fragments of membranes, hooklets or scolices. The enlarged movable kidney is bean-shaped; the hilum may be outlined, and the tumor is firm and somewhat sensitive. There is a tympanitic resonance in that part of the lumbar region where the kidney should be found, and the latter can usually be pressed upward to the liver as easily as downward to the pelvic inlet,

without a pedicle being distinguished. The patients have attacks of partial syncope, extreme weakness, nausea and vomiting, and these symptoms suggest torsion of the ureter and retention of urine.

The Spleen may be so greatly enlarged by neoplasms or other causes that it extends down to or even into the true pelvis. I have repeatedly punctured a splenic cyst, which following calcareous degeneration occurred; the tumor was as large as the fist, and reached the anterior wall of the retroflexed uterus, and could be pushed upward from the true pelvis to the ribs on the left side; both ovaries could be palpated. The spleen, enlarged by leukemia, may likewise descend into the pelvic cavity. In all such cases confusion will be avoided by giving due attention to the extramedian location of the tumor, to the depression in its right anterior border, to its consistence and to the anemia.

Simple Ascites has been mistaken for ovarian cyst even by reputable ovariotomists, and relieved by laparotomy. The points of difference are as follows: In the dorsal position, the area of dulness is convex above in ovarian cyst, while it is concave in ascites. Secondly, there is a change in the dulness, and it may possibly completely disappear, when the patient is turned upon the opposite side. There is fluctuation at all points, and even above the boundary line previously marked out on the abdomen. The abdomen is flat above and bulges at the sides in ascites. The history of the case should of course receive due consideration in forming a diagnosis. There is a marked difference in the nature of the fluid in the two affections. That of ascites is of low specific gravity, varying from 1010 to 1015, thin, clear, greenish or yellowish in color, contains fibrin which forms a delicate, jelly-like coagulum after some hours, pavement epithelium and microscopical colorless cells also being present. Ovarian fluid contains albumin, paralbumen, pseudomucin, cylindrical cells and cholesterin, while its specific gravity may be above 1070. The differential diagnosis between ovarian cyst and encapsulated ascites, or encapsulated collections of pus, is more difficult. The history of the case, orign of the tumor, the temperature record, exploratory puncture and incision may all be required to establish the diagnosis.

I have frequently been compelled to deny the existence of ovarian tumors, even after they were said to have been repeatedly punctured. In the autumn of 1865, a patient was sent to me from the City Hospital in S——, where she had been four years, because of a large abdominal tumor. The tumor was considered malignant, for occasional hemorrhages had occurred in various parts of the skin of the abdomen, legs and arms. The patient was only twenty years old, but suffered so much from meteorism that she could scarcely move; and she was sent to my clinic in a special ambulance! She so well understood how to inflate the stomach and intestines, and to render the fat abdominal walls tense, that an examination was almost impossible. Percussion of the thick layers of fat gave a feeble, tympanitic note. We finally succeeded, however, in overcoming the tension, and palpating the spinal column through the abdominal walls, and proving beyond a doubt that there was no tumor whatever present. In four weeks she was able to walk, and was completely cured without the necessity of resorting to an operation.

In another case alcoholism had produced great obesity in a washerwoman. She had been punctured a number of times in the hospital, but only a few drops of bloody fluid escaped; we found the ovaries normal and saw no reason for performing ovariotomy, though she had been sent to us for this purpose.

Tumors of the Abdominal Walls and of the Parietal Peritoneum may, if they arise in the lower half, especially close to the pelvic inlet, and from the transversalis fascia, push the peritoneum inward so that they can be felt in the true pelvis, and may be mistaken for ovarian tumors. I have examined four such cases, and performed three successful operations. One must determine from the history of the case the point of origin, as to where the patient first noticed the tumor, and must recognize its firm connection with the abdominal walls, the skin being generally closely adherent to the tumor. The form of the abdomen is different from that seen in ovarian tumors. The contour of the tumors is more sharply defined, and does not change with the respiratory movements.

A distended bladder, especially with retroflexion of the gravid uterus or a retroflexed uterus, may be mistaken for an ovarian

tumor. I will refer the reader who desires a detailed account of all possible sources of error in such cases to Olshausen's *Krankheiten der Ovarien*, pp. 135–160. In conclusion, I wish to call attention to the possibility of erring in the diagnosis of encapsulated collections of pus, such as occur in tuberculosis of the tubes and peritoneum. The subject has been fully described in the chapter on affections of the tubes, p. 504.

f. Ætiology.

Unilateral or bilateral ovarian cystomata may be present in fœtal life, and I have such a preparation in my collection, shown in Fig. 18, p. 225. The Munich collection contains the specimens from two cases of bilateral congenital ovarian cysts, which are shown in Figs. 98, 99 and 100. Kiwisch saw the disease in a child of 1 year; Carr and Alcock, in one of 3 years; Wells and Goodrich, in one of 8 years; Baker Brown and Marjolin, in one of 11 years; Wegscheider and Jouijon, in one of 12 years. The disease is of rare occurrence before puberty, but after it the number of cases increases with each decade, the greatest being found between the thirtieth and fortieth years. The unmarried seem especially liable to this affection; according to Peaslee, S. Lee, Scanzoni, Wells, Nussbaum and Olshausen, 510 cases occurred among unmarried to 730 in married patients.

According to Olshausen, the greatest predisposition among the married is found in the third, fourth and even in the fifth decade, while among the single the predisposition is quite as great just after the twentieth year. Veit and Peaslee therefore concluded that pregnancy and lactation afford a certain temporary immunity from ovarian cystic disease, while the menstrual congestion favors its development. The question as to whether women with ovarian tumors are more frequently sterile than others cannot be positively answered; examples have already been given to show that women with bilateral ovarian disease may conceive; I have repeatedly seen conception occur when there was a very large tumor of one ovary. Nevertheless, so many patients with small ovarian tumors, either unilateral or bilateral, have come to me solely on account of their being sterile that I am convinced they are a very common source of sterility. Ovulation is interfered

with, the number of ovules diminishes, the dislocation of the uterus and tubes aids the sterility, and, above all, the chronic inflammatory condition in the vicinity of the tumor does much to hinder conception (see Fig. 102).

J. Simpson, Rose, Lever, Boivin and Olshausen have published cases in which several sisters have been affected with ovarian cysts; I have also seen such instances. One might therefore conclude that heredity exerts some influence.

The statement that one ovary is more frequently affected than the other cannot be confirmed by statistics, as both are equally liable. The disease is generally unilateral, but in 6 to 10 per cent. bilateral. My experience in the Dresden polyclinic has given the following results: Among 2380 patients, 116, or 4.8 per cent., suffered from ovarian tumors.

At the time of beginning treatment—

From the	10th	to	20th	years	there were	5	cases or	4.3 per cent.
"	20th	to	30th	"	"	29	" or	25.0 "
"	30th	to	40th	"	"	36	" or	31.0 "
"	40th	to	50th	"	"	34	" or	30.0 "
"	50th	to	60th	"	"	9	" or	7.7 "
"	60th	to	70th	"	"	3	" or	2.6 "

Thus almost two-thirds of all cases appeared between the thirtieth and fiftieth years of age. There were 8 virgins and 19 nulliparæ; parous women, abortions only, 3.7 per cent.; abortions and normal confinements, 23.4 per cent.; and normal confinements, 72.9 per cent. The number of deliveries among I.-paræ were 21, or 26 per cent., as against 22.1 per cent. of II.-paræ; II.- to V.-paræ were 45, or 55 per cent., as against 55.4 per cent. of VI.-paræ; VI.- to X.-paræ were 13, or 16 per cent., as against 22.5 per cent. of XI.-paræ; XI.- to XV.-paræ 2, or 3 per cent. According to these tables the fertility of women who bore children was not small. The number of sterile patients, 16 per cent., is rather large. I found the disease to have been bilateral oftener than stated by Olshausen, viz., in 12 out of a total of 116 cases, or 10.3 per cent. Ovarian cysts, when congenital, are generally dermoid. In 18 cases, Piqué found 3 premature births, 4 fœtuses at term, 6 children under two years and 5 under twelve. They are usually discovered at puberty.

With regard to the frequency of ovarian tumors in the dead subject, I found cysts of all sizes to be present in 9.5 per cent. of the cadavers examined. Of 50 such tumors there were 34 simple cysts, 2 oligocystic tumors, 10 proliferating cystomata, 1 papillary cystoma, 1 dermoid cystoma, 2 cysto-carcinomata. The most frequent complications were myomata (18 per cent.), adenomata (4 per cent.) and carcinomata of the uterus (8 per cent.). Other complications were adhesions in the vicinity of the tubes, ovaries and uterus, especially upon the diseased side. Atresia of both tubes was not uncommon.

g. Treatment of Ovarian Cysts.

As long as an ovarian cyst is small or not suitable for operation, or the patient refuses to consent to its removal, medical treatment, internally and externally, is appropriate. Many ovarian tumors may thus be lessened in size or even cured. I have repeatedly employed and can recommend a solution of iodide of potassium (10–15 : 200), with which cotton is saturated and then placed in the vagina. The remedy may also be given by the mouth in the dose of 3 grains, and should be continued until iodism is produced. One of my patients who had an ovarian tumor on the left side about as large as an apple, and who had been sterile for eight years, was treated by the tampons until the appearance of a coryza; this treatment materially lessened the size of the tumor. She at once became pregnant on ceasing the use of the remedy, and went to full term. During her pregnancy the tumor did not increase, and for a period of eight years following her confinement it still remained stationary, after which I lost sight of the patient. Some of my patients have been much benefited by the baths of Kreuznach, Hall, in Upper Austria, and Tölz. In one case of dermoid cyst the tumor became smaller, and remained so for five or six years, when it again began to grow. The baths exerted likewise a favorable influence upon the inflammatory symptoms. Since the publication of my work on the sexual organs, in which I mentioned that I had never seen an ovarian cyst completely cured by these baths, I have had the opportunity of observing such a result in the case of a patient with an ovarian tumor about as large as an apple, in which the ovary was reduced

almost to its normal size. I wish, therefore, to correct this statement. It is, of course, understood that the patient should employ to their fullest extent all the auxiliary means of treatment. The depletion, however, must not be carried to the extent of weakening the patient. Abdominal compresses and painting with the tincture of iodine are useful in inflammatory complications of the peritoneum.

The patient must remain quieter than usual during the menses, and pay attention to free action of the bowels.

Inflammatory symptoms in small tumors should be treated as in a case of pelvic peritonitis, and this also is true of accidental perforation of the cysts, if immediate ovariotomy be not permitted. The patient must be placed in the horizontal position, kept absolutely quiet, have ice-bags applied, and given castor-oil and afterward tincture of opium, or morphia administered hypodermatically, as required.

Puncture.—Evacuation of the contents of the cyst that have escaped, by means of a trocar and canula, would be decidedly more dangerous, because of incomplete discharge, than immediate ovariotomy.

As the mortality from ovariotomy is now scarcely 10 per cent., tapping has become very much restricted. I have, nevertheless, often had very favorable results from ovariocentesis in those small cysts which produced much pressure, tension and pain in the pelvis. Vaginal ovariocentesis is done in the following manner: The patient being placed in the dorso-coccygeal position, the vagina is thoroughly disinfected with a 2 to 5 per cent. solution of carbolic acid; the contents of the rectum and bladder should have been previously evacuated. While an assistant fixes the tumor from the outside of the abdomen, the operator introduces one or two fingers of the left hand into the vagina and locates the point of fluctuation. The walls of the vagina and tumor are then punctured with a long, curved trocar, the canula being guided by the fingers placed within the vagina. Withdrawing the stylet, the fluid may be allowed to run into a vessel, or an aspirator may be used as a substitute. The canula may be withdrawn by exerting moderate counter-pressure upon the vaginal wall with the fingers of the left hand. It is not necessary to

tampon the vagina. The patient must remain quietly in bed for several days.

When puncture is to be made through the abdominal walls, Potain's or Bresgen's apparatus should be used to prevent the admission of air into the cyst. An elastic tube attached to the canula of the Bresgen apparatus passes into a vessel of water ; before puncturing, the tube and canula are filled with water, and the stylet is then passed through the canula into the abdomen. After perforation of the cyst, the trocar should be withdrawn only far enough to allow the contents of the tumor to flow through the tube; the end of the tube must remain under water until the cyst is emptied. The usual precautions are observed, and the patient should remain in bed from four to six or eight days. The dangers connected with the operation are suppuration, sloughing of the cyst, opening large vessels in the walls of the abdomen or tumor, and consequent hemorrhage, and acute peritonitis from escape of fluid into the abdominal cavity. But these dangers may, in a great measure, be avoided by using a suitable aspirating apparatus with short needles of small caliber, and observing all antiseptic precautions; in doubtful cases ovariotomy must be performed at once. Tapping is frequently indispensable, not only from a therapeutic, but also from a diagnostic standpoint.

Thornton disputes this statement. Spencer Wells, however, is an advocate of tapping in unilocular cyst.

I usually tap the day before operating on large tumors; first, in order to lessen their size, so that the abdominal incision may be shorter, and, second, to reduce the tension of the abdomen, thus preparing it for the removal of the entire tumor.

As to the proper time at which the major operation should be done, it was formerly held that it ought to be deferred until the tumor had reached the level of the umbilicus, but this rule is no longer observed; tumors as large as an orange should be removed as soon as they cause much suffering. The operation is contraindicated when the tumor is malignant and the disease has extended to the uterus, intestines or peritoneum, in short, when it is no longer limited to the ovary. The operation is not absolutely contraindicated when the tumor remains chiefly intraligamen-

tous, between the folds of the broad ligaments, or has grown upward under the pelvic and abdominal peritoneum; nor are extensive adhesions, *per se*, a contraindication. As a rule, the operation should not be done when grave, acute or chronic affections, such as cavernous lungs, coexist in other parts of the body, or if the patient labors under extreme exhaustion. Nevertheless, I have operated upon patients who are yet alive but who were at the time so weak that I feared that they would not even survive the anesthesia; one must, therefore, not lose hope too soon nor neglect at least making an attempt to save such patients. Old age is no more a contraindication than extreme youth. That pregnancy is no contraindication is proved by fourteen cases collected by Olshausen and by eleven by Hegar. I have twice performed ovariotomy upon pregnant women, the patients recovering and miscarriage not occurring. In the second case, the tumor was very generally adherent and was situated directly above the uterus, thus preventing the latter from enlarging upward; at the time of the operation the organ partially protruded from the vagina. The results of ovariotomy upon pregnant women are quite favorable, as is shown by the recent statistics of Bennett, Cayla, Crawford, Galabin, Golenvaux, Howitz, Storry, Wilson and Zagiell.

For a description of the operation, preparations for its performance, with complete details of the various methods and the subsequent treatment, I must refer the reader to the treatises of Hegar and Kaltenbach and of Olshausen. I will simply describe the operation as performed by myself, not because it differs from that of others in any essential particular, but because in it is carried out every detail of the Listerian method. The preparation of the patient, especially if she is much emaciated or has a dry, scaly integument, consists in placing her in a warm bath the day before the operation is to be done, and in repeatedly and thoroughly evacuating the bowels. On the morning of the day for operation, she takes some coffee but is allowed no solid food. To avoid all sight of the preparations, she is not brought into the operating room until after being completely under the influence of chloroform; the bladder is evacuated by the catheter immediately before. She should wear a chemise, a jacket, warm

drawers and stockings, and after being placed upon the operating table, which has been well warmed with bottles containing hot water, she is covered to the pubic symphysis by a woolen coverlet or a blanket.

The operating room should be airy, high, well-lighted, easily warmed and perfectly aseptic. During the day preceding the operation several quarts of a 5 per cent. solution of carbolic acid are sprayed for two to three hours in the room. Other operators use a 10 per cent. solution, filling the room with the spray; have the ceiling and the entire room scrubbed with lye and, finally, everything washed with a concentrated solution of carbolic acid before each operation. The articles needed in the room are the operating bed, a table for the instruments, which latter are placed in a 2 per cent. solution of carbolic acid, a long table for sponges, ice, atomizer and concentrated solutions of carbolic acid, a small table with ether, a mouth-gag, a Pravaz syringe, electric battery, and the large steam spray-apparatus.

I invariably operate in the room in which the patient is to remain, and upon the bed which she is to occupy after the operation. The surface of the bed is elevated by the addition of two horse-hair mattresses, being also well protected by oil-cloth so as to remain perfectly dry; by thus raising the bed the operator altogether avoids stooping. After applying the final dressings, the operation having been completed, the bed containing the patient is rolled into the most protected part of the room.

When the instruments have been previously used, they must be heated until they are aseptic, and placed the day before the operation in a 2 per cent. solution of carbolic acid. I always operate under the spray, and see no reasons for abandoning it. The instruments used for the abdominal incision consist of scalpels, grooved directors, catch forceps, tenaculum forceps, Köberle's hemostatic forceps, straight and curved scissors, tenacula and retractors. To diminish the size, to separate and extract the tumor, we employ a Köberle's or Spencer Wells's large trocar, assorted sizes of smaller straight and curved trocars, large transfixion needles carrying a long, doubled thickness of any heavy ligature material, a Museux's forceps and the forceps either of Spencer Wells, Martin or Nyrop.

The following articles are required for the treatment of the pedicle: Spencer Wells's clamp, large transfixion needles, long-handled blunt forceps, to pass into deep cavities, forceps to grasp and compress the stump, Spencer Wells's compression forceps, and the Paquelin cautery, besides a number of sponges and ligatures. The forceps of Martin and Nyrop are especially important and useful for the extraction of the tumor; they are great improvements on those of Museux and Nélaton, because the grasp upon the tumor is firmer and stronger, and, being deeply grooved upon the inner surface, they do not tear the walls of the cyst. Other operators are not in the habit of using as large an armamentarium as the one just mentioned. A. Martin, for example, employs a scalpel, a pair of scissors, a number of large and small needles, a needle-holder, several tenaculum forceps, Museux's forceps, a large pair of dressing forceps and hemostatic forceps of various sizes. In this list I should greatly miss the Nyrop's forceps and the temporary clamp for the pedicle.

It is required that the operator and his assistants observe certain precautions: I perform ovariotomy in the early morning, and make it the first operation. On one occasion only have I performed two ovariotomies on the same morning, and both patients recovered. The person and clothing of the operator must be perfectly clean; it is advisable, though not indispensable, to take a bath just before the operation. Upon entering the operating room, I first wash my hands in a 1 : 1000 solution of corrosive sublimate, at the same time using the nail brush. I then draw on a large gutta-percha apron over a fresh linen suit, bare the arms to the elbows, and disinfect the front of the apron, the hands and arms. Next I stand directly in front of the spray and thus disinfect my face, hair and beard; allowing time for these parts to become dried, I perform the entire operation under the spray. This method of preparation seems to me to be of great importance, because it is carried out immediately before the operation. I have at least four assistants; one administers the chloroform, the second aids in the operation, the third manages the spray and the fourth hands the instruments; under certain circumstances, however, the third and fourth may be dispensed with. I have never yet insisted that all of the assistants and

spectators should wear perfectly new linen suits, and have taken a bath; it is possible to go to extremes in this matter. None of the spectators should have suspicious wounds upon their persons, nor have recently attended a post-mortem examination, and all who come in contact with the patient or the instruments must be as thoroughly disinfected as the operator. There are other precautions observed by various operators, such as avoiding the use of gloves, or attending cases of abortion, using a respirator, etc., but these I consider superfluous.

The Operation.—The anesthetic may be ether, chloroform or a mixture of the two. I have little fear of the formerly dreaded vomiting. I always have during chloroform narcosis a syringe filled with ether at hand, and it is injected at once if symptoms of weakness or collapse appear. Some operators stand to the right of the patient and others to the left. A. Martin sits between the thighs. I usually stand upon the right side. When anesthesia is almost complete, the spray is directed upon the abdomen, which is then thoroughly washed with soap and with a 5 per cent. solution of carbolic acid, the mons veneris included; the abdomen is lastly bathed with undiluted alcohol. A. Martin applies fresh lemon juice to the skin before using the wash of carbolic acid. Towels soaked in the carbolized solution are then placed transversely across the mons veneris and the upper part of the abdomen. It is not necessary to shave the vulva.

The abdominal cavity should be opened as rapidly as possible, the incision being made in the linea alba. Bleeding vessels can be twisted by the forceps; if the hemorrhage is only slight, this is not necessary. It is certainly good practice not to open the peritoneum until the hemorrhage from the wound has entirely ceased; still it is not always necessary to follow this rule, because when the cyst is evacuated the tension of the abdominal walls is diminished, and the venous hemorrhage soon ceases. All the large veins should be doubly ligated and the incision made between the ligatures.

If the abdominal incision has not been made between the recti muscles, the latter should be drawn either to the right or to the left, until the aponeurosis between them is found; if this is impossible, the muscle should be cut through longitudinally.

We often believe that the parietal peritoneum has been divided before such is really the case. When the adhesions are extensive, this structure may be difficult to differentiate, and it is better to pass the knife directly into the tumor than to risk a separation of the peritoneum from the anterior abdominal wall. The parietal peritoneum usually contains some fatty tissue, and may be recognized by its loose connections, its bulging, or often by the fluid which is accumulated behind it. The opening into the peritoneum is made with the scissors after lifting it up with a tenaculum-forceps. The incision is then enlarged with the scissors, which is guided by the tenaculum-forceps, a director or one finger. The anterior wall of the tumor is now drawn closely against the abdominal walls by several double tenacula, after which a Köberlé trocar is passed into that part of the wall at which fluctuation is most distinct, and the fluid allowed to run into a vessel standing near the bed. The tenacula are not removed until the cyst having been well evacuated, the trocar is fastened to the cyst by means of the tenacula belonging to the instrument. As soon as enough fluid has escaped from the cyst to relax its walls, it should be grasped by one or two Nyrop's forceps, as these instruments are the best with which to draw the tumor out of the abdominal opening. During this stage of the operation the existence and location of adhesions should be carefully sought.

If traction upon the tumor brings into sight omental or intestinal adhesions, they are to be secured by a double ligature of silk or catgut and divided. This must be done with great care, and the surfaces of the incisions closely examined, especially in the case of extensive omental adhesions. It has been proved that the whole omentum may be excised without lessening the chances of recovery. But why should an organ be removed which, through its closely-lying plexus of large bloodvessels, is such a protection and so important a source of warmth to the abdominal viscera? On the contrary, I believe that the omentum should be left. If the cyst is adherent to the intestines in such a way that they cannot be separated without injury, a portion of the cyst wall may be permitted to remain.

When the contents of the cyst are tenacious and too thick to be evacuated by puncture, or if a number of small cysts are

present, the opening into the tumor should be enlarged and the hand partly introduced, the septa broken down and the contents emptied out, while the tumor is brought through the abdominal wound. By this method we avoid extending the abdominal incision, or introducing the hand between the surface of the tumor and the abdominal viscera. As a rule, the hemorrhage from the ruptured septa is slight, but should large vessels be torn, by rapidly extracting the tumor and ligating its pedicle, no great loss of blood will follow. I have, in two instances, removed cysto-sarcomata of the ovary by this method, both patients recovering. The repeated introduction of the hand between the tumor and the abdominal organs is in many cases unavoidable, because the adhesions may be very extensive, especially on its posterior surface, and because the walls of the cyst are so easily torn that it is impossible to make traction upon them. In such cases it may be possible to separate the cyst from the adjoining organs by grasping the wall and throwing it into folds from the inside, as suggested by Nussbaum; but it seems to me that we are more liable to lacerate the abdominal viscera than if the adhesions are divided from the outside, at the same time exerting a moderate traction upon the wall of the cyst. Large non-vascular adhesions, when they cannot be seen and divided by the knife, may be broken up by a rubbing or sliding movement of the fingers.

When the tumor has been brought through the abdominal opening one assistant should press the edges of the wound tightly around the pedicle while the other holds the tumor to one side, or perpendicularly if the pedicle be short, to avoid any laceration until it has been divided.

The methods of treating the pedicle were formerly very complicated. I have in some instances united it to the abdominal wound; in other cases I have used the clamps of Clay, Spencer Wells and Köberlé, but for the last ten years I have employed the intraperitoneal in preference to any extraperitoneal method. When the pedicle is not too thick it should be grasped in Spencer Wells's clamp and the tumor removed about ½ centimeter (⅕ in.) above it. The pedicle is then ligated below the clamp in from two to four sections. The ligatures

may be prevented from slipping by passing the two external ones through the edges of the pedicle instead of over them. While an assistant holds the ends of the ligatures the operator divides the pedicle by passing Hegar's knife, the Paquelin, or the wire of the galvano-cautery just beneath the clamp. The surface of the wound should then be examined, and if bleeding vessels are found they must be ligated.

When the hemorrhage is stopped, and drops of blood no longer appear upon the surface of the pedicle if pressure is made upon it, the other ovary and tube should be carefully examined. If these organs are normal, the abdominal and pelvic cavity are thoroughly sponged out, removing all foreign material. In the meantime the pedicle becomes relaxed, and it should again be examined to see whether its surface is entirely free from blood. If none is found it is then washed with a 5 per cent. solution of carbolic acid, the ends of the ligatures cut off short, and the stump dropped into the pelvic cavity. Cauterization of the pedicle is unnecessary.

In some cases, when the pedicle is not too thick, another ligature may be applied around it at a lower level, slipping being prevented as previously stated, by passing the ligature through the tissues.

Hegar advises the application of the actual cautery to the surface of the stump, but I do not think it necessary. Neither do I insist upon such a minute examination of Douglas's cul-de-sac as is directed by some operators, agreeing on this point perfectly with the views stated by A. Martin.*

In many cases, ovariotomy is not so simple an operation as might be thought from this description, because almost insurmountable difficulties may be met with. When portions of the tumor project into the true pelvis and cannot be lifted out they may be constricted by an elastic ligature, an écraseur, or Spencer Wells's clamp for provisional compression, and the tumor removed above them. The pedicle should then be ligated at a lower level than usual, and the remainder of the tumor removed above the last ligature.

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* *Loc. cit.*, p. 403.

The tumor may have no pedicle, having either partially or completely grown into the folds of the broad ligament—partially, when the folds of the ligament are still in connection with each other; completely, when the tumor has separated them and penetrated into the pelvic connective tissue. In such cases, that portion of the cyst which separates the layers of the broad ligament should be completely evacuated, and the walls of the sac then folded on the inside as if they were to be separated from the peritoneum, thus forming an external fold in the latter. Before the tumor is removed this fold is united from the outside towards the median line by sutures placed about 1 centimeter ($\frac{2}{5}$ in.) apart. The two folds of peritoneum will in this manner be united by sutures before they are divided by the knife, thereby avoiding opening the pelvic connective tissue. The sutures must be strongest near the uterus, and, after they are in position, the remaining portions of the cyst wall are removed.

If the tumor has penetrated so widely and deeply into the retroperitoneal tissue that it is impossible to unite the divided peritoneum behind it as has been described, we may pursue one of the following methods: Olshausen advises that the secreting surface be dissected off, and enough of the outer wall of the sac allowed to remain to close the gap in the peritoneum. I have also followed Schröder's suggestion for this complication, and only partially extirpated the tumor, drawing the cyst wall forward, throwing it into folds turned towards the interior of the sac, and uniting them by sutures to each other and to the upper angle of the abdominal wound. The bottom of the sac must then be drained through the vagina or the abdominal wall.

Extensive adhesions between the tumor and the anterior abdominal wall may usually be separated with the fingers; large vessels are ligated, and parenchymatous hemorrhage checked by circular sutures constricting the bleeding surfaces. If there are adhesions to the intestines, pieces of the tumor should be left attached, and hemorrhage controlled by sutures. Lesions of the serous membrane are united by the finest catgut. If they cannot be brought together, A. Martin arrests the hemorrhage by applying dilute iron solution, or oil of turpentine. The elder Martin succeeded in stopping a hemorrhage from a lacerated

liver by liquor ferri, and the patient recovered. The most troublesome hemorrhages are those occurring from torn adhesions in the true pelvis. The bleeding surfaces should be united by continued sutures as far as possible, or they may be attached to the uterus; they should also be mopped with diluted iron solution, and finally, in all such cases, at least, drainage through the vagina should be employed. For this purpose, the intestines must be lifted out of the abdominal cavity and placed upon the upper portion of the abdomen, being supported there by a cloth dipped in a warm carbolized solution, until the operation is completed.

If the other ovary be diseased, *i. e.*, if there be a neoplastic formation affecting the entire organ, and not merely a few dropsical follicles, it must be removed in the same manner as the first. When the ovary is but partially diseased, the affected portion only should be removed, and the healthy tissue allowed to remain, so that the woman will yet menstruate, conceive and bear children. If a diseased tube requires removal, the sound ovary should likewise be taken away, for it is useless.

I have performed secondary ovariotomy upon three patients only; two had been operated upon by myself. My incision was made, as at first, in the median line, and not, as Hegar advises, parallel to the previous one, from 2 to 3 centimeters (.8 to 1.2 in.) nearer the diseased ovary. I excise a portion of the cicatrix, because in doing this the predisposition to abdominal hernia is, at least, not increased, and possibly is entirely prevented. The recovery was as rapid in each case as after the first ovariotomy.

After the abdominal cavity has been thoroughly cleansed, the incision in the walls is united. I have employed sutures of silkworm-gut for many years. All the sutures are passed through the entire thickness of the wall, including the peritoneum, 1.5 centimeters ($\frac{3}{5}$ in.) apart. A. Martin places a sponge in the abdomen beneath the incision, introduces his sutures, and before fastening them, removes it; I do not consider this essential. The closer and firmer we make the sutures, the less danger there is of abdominal hernia. Interrupted sutures answer every purpose; others are not so convenient, require more time and give no better results.

When the wound is closed the abdomen should be washed and dried, and the dressings applied. A strip of protective silk is placed upon the wound, over it several layers of iodoform gauze, the latter being covered with a layer of salicylated cotton thick enough to fill out the inequalities of the abdominal walls. These are held in place by a bandage of mackintosh applied to the lower half of the trunk, and the whole covered by a roller of gauze which has been dipped in a solution of carbolic acid. A few turns of the last bandage should pass around each thigh, so that the lower part of the dressing will not be displaced by the movements of the patient. This, firmly applied in the manner described, is the best safeguard against meteorism. If a drainage-tube has been placed in the abdominal wound, it should be covered with cotton and left under the layer of mackintosh, as Hegar also arranges his glass drains; or, if it be of rubber, its outer extremity should be placed between the layers of cotton. The discharges are absorbed by the cotton, and the dressing can thus be allowed to remain for five or six days. The drainage-tube may also be placed so that it will open upon the surface of the dressings, thus removing every obstacle to the discharge of the secretions.

After-Treatment.—The patient, especially if anemic, should be warmly covered after the operation; she should remain in the same bed and room in which the operation was done, and have warm-water bottles placed about her. For seven days her diet is to be liquid, and it should be only small in amount, so as to secure rest for the stomach and bowels: milk, *bouillon*, thin soups, the yolk of an egg, tea and dilute red wine, in very small quantities, will be quite sufficient. Vomiting will be treated by giving small pieces of ice. She should empty her bladder in six or eight hours, and if this is impossible, the urine should be drawn off with a catheter.

The administration of medicine is rarely necessary. In many cases I have not at all used narcotics, especially morphia. The nurse must not leave the patient during the day or night. The bowels should be evacuated in 5–7 days by injections of warm water; if these prove ineffectual, 2–3 capsules of castor-oil may be given.

The first dressing will remain from ten to twelve days, and then be removed, together with the sutures, under the spray. After this a new dressing is applied as before, which should remain until the twenty-first day. In the meantime a thick bandage should be prepared and applied, to reach from the mons veneris to the pit of the stomach, and lacing in front; it should also button behind, and have two bands passing around the thighs to prevent it from slipping up.

In the second week the patient may be allowed gradually to return to her usual diet. She should not leave the bed until the end of the third week. The tendency to the development of abdominal hernia is guarded against by securing regular and easy defecation.

About the time that the first dressing is changed, we frequently observe that the temperature, hitherto normal, often in the beginning subnormal, rises a little, possibly to 39° C. (102.2° F.). Here a few doses of quinine have a good result.

Among the unfortunate *complications of the operation* may be injury of the ureter; this accident occurred to Walter (Offenbach), Nussbaum and Hegar. Simon and Zweifel have cured fistulæ of the ureter by extirpation of the corresponding kidney. Nussbaum made a new ureter leading from the bladder into the urinary reservoir behind the abdominal walls, and cured the fistula after bringing the ureter to the surface of the abdomen. Hegar's and Müller's patients upon whom the same operation was attempted, still had a small fistula opening upon the abdominal wall.

In many cases of ovariotomy death is said to result from tetanus and from strangulation of the intestine. I have performed 120 ovariotomies without the occurrence of a death from either of these causes, nor have I seen death from shock. I guard against the danger of embolism by having the patients remain in bed three weeks, and not, as many operators, allowing them to rise on the 13th–14th day.

By the error of an assistant, I lost a patient from arterial hemorrhage, by puncturing a branch of the hypogastric uterine artery; since then I have discarded drainage, and have up to the present had no occasion to regret this step. Numerous

writers have expressed the opinion that drainage is valueless, because the intestines soon cover over Douglas's cul-de-sac and prevent the discharge of the secretions, while the tube admits septic matter into the cavity of the peritoneum. I concur in this opinion. Among those still decidedly in favor of drainage is A. Martin, who employs it after extirpation of myomata, and also uses it, both primary and secondary, after ovariotomy. While supporting and stretching the tissues in the posterior vaginal vault, he forces a strong dressing forceps through the lowest part of Douglas's cul-de-sac. Then directing the instrument forward into the vaginal entrance, he seizes a piece of ordinary rubber-tubing with a cross piece, and draws it into the abdominal cavity, the tube is then drawn from below until the cross piece rests upon the pelvic floor. At first the lower end of the tube is bent upon itself, and the entrance of air prevented by a tampon placed in the vagina. A. Martin uses primary drainage after ovariotomy only when suppurating or secreting surfaces are left, and secondary drainage when symptoms of septic infection appear. In such cases during light narcosis he has laid open the posterior vaginal vault to the peritoneum, and passed a dressing forceps, carrying a drainage-tube, through the aperture. The hemorrhage which follows is arrested by ligatures. In two cases the patients were cured, in two others, however, not.

Martin recommends massage and faradization for the severe vomiting, intestinal paralysis and constipation which might in some cases produce a fatal termination; fortunately, I have never been compelled to test the efficacy of these means.

Carbolic intoxication may occur; it must be treated with small doses of opium or morphine hypodermatically, ice and milk with lime-water, and sulphites.

On one occasion I accidentally left a small Köberlé's hemostatic forceps in the abdominal cavity, in which it remained six months without exciting the least suppuration; fortunately it perforated the abdominal wall, and was easily extracted. Small abscesses sometimes form about the suture tracks in the abdominal wound, especially in the vicinity of the mons veneris, through the dressing becoming displaced and air being admitted. Not infrequently small parts of the cicatrix do not heal, remaining moist

or suppurating for some time, and troubling the patient; this is usually due to the presence in the abdominal wall of a ligature, which finally is detached. For this reason I avoid as far as possible the use of such ligatures.

If a tumor presents such large adhesions that its extirpation is impossible, the abdominal cavity must be thoroughly cleansed and drainage made through the vagina, after which the wound may be closed. In these cases some authorities have recommended ligating the vessels supplying the tumor. In only one case was I compelled to leave the ovariotomy unfinished; the tumor was easily torn and of malignant character. I ligated the lacerated portions with rubber tubing and then excised them, afterward placing a drainage-tube in the abdominal wound. The patient recovered from the operation without fever; dying after several months of very rapid and numerous cancer metastases.

Laparotomy is no longer contraindicated by an acute peritonitis, as when produced by perforation; on the contrary, the disease is almost always aborted by the operation, and, as shown by A. Martin, the chronic and subacute forms may be readily cured after the diseased tissues have been removed. Ovariotomy is the most certain and rapid means of curing the otherwise fatal peritonitis which results from torsion of the pedicle; one of my own patients had a threefold torsion and nevertheless recovered promptly after the operation.

In conclusion, I may add that of my 120 ovariotomies, 25 patients died. Of these, 20 operations were performed before Lister's time, and 13 or 65 per cent. resulted fatally. Of 100 done at a subsequent period and under complete antiseptic precautions, only 12 or 12 per cent. were fatal. These results compare very favorably with those of Olshausen, Schröder, Dohrn and the majority of English operators. Only Kocher, Keith and Thornton have been more successful.

Vaginal ovariotomy has also been done. Gaillard Thomas performed the first successful vaginal ovariotomy in 1870, but in 1876, while operating upon a second case, he injured the rectum, and was obliged to perform laparotomy in addition to the other operation, and the patient did not recover. Battey has performed the largest number of vaginal castrations, and Davis, Clifton-

Wing and Goodell have successfully removed through the vagina ovarian tumors weighing as much as nine pounds. Hegar was not satisfied with his attempts in performing vaginal extirpation of the ovaries upon the cadaver, as the ligaments, the spermatic plexus, and the fold of peritoneum by the side of the latter were usually very tense, and he was frequently unable to bring the ovaries far enough down into the vagina.* My own experiments, performed upon the phantom described in the introduction to this book, showed me that vaginal extirpation by an incision 4 or 5 centimeters (1.8 to 2 in.) long in the posterior vault was not difficult if the ovaries were movable and had moderately long pedicles; on the other hand, if the pedicle was short and the adhesions extensive the extirpation often appeared impossible. The only additional operators who have recently employed this method are Baker and Smith.

The Treatment of Cases of Ovarian Cystomata not Suitable for Operation.—Various indications are to be met. If there is much ascites, the fluid should be evacuated; when the tumor fluctuates and is very tense, tapping from time to time will afford relief; rapid growth may be to some extent prevented by securing free defecation and diuresis, and by moderate abstinence from fluids. Suitable abdominal supporters, the use of baths, cutaneous inunctions, and adhesive plaster to support the abdominal wall, a carefully arranged diet, and delaying the administration of narcotics to as late a period as possible, will help to prolong life for many years.

II. Solid Tumors of the Ovary.

1. *Ovarian papillomata* may be developed from the surface of the ovary, or from the wall of a glandular cyst. Cases of the first variety have been observed by Gusserow-Eberth, Klebs, Birch-Hirschfeld and the author. At the autopsy of a woman, 17 years old, who died from peritonitis, Birch-Hirschfeld found cauliflower growths upon the surface of both ovaries; these consisted of delicate, vascular, branched villi, covered with a stratified epithelium composed of short cylindrical cells. A similar

* Volkmann's "Sammlung Klin. Vorträge," Nos. 136 to 138, p. 1028.

case is illustrated in Fig. 97. In the case described by Gusserow-Eberth a bilateral superficial papilloma of the ovaries caused symptoms of oöphoritis and secondary peritonitis, with great accumulation of ascitic fluid, rupture of the umbilicus and prolapse of the intestines. The ovaries were as large as hen's eggs, and covered with cauliflower excrescences; in short, it was a case of malignant neoplasm. Papillomata of the interior of cysts will be considered in a subsequent chapter.

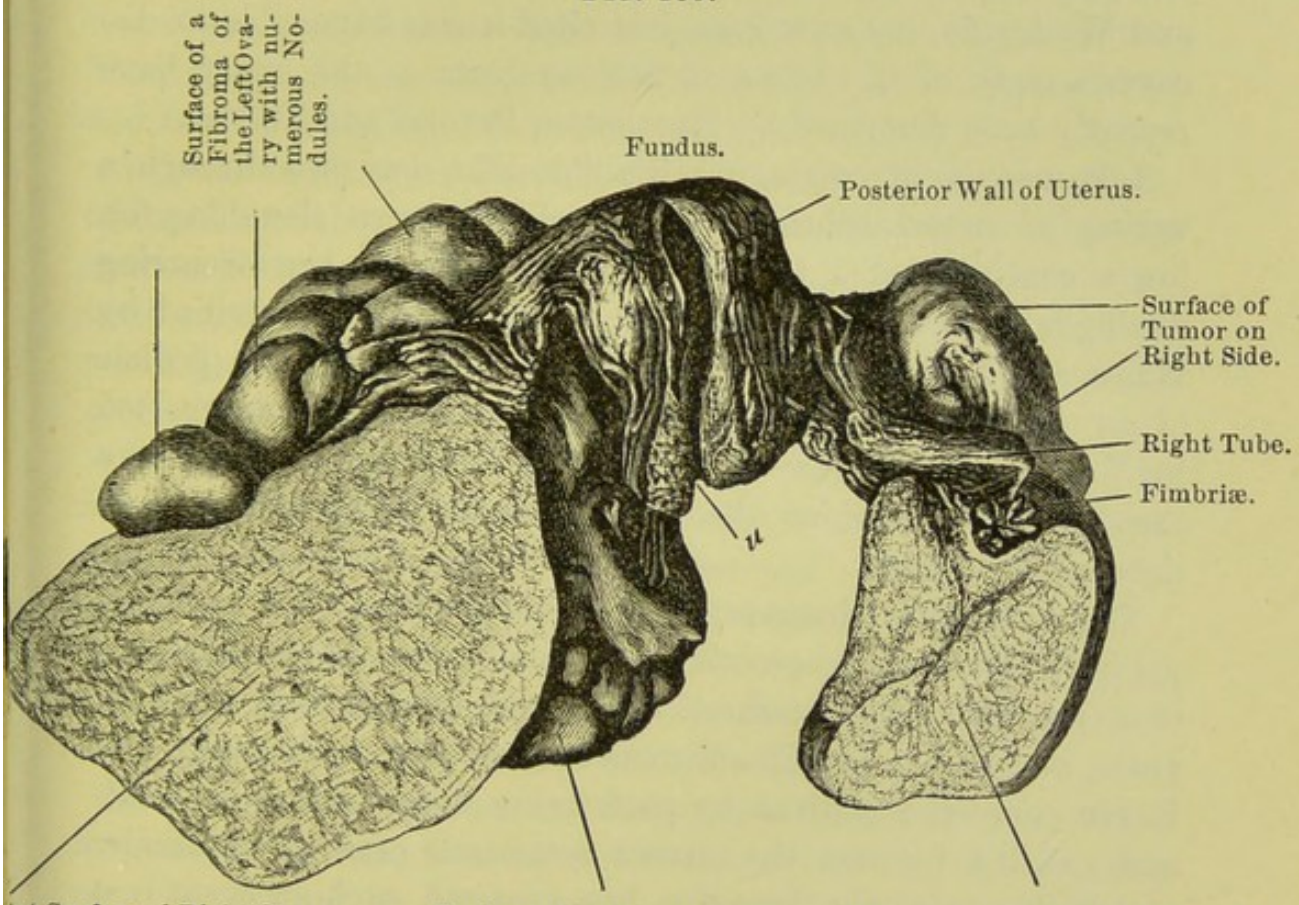
2. *Fibromata and Fibro-myomata of the Ovary.*—These growths are very rare, and their origin is imperfectly understood. According to Klob, Klebs and Rokitansky, small fibromatous nodules may be developed from the corpora lutea. It is also possible that they may originate from constrictions of the parenchyma which are connected with ovulation; as a proof of this hypothesis I refer to those cases in which we find a corpus nigrum shaped like a figure 8, part being inclosed in the parenchyma of the ovary, while a part projects above the surface.* The structure of an ovarian fibroma consists chiefly of homogeneous or fibrillated connective tissue. These tumors are classified as circumscribed and diffuse. On the surface of a diffuse fibroma as large as a man's head, Waldeyer found a globular convolution of cysts; the parenchyma consisted of grayish meshes of homogeneous and fibrillated connective tissue, the spaces containing large vessels and irregular masses of blood. This case proves that an ovarian fibroma may have a cavernous structure. Leopold examined an ovarian fibroma as large as a walnut, and could find no trace of either a cicatrix, a follicle or a corpus luteum; there was no characteristic ovarian tissue or non-striated muscular fibres, but it consisted of a wavy connective tissue with few vessels.

The author has published one of the most interesting cases of diffuse fibroma of both ovaries on record. The right ovary was as large as a kidney, and the left larger than a man's head; their surfaces were perfectly smooth, except posteriorly, where there were adhesions to the ileum. Upon section both tumors showed a firm, fibrous structure, interspersed with cystic, œdema-

* *Vide* plate iv, p. 102, of my Atlas.

tous portions. The wavy fibrillated connective tissue contained quite a number of nuclei, the latter being especially numerous in places where small, recent tumors lay within the larger fibrous tumor. Neither Graafian follicles, cysts nor muscular fibres were found. The hilum and the insertion of the ovarian ligament could be distinctly recognized on each tumor. The tube and the round ligament were not connected with the tumor, as shown in Fig. 109.

FIG. 109.



Bilateral Ovarian Fibroma.

This case is peculiar on account of the size of the growth, as tumors larger than the fist are extremely rare, and it is doubtful whether those described by Cruveilhier, of 46 pounds, by Simpson, of 56 pounds, and by Spiegelberg, of 60 pounds, were composed of pure fibrous tissue. It is even more rare to find both ovaries thus degenerated. There was no ascites and the kidneys were very much congested.

The pedicle of a fibroma is usually very short, thick and vas-

cular, and is formed chiefly of the enlarged wide portions of the broad ligament into which the normal ovary is inserted. The tube is not tightly stretched over the tumor as in cystoma, but is freely movable at the side. In general, an ovarian fibroma with its numerous elevations and depressions, closely resembles an enlarged ovary.

The statements regarding the presence of non-striated muscular fibres in ovarian fibromata are contradictory. While Klebs and Lücke have found muscular tissue in the cases of Leopold and Wyder, in my own case just cited it was impossible to discover a trace of it. Cases of fibromyomata of the ovary have recently been described by Hartmann, Peruzzi and Terrier.

Like uterine myomata, ovarian fibromata may pass through a variety of metamorphoses. Rokitansky has seen sloughing follow a contusion of a tumor the size of a goose egg occurring during labor. Ossification of the tumor has been described by Haase and Löbl. An interesting case of torsion of the pedicle of an ovarian fibroma, followed by fatal peritonitis, was reported by Van Buren, of New York, in 1851.* Klob also mentions a case of torsion in which the pedicle was turned one and a half times upon its axis.

The symptoms characteristic of ovarian fibromata have not yet been isolated, on account of the small number of cases hitherto reported. Amenorrhœa was found in a patient aged 21 years, who had an ovarian fibroma as large as a man's head; Van Buren cured this patient by performing ovariotomy. In bilateral ovarian fibroma the menses sometimes cease at an earlier period than normal; Spengler has reported such an event in a woman 33 years old. The menses may also be regular and scanty, or irregular and painful. My own patient was sixty years old, and had menstruated regularly at intervals of four weeks, for 4–5 days, until her forty-eighth year; she then discovered a small hard tumor on the left side above Poupart's ligament, which gradually increased in size until within five years, when it ceased to grow. While in all the cases of fibroma of the ovary hitherto reported the other organs of the body were

* Case No. 4 of Leopold's Table.

found healthy, and only in that published by Spengler a myoma in the uterine wall as large as a duck's egg, and in that of Leopold, a mucous polyp, three centimeters long, were present, our patient suffered with an already well-advanced and not operable vulval carcinoma, and died suddenly of pulmonary embolism after the tumor had been treated with the actual cautery, and she had been able already to leave her bed. As already mentioned, Dohrn has very recently observed several cases of the same kind. He justly holds that the conditions for the coagulation of the blood in the veins are more favorable in the neighborhood of the firm pedicles of fibromata than in the ligamentous and flexible pedicles of ovarian cysts.

Several authors, as Kleinwächter, Spencer Wells and Rokitansky, have observed pregnancy in connection with unilateral ovarian fibromata. During labor the tumor may obstruct the birth canal, and thus make Cæsarean section necessary, as happened in Kleinwächter's case; the tumor may be contused and become gangrenous, as described by Rokitansky.

Ovarian fibroma, as shown by the few cases existing, are more frequent in advanced life than other solid ovarian tumors. These tumors sometimes reach a certain size and remain stationary; sometimes they grow rapidly, become œdematous, and give evidence of fluctuation, so that Spencer Wells evacuated, by tapping, a light-colored, clear fluid from a fibroma as large as a man's head, the patient being twenty-nine years of age.

That large tumors of this kind may cause considerable discomfort by pressure upon the bladder and rectum, blood vessels and nerve plexuses, further, by displacement of the uterus, intestines, liver, spleen and diaphragm, requires no further discussion. The disturbances, however, as in our case cited above, are at times slight; ascites is not always present and peritoneal adhesions are entirely absent, or only of insignificant character. In one of Van Buren's cases there was prolapse of the uterus; in one of Spiegelberg's elongation of this organ; in my case of bilateral tumor the patient said she had prolapse of the uterus, though it was not apparent when she was admitted to the clinic. In the larger ovarian fibromata death results from peritonitis, Bright's disease

with uremia, embolism or from the operation. It may, however, be caused by other coexisting diseases.

Diagnosis.—When it has been determined that an ovarian tumor is present, the differential diagnosis between cystoma, fibroma, sarcoma and carcinoma may often be made only by tapping or harpooning the tumor. Tapping a solid tumor is a dangerous operation, Spiegelberg's patient dying from venous hemorrhage. If no positive results be obtained by tapping or harpooning the tumor, an exploratory incision should follow or, eventually, total extirpation be performed.

Treatment.—When ovarian fibromata have reached a moderate size, they should be extirpated even though they may have ceased to grow, for there is always a possibility of malignant degeneration. When the tumor is large, the hemorrhage from the vascular adhesions and the thick, firm pedicle may be great, and hence the prognosis of ovariotomy in large fibromata is less favorable than in large ovarian cysts. The results of the operation have been better since the elastic tube has been employed for ligating the pedicle, because we can extirpate the tumor in sections and with comparatively little hemorrhage. It cannot be stated with certainty whether other methods of treatment, such as the application of the constant electric current, will remove these tumors or even reduce their size. Cases have been reported in which the growth was perceptibly diminished by electrolysis, but it remains an unsettled question as to how long this treatment will be effectual, and whether a radical cure is possible.

3. *Sarcoma of the Ovary.*—Ovarian sarcoma occurs most frequently as the spindle-celled variety, containing scattered groups of round cells. It may be primary and isolated, or in the larger cystomata secondary; congenital sarcoma of the ovary has also been observed. The tumor is slowly developed, and causes destruction of the follicles. Primary isolated growths have a smooth, pale-red surface, and occasionally are partially lobulated. The tumor is often very large, and may appear in combination with myxoid cystomata, carcinomata and fibromata. The growth may involve the adjacent tissues and is often associated with sarcomata of other organs, as of the uterus, but metastases are

uncommon. It causes death from peritonitis, embolism, metastases or progressive debility. Both ovaries are occasionally affected; in Leopold's statistics, there were 12 such cases. I have had under observation three very interesting cases of ovarian sarcoma. The description of the first case, by Dr. Lobeck, will be found in my work entitled *Berichte und Studien*, Band I, 1874, pp. 355 to 363 inclusive.

The patient, 19 years and 9 months old, had noticed for about three months that her abdomen was increasing in size. Death was caused by embolism of the pulmonary artery, originating in a thrombosis of the right uterine vein. A fluid containing dropsical fragments of tissue was found in the abdominal cavity. The right ovary formed a tumor weighing 3850 grams (7½ lbs.), was larger than a man's head, and was completely inclosed in a glossy, white capsule; the latter had a smooth surface, and contained congeries of large veins. Upon section the tumor was found to consist of a whitish medullary mass, from which a small quantity of grayish fluid could be expressed. The lower portions of the tumor consisted of gelatinous tissue, in which were embedded irregularly shaped cysts the size of pigeons' eggs. Microscopical examination showed numerous strands of small, somewhat elongated, fusiform cells, containing large nuclei and granular protoplasm; these strands interlaced in all directions. Large vessels were few, but the network of capillaries abundant. In the metamorphosed portions of tissue were granular cells and swollen nuclei, lying in a matrix which contained numbers of fat corpuscles and colloid granular matter.

In the second case* the patient was 18 years old. The ovarian sarcoma was much larger than the one just described, and there was a myxoid cystoma. I performed ovariotomy, and reduced the size of the tumor to some extent from its interior, but with considerable loss of blood. Six months after the operation the patient had a sarcoma of the umbilicus and, as the autopsy proved, of the great omentum. I excised the umbilical sarcoma, but the patient died soon after the operation.

The third patient had a myxoid cystoma which showed signs of malignant degeneration, and it was accordingly punctured; nothing of a suspicious nature was found in the fluid. The tumor which was extirpated at the ovariotomy showed the presence of a sarcoma in addition to the myxoid cystoma. It was necessary to reduce the size of the tumor as in the previous case; the hemorrhage was considerable. A myoma of the uterus which lay beneath the ovarian sarcoma was as large as a man's head; this began to grow after the extirpation of the sarcoma, and caused

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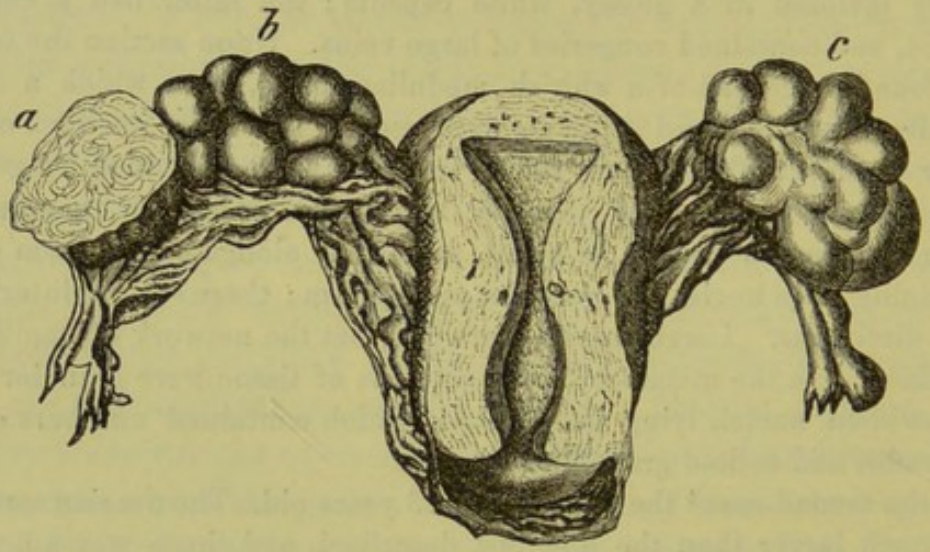
* "Berichte u. Studien," III, p. 291.

menorrhagia and profuse discharges of mucus, but the patient was still alive a year and three-quarters after the operation.

4. *Cancer of the Ovary.*—Ovarian cancer may be primary, in the form of scirrhus, medullary or colloid cancer, or secondary, in myxoid cystomata, papillary tumors, or affections of other abdominal organs.

As a rule the primary affection involves the entire ovary, and the tumor formed may vary in size from a hen's egg to a man's head. The disease is often bilateral and usually characterized by the early occurrence of ascites and circumscribed peritonitis. When both ovaries are affected we frequently observe metastases

FIG. 110.



Bilateral Glandular Carcinoma of the Ovary.—*a*, section of the growth; *b*, *c*, nodulated surface.

to the adjacent lymphatics and to the peritoneum. The microscopical examination of such carcinomata usually shows their glandular character; Waldeyer has proved that the disease originates in the epithelium of the follicles or tubes of Pflüger. These neoplasms are closely related to cystomata (Fig. 110). Primary cancer extends from the ovary to the broad ligaments, pelvic connective tissue, bones of the pelvis, peritoneum (as in Fig. 112) and to the lymphatic glands, liver and lungs. Primary ovarian cancer has been observed in young persons and in children. Combinations of cystomata with carcinoma of the ovary may arise simultaneously, a portion of the ovarian tumor showing one

or the other form of cancer, while another portion is developed into a cystoma; or nests of cancer cells, secondary in appearance, may be developed in the walls of the cystoma. In such cases all the variations in development from typical gland tubules to atypical proliferation of the epithelial cells may be observed. Alveolar cancer is very similar in appearance to cystoma, especially the multilocular form. Klob has reported a case of cystic cancer of the left ovary in connection with villous cancer of the fundus and body of the uterus.* I had under observation in Munich a case of medullary ovarian cancer in which

FIG. 111.



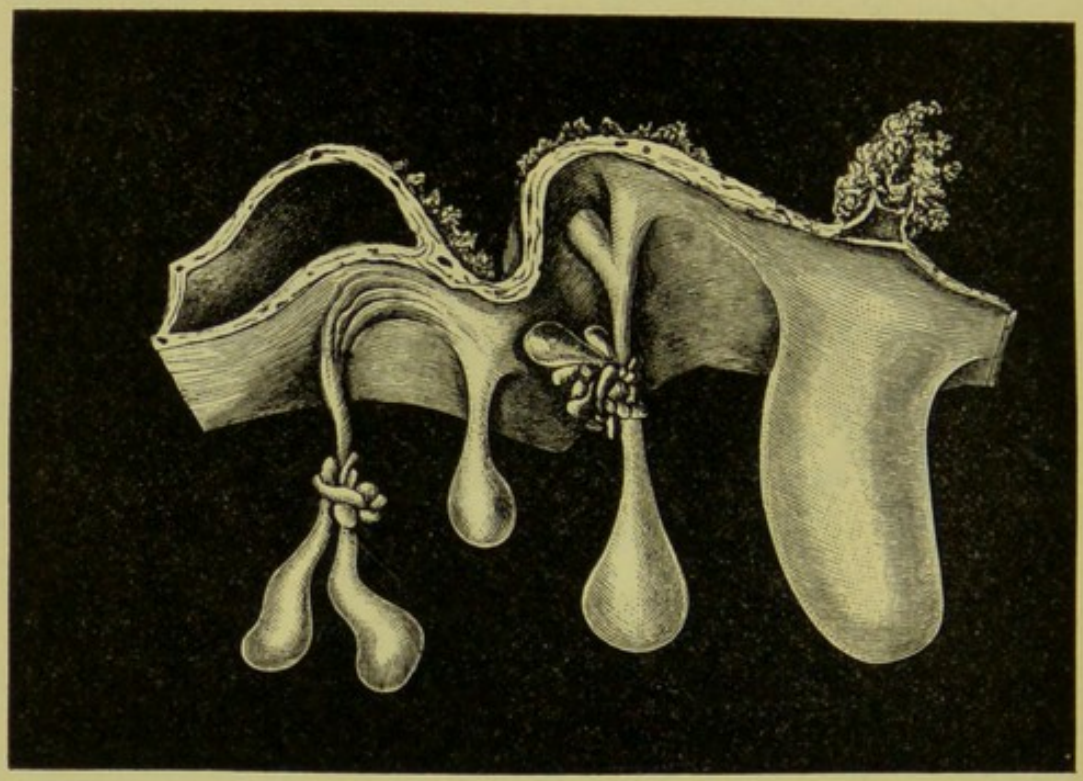
Alveoli of a Glandular Ovarian Carcinoma, with Nests of Cancer Cells.

the affection had extended to all parts of the organ and to the wall of the uterus, as shown in Fig. 111. In Figs. 112 and 113 there is represented another interesting case of papillary carcinomatous ovarian cystoma with colloid cancer of the peritoneum, under my care in Munich in the summer of 1885. The polypoid neoplasms shown in Fig. 112 upon the external surface of the papillary cystoma were likewise found upon the other abdominal organs, and are identical with the polypoid intestinal appendages described by Werth, referred to upon page 533. The histological

* *Loc. cit.*, p. 379.

nature of the inner papillary surface of the cystoma is shown in Fig. 113; its stroma resembles that of the adenomyxo-sarcoma of the cervix described on pp. 390–393. These tumors are similar to the polypoid cystoma recently described by Olshausen, and mentioned upon page 527, but that metastases are more common, and that they are of a malignant nature. In this case the other ovary was likewise diseased but could not be extirpated; the cystoma upon the right side was removed, the patient

FIG. 112.



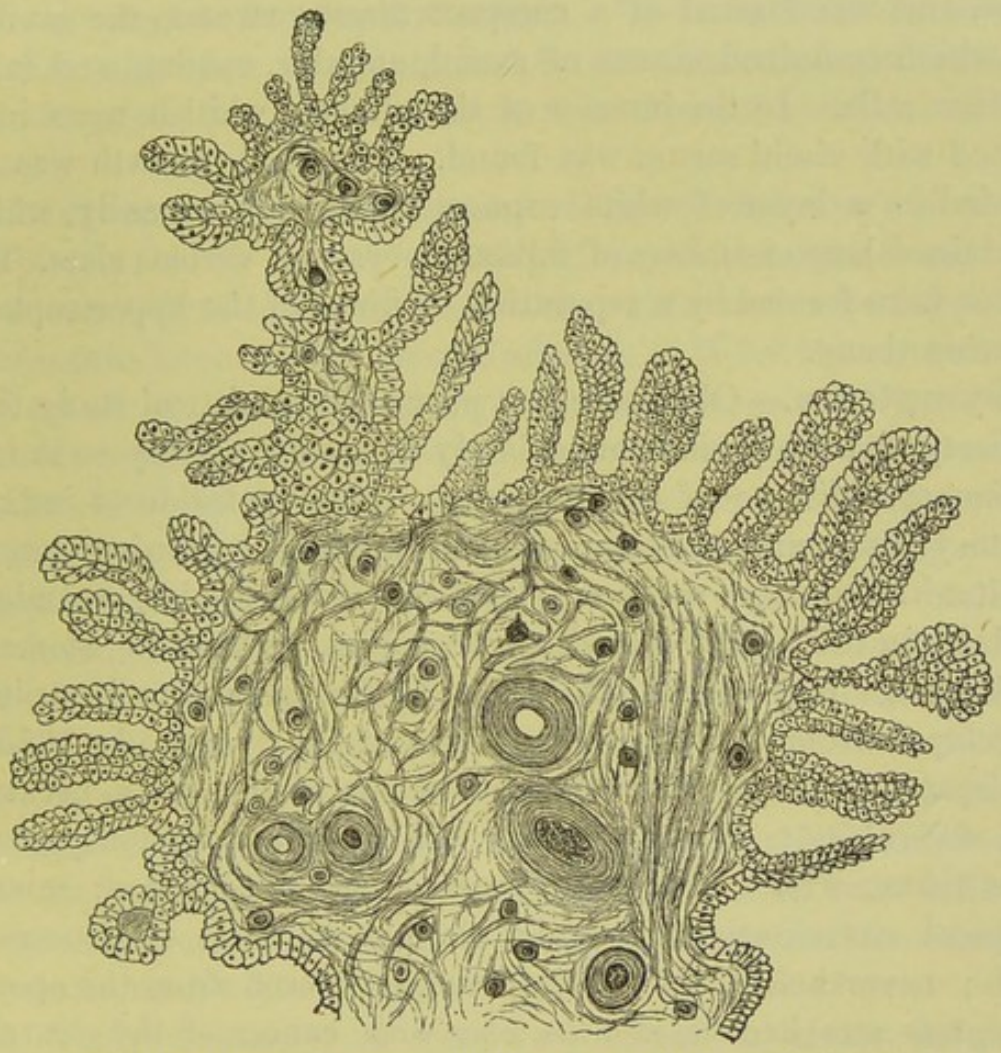
Colloid Cancer of the Peritoneum; grape-like appendices on the outer surface of a papillary cystoma of the ovary; a cauliflower growth upon its inner surface.

made a rapid recovery, and four months and a half after the operation was attending to her household duties.

A large ovarian carcinoma, a cancer of the lymphatic vessels, which was developed after the extirpation of a cancroid tumor of the vaginal portion, is shown in plate xxxvi *a*, p. 146, of my *Atlas;* the bones of the pelvis were perforated, and the right femur dislocated. The neoplasm probably originated from the uterus; the affection in the latter organ had been completely cured by extirpation of the cancroid growth with the galvano-cautery.

Colloid cancers are also examples of secondary carcinomatous affection of the ovaries. In one case I found the ovary 3.5 centimeters (1.4 in.) long, and 2 centimeters ($\frac{4}{5}$ in.) thick, with a number of soft round nodules upon its surface. In another case both ovaries were much enlarged, the right being almost as large as a hen's egg, and composed of five cysts and a number of smaller colloid nodules; both tumors were flat and sessile,

FIG. 113.



Papillary-myxo-carcinomatous Proliferation of the Inner Surface of the Preparation shown in Fig. 112. (Zeiss, ocular ii, objective c.)

being attached to the peritoneum. The peritoneum was infiltrated with carcinomatous cells of medium size and having the appearance of epithelium. An irregular network was formed within the tumor by small branches or strands of the connective tissue; these meshes in some places enclosed a structureless tissue in

which no cellular elements could be found; other portions of the network were filled with cancer cells. In many places the appearance was similar to the crypts of the uterine cervix; in other places the carcinomatous portions were more tube- or flask-shaped; colloid degeneration or decomposition of the cells was not found.

Rokitansky describes a case of ovarian carcinoma developed from a corpus luteum. The tumor was as large as a child's head, was nodulated, had a cortical layer eight to twelve lines in thickness, and was formed of a compact fibrous stroma, the cavities of which contained masses of round, angular, caudate and large mother cells. In the interior of the tumor a whitish mass infiltrated with viscid serum was found. The whole growth was included in a layer of white connective tissue externally, which contained large numbers of follicular cysts of various sizes. The latter were formed by a separation of fibres of the hypertrophied ovarian tissue.

Symptoms.—Olshausen has proved by statistical study that puberty and the period immediately following predispose to carcinomatous disease of the ovaries.* Acute or insidious inflammatory onset; amenorrhœa; pains in the rapidly growing tumor; peritonitis; ascites; marasmus; œdema of the thighs; secondary nodules in the lumbar glands, liver, spleen, peritoneum, stomach and pleura may occur. Occasionally the carcinoma is rapidly developed from a glandular cystoma of the ovary. In 1875 I extirpated a large proliferating cystoma of the ovary, between the several cysts of which there was a medullary, honeycomb-like tissue, which had a very suspicious appearance; microscopical examination, however, showed no nests of cancerous cells; nevertheless, the patient, who recovered from the operation, was attacked six months later with cancer of the cicatrix, abdominal walls, peritoneum and liver, death following in a few weeks.

The diagnosis of primary ovarian cancer is not usually difficult; secondary cancer is less easily recognized. The characteristic symptoms of the former are the occurrence in a girl, or in a

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* *Loc. cit.*, p. 435.

woman at the menopause, of rapidly developed ascites, of pain and œdema of the thighs, and especially the presence of a tumor in Douglas's cul-de-sac beneath the ovarian tumor, or of nodules in the omentum or intestinal walls, with early manifested cachexia. When these symptoms are partially or entirely wanting, an incision may be made by puncturing the tumor and finding sarcomatous or cancerous cells in the evacuated fluid. If specific elements are not found in the fluid, as is the case during the early stages of the disease, before the neoplasm has begun to degenerate, we must resort to exploratory incision. The true character of the affection may then be recognized by the thickened peritoneum and the presence of nodules upon it or upon the surface of the tumor.

Treatment.—Isolated primary cancer of the ovary may be completely cured by early extirpation; the operation fails to produce a radical cure when adjacent organs, and especially the peritoneum, have already become affected. When the carcinomatous tumor can be readily extirpated, the operation will remove the source of the ascites and tension, and at least temporarily contribute to the patient's comfort. When there is much ascites, puncture may be of temporary service. According to Olshausen's statement, the extirpation of carcinomatous ovaries has usually terminated fatally shortly after the operation, and exploratory incision is also very dangerous; nevertheless, I have had three cases in which the patients not only bore the operation well, but were improved for months afterward. Ovariotomy is decidedly contraindicated when nodules can be felt in Douglas's cul-de-sac near the principal tumor. In such cases the treatment will be necessarily symptomatic, and similar to that suggested for ovarian cystomata unsuitable for operation.

5. *Enchondromata of the ovary* very rarely appear as isolated, independent tumors. Kiwisch has described two cases of this kind, but, according to Klob's criticism, the real nature of the first is doubtful, because no microscopical examination was made. From the description of the second it seems that the tumor was not a simple enchondroma, but probably a dermoid cyst, in which a deposit of cartilage had occurred; cases of this kind

have been reported by other writers. Klob states* that in such tumors the cartilage substance occurs in the form of thin or thick plaques, which frequently are formed in large rows upon the external layer, or appear as granular wart-shaped prominences, or, finally, cartilage kernels as large as a pea are imbedded here and there in the connective tissue. In others there is also found frequently a fibro-cartilaginous structure.

In conclusion, it must be remembered that *entozoa* have been found in the ovary. Treutler states that he saw hexathyridium pinguicola in a fatty cyst of the ovary; Küchenmeister questions this, and says that he probably had a dead linguatula or the scolix of a tænia under observation. On the other hand, O. Petit mentions a case of echinococcus of the ovary, and Freund has observed a case in which an echinococcus migrated from the omentum into a dermoid ovarian cyst affected with follicular and glandular degenerations. We postpone, however, the consideration of echinococci in the pelvic connective tissue to Section VI.

CHAPTER IV.

NUTRITIVE DISTURBANCES OF THE OVARIES.

1. Hyperemia and Hemorrhage.

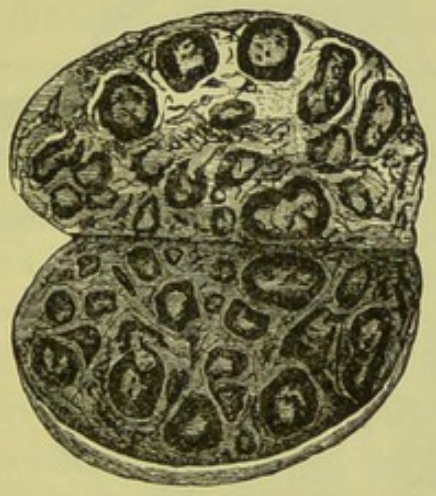
The hyperemia of the ovaries which accompanies menstrual congestion may be so greatly increased by external causes that not rarely a follicular hemorrhage as large as a cherry may be found in the ovary. This apoplexy may affect a number of follicles simultaneously. Fig. 114 represents the right ovary of a servant girl, 17 years old, who died after severe burns from petroleum. The ovary measured 3.5 centimeters (1.4 in.) in length, 2 centimeters ($\frac{4}{5}$ in.) in breadth, and 1.8 centimeters ($\frac{18}{25}$ in.) in thickness; upon section not less than 15 cavities, varying in size from the head of a pin to a pea, filled with

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* *Loc. cit.*, p. 344.

fluid or coagulated blood, were found. I have observed this condition of both ovaries at three autopsies, death having resulted from petroleum burns. In one instance, the greatest hemorrhagic infarct was equal to a bean in size, shown in Fig. 115; in no case was the follicle ruptured, nor was there any extravasation of blood into the stroma. The ovary is usually but little swelled; it may be either soft, or tense and elastic. I have observed analogous follicular hemorrhages twice as a result of phosphorus-poisoning, three times in typhoid fever, and once each in cerebral apoplexy, tuberculosis and disease of the heart, but in none of these was the number of hemorrhagic follicles so great as in the cases of burn above cited. In addition to

FIG. 114.



Follicular Hemorrhage of the Ovary, after Death from Extensive Burns.

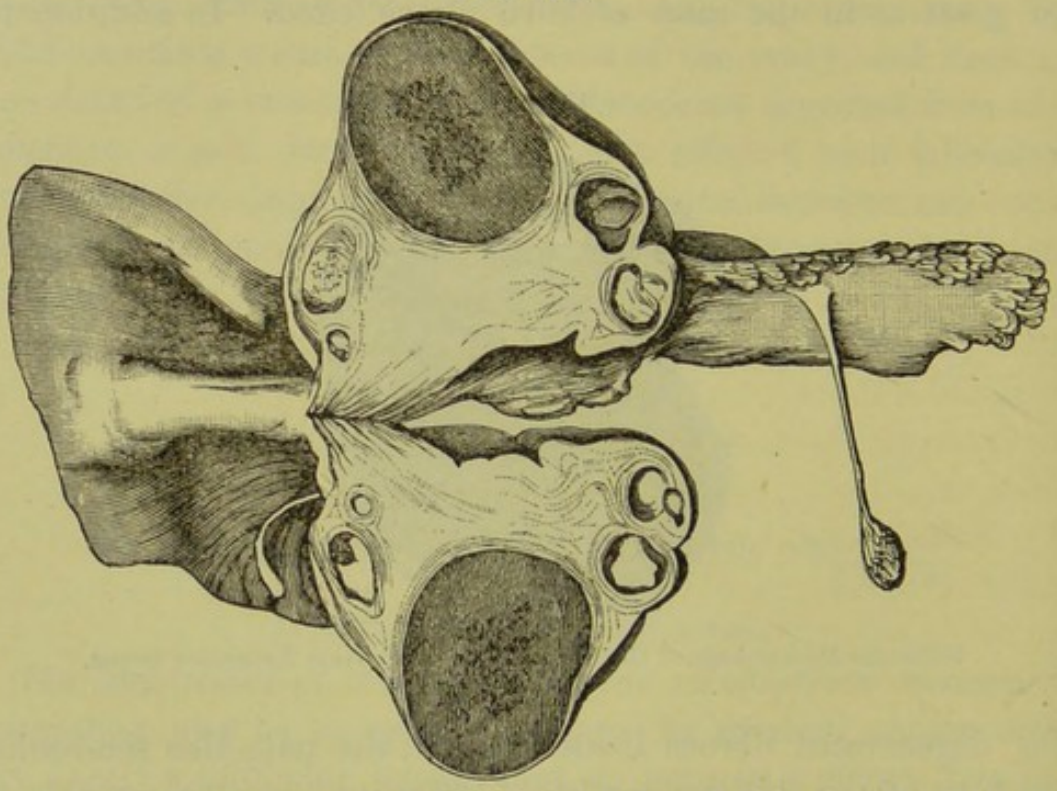
the degenerated fibrous tissue present, the pulp-like semi-solid contents of the follicles consist of granular pigment, crystals of hematine and often, also, cholesterin. When death has not previously resulted from the original affection, the contents gradually become thicker, the pigment changes to a black color, and finally nothing remains but a band-like cicatrix with a pigmented center.

2. INFLAMMATION OF THE OVARIES. ACUTE AND CHRONIC OÖPHORITIS.

Inflammation of the ovaries may follow hyperemia and apoplexy of the organ, or may be caused by an extension of inflammatory processes from the vagina, the uterus and tubes, as from gonorrhœal

infection, and especially from acute pyemic or septic infection after labor; it also occurs in conjunction with acute exanthemata, in typhoid fever, phosphorus and arsenical poisoning, and in cholera. In the latter cases there are granular cloudiness, fatty degeneration of the ovules and the follicular epithelium, so that the contents are opaque and the follicle sterile. In acute inflammation from puerperal infection, the ovary is much swelled, softened and of a doughy consistence; its tissue is reddened, infiltrated with serum and marked by small hemorrhagic points. Yellow points and streaks appear in its interior, or the opaque follicular

FIG. 115.



Follicular Hemorrhage of Right Ovary (natural size). Follicles about to rupture.

contents become yellowish, and suppuration occurs which may be follicular and interfollicular. The ovarian abscess may be encapsulated by connective tissue or a granulation membrane and thus remain interfollicular; as the secretion from this membrane accumulates, the cavity of the abscess is enlarged, thickened and it eventually ruptures into the peritoneum, the rectum or some other organ; in more favorable cases, the purulent contents become thickened, caseous and calcified, or entirely disappear, leaving a band-like cicatrix.

Puerperal inflammation of the ovaries frequently becomes chronic, although chronic infiltration of the ovarian connective tissue may also result from non-puerperal inflammation. Hemorrhages into the stroma lead to obliteration of the follicles and to indurations; usually then the ovary becomes adherent to neighboring tissues, to the tubes and to the uterus. The adhesions may be thin and delicate, membranous, narrow or broad, so that the ovary is often dislocated, and may even be imbedded in them, in which case there is chronic oöphoritis with perioöphoritis. There are small, often deep, cicatrices upon the surface of the ovary, giving it the appearance of the surface of a walnut; such changes of form result from atrophy of the tissues and premature rupture of the follicles. In addition to these cicatrices, we find large follicles which have undergone cystic degeneration, the follicular membrane being thickened and the albugineous covering transformed into a firm, fibrous connective tissue. Ziegler* has directed attention to the fact that true cicatricial tissue can rarely be found; it seems, therefore, that the ovarian stroma possesses great power of regeneration, so that the traces of the inflammation are again obliterated. Very considerable increase of the ovary through proliferation of the connective tissue in chronic inflammation does not occur. Fibrous hyperplasia of the ovaries is found in fibromata and fibro-sarcomata. In chronic oöphoritis the ovary may become as large as an apple or a billiard ball.

Symptoms.—As acute oöphoritis usually appears subsequent to infection manifested by a severe attack of disease in neighboring organs, its symptoms are at first masked by those of the constitutional affection and the peritonitis. In some cases of puerperal disease, however, it is possible to palpate the affected ovary at an early period, and to recognize its sensitiveness, and that it is the source of the pains which radiate into the thigh and into the bladder, rectum and other adjacent organs. In a case of puerperal ovarian abscess under my care for almost two months, the patient suffered from severe and frequent rigors, which could only be controlled by quinine; the case terminated fatally from

* "Patholog. Anatomie," 1885, pp. 1483–4.

sudden perforation. Acute oöphoritis, parenchymatous or interstitial, may terminate in cicatricial contraction, or in the constriction of the gland or tubes, with which hematomata and chronic inflammation may be associated. A. Martin has repeatedly found hematomata of the ovary as large as a fist, and enclosed in a firm, thick layer of connective tissue.

The symptoms of chronic oöphoritis have generally associated those of chronic pelviperitonitis; at other times they are obscured by retroflexion or prolapse of the uterus, these dislocations being a frequent cause of chronic oöphoritis; in a third variety they form part of the symptoms characteristic of infectious peritonitis in gonorrhœa.

Amenorrhœa is a symptom of premature destruction of the follicles, and of chronic thickening of the albugineous tunic. In patients in whom I have been able to confirm this diagnosis by an autopsy, I have observed the menopause as early as the thirtieth year caused by chronic oöphoritis; this is due to the fact that both acute and chronic inflammations are seldom unilateral, but usually affect both ovaries. In nineteen cases of extirpation of the ovary for chronic oöphoritis, A. Martin has seen the second ovary diseased in three instances, and subsequent extirpation was necessary. Conception is very infrequent in unilateral disease of the ovary, and the cause of the sterility is probably catarrh of the uterus resulting from gonorrhœal infection, the most frequent cause of chronic oöphoritis.

Cohabitation is usually painful and increases the severity of the symptoms.

In other cases of oöphoritis we observe profuse and protracted menstruation. As a rule, the symptoms are aggravated during the menses, and the pain is much more severe. What has been said concerning menstruation and the inflammatory symptoms of dermoid cysts, is applicable to this affection.

Diagnosis.—An acute oöphoritis can be diagnosticated only when the enlarged and extremely sensitive organ can be directly felt. I have several times succeeded, by this method, in recognizing the affection without especial difficulty. Inflammation of a cystoma may be diagnosticated by the fever and by examination of the purulent contents. Other coexisting diseases, such

as urethritis and colpo-endometritis, will often lead to the discovery of the tubo-ovarian affection. The symptoms characteristic of chronic oöphoritis are the swelling, sensitiveness and the periodical variation in the severity of the suffering. A. Martin reports a case which is of especial interest in this connection: He found the remaining ovary constantly swollen in a patient upon whom his father had performed ovariotomy in 1873; at some times, it was of almost normal size and consistence, while at others it was as large as a billiard ball and harder than normal; the pain was not severe. I have never seen a similar case. As the ovary under such conditions is not very firm, but rather elastic and occasionally fluctuating, one would be more apt to suspect a cystoma with chronic oöphoritis than the latter affection alone.

Course and Terminations.—Both the acute and chronic varieties are curable, but complete restoration probably never occurs. In the majority of cases ovulation in the diseased ovary ceases, and the power of conception, as rupture and evacuation of the follicles are prevented by the firm connective tissue capsule which encloses it. Death may result from perforation, as in the cases reported by Comby, Larrivé, the author and others. The affection may recur with returning congestion, and a protracted illness thus be caused. There are also many cases in which the inflammation gradually subsides, the exudation is absorbed, the pain in the pelvic organs slowly disappears, and the condition of the patient becomes endurable. The prognosis is not favorable, however, even in such cases, because cohabitation is painful, conception impossible, and sexual excitement often causes recurrence of the disease.

Treatment.—Acute oöphoritis should be treated like acute peritonitis, by rest, regular evacuation of the bowel, ice-bags placed upon the abdomen, morphia hypodermatically, and quinine in large doses if there be rigors. When the ovary continues to enlarge, and fever and fluctuation indicate the formation of an abscess, the pus may be evacuated by puncture; if the disease be unilateral, ovariotomy may be performed at once. Such a course would be hazardous in case of acute gonorrhœal infection,

because involvement of the peritoneum and diffuse peritonitis would probably result.

In chronic oöphoritis our first care should be the recognition and removal of its causes. The functions must be regulated, and congestion of the pelvic organs prevented; cohabitation should be prohibited, and the patient confined to her bed during menstruation. The pain and hyper-sensitiveness should be controlled by the local use of narcotics, and the tendency to ovarian hyperemia in some degree lessened by scarification of the vaginal portion. The pain will be diminished and the condition of chronic cases improved by tepid compresses, or, when severe, by the ice-bag applied to the abdomen, or by hot vaginal injections. The inflammation may often be successfully treated by general and local baths and the preparation of iodine. Kreuznach, Tölz and Hall, in Upper Austria, may be first recommended as bathing places. In the second rank are to be placed the peat baths and compresses of Franzensbad, Elster and others; and in the third the baths of the eastern banks of the North Sea may now be resorted to, and only if they are well borne the patient should try the more powerful billows of Blankenberge, Borkum, Norderney, Heligoland, Biarritz and Trouville. Finally, also, in these conditions hot sand baths are worthy of a trial, as, in describing displacements of the uterus, we have learned their value in promoting the absorption of exudates.

If all these means prove ineffectual, if the pain increase in severity, if recurrences are frequent and profuse hemorrhages have undermined the constitution, we may resort to single ovariotomy, or even castration, as both ovaries are usually similarly involved.

The cases in which castration is indicated for bilateral oöphoritis with ovarian neuralgia are, in my judgment, of rare occurrence; the operation is more dangerous than ovariotomy, and fatal pelvic exudation may occur even after the successful removal of the ovaries and tubes. Furthermore, any part of the ovary allowed to remain may degenerate into a cyst, according to P. Müller.* If the tube be healthy it can be allowed to

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* *Deutsche Zeitsch. für Chirurgie*, Bd. XXI.

remain; it will atrophy, and without it the portion to be included in the ligature is much smaller. An important fact has recently been demonstrated by Hegar,* in proving that inflammation and contractions near the stump not only cause a continuation of the nervous symptoms in a case, but also produce irregular, or even typical menstrual hemorrhages. This should warn us against performing either ovariotomy or castration, when such inflammations are present, without careful consideration. Hegar had previously insisted that inflammatory nodules in the broad ligament might have this effect, and later observations have confirmed his statement. Vicarious menstruation in the form of regular or irregular hemorrhages from the rectum, bladder, nose or vagina, has been observed by Damour in a study of 31 cases in which the ovaries and portions of the uterus had been removed by Porro's operation. From this fact it appears that ovulation is not the sole cause of periodical hemorrhages from the sexual organs. The same effect may be produced by mechanical disturbance of the circulation, and by nervous and vaso-motor influences. The pathological nodules mentioned as being present in the ligament cause compression of the recurrent vessels, collateral stasis and nervous irritation. The nodules, like the ovary, irritate the same nerves as before the operation, with this difference, that not their ends but their larger trunks are affected; the nervous symptoms will, therefore, continue after the removal of the ovaries. It has even been stated that these nodules are swollen during the hemorrhage, thus corresponding to the menstrual congestion of the ovaries, and that bearing-down pains occur which are analogous to those observed in dysmenorrhœa.†

Hegar states that the operation is contraindicated when the inflammatory products are old and extensive, and when the adhesions are numerous and firm; in this opinion I agree. Nor should the operation be performed when the ligaments are contracted and rigid, and when nodules and indurations are found in their structure, because it is possible that these abnormalities,

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* *Loc. cit.*, p. 66, 1885.

† Fehling, *Archiv*, XXII, p. 448, Case No. 9.

which cannot be removed by the operation, may be the chief causes of the neurosis.

In performing castration for neuroses, surgeons have grown much more careful under the many restrictions placed upon the operation by Hegar, so that it is less often advised. The indication for the operation for neuroses, according to Hegar, is as follows: "Castration is indicated for a neurosis which is dependent upon a pathological change in the sexual organs when other means have been used without success, or when nothing can be expected from other treatment (?). The affection must be dangerous to life, the psychic condition of the patient decidedly affected, or all business and enjoyment rendered impossible. The cause of the neurosis must be removed by the operation, or some factor eliminated the presence of which renders a cure or improvement impossible. In the latter case the other ætiological factors must be amenable to treatment."

My standpoint, on the other hand, is the following: I consider every castration for the removal of ovaries which are not obviously diseased to be a mistake; indeed, as Liebermeister declares, it is a blunder. I cannot agree with Schröder, who says that castration, or "normal ovariotomy," *i. e.*, the removal of ovaries which have not degenerated into tumors, is justifiable in cases in which the symptoms cannot be otherwise relieved, and the patients are confirmed invalids. After years of careful observation and treatment I have seen such patients recover without the operation, and have rejoiced with them when they became happy brides. Schröder states correctly that, according to his experience, non-operative treatment is by no means so hopeless as has been represented by many.

A dermoid cyst, the slightest irritation of which caused the most intense pain, was recently extirpated by Landau; the sensitiveness was not lessened by the operation, and he, therefore, concluded that there must be a central cause, an affection of the nerves supplying the generative glands. According to the law of eccentric projection toward the periphery, the sensation of pain which is felt in the ovary will persist after the latter has been removed, as we so often observe in other nerves and in other parts of the body. The operator, therefore, who extirpates an ovary

merely because of painfulness and hyperesthesia commits a scientific error.*

It is to be hoped that the time is not far distant when the extirpation of the healthy ovary for dysmenorrhœa, ovarian neuralgia, epilepsy and mental diseases will be classed with clitoridectomy, once so frequently done, although the latter is far less injurious and harmless.

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* *Deutsche Med. Wochenschrift*, No. 17, 1884.

SECTION VI.

ANOMALIES AND DISEASES OF THE UTERINE LIGAMENTS, PERITONEUM AND PELVIC CONNECTIVE TISSUE.

CHAPTER I.

AFFECTIONS OF THE ROUND LIGAMENTS.

1. Little is known of the malformations of the round ligaments, except that they may be absent in connection with unilateral or bilateral absence of the uterus and tubes, as shown in Figs. 12 and 13, pp. 213 and 214, and that they may be of unequal length and volume. That they essentially participate in the increase in size and thickness of the uterine wall in pregnancy, and manifest contractions, also as they may sometimes be seen and felt through the abdominal wall almost as large as the little finger, so is it more than probable that a considerable difference in their length and strength may have an influence upon the position of the uterus. Hydrocele of the round ligament is defect of development, whereby the ligament has not become a firm muscular cord, but remains a pervious canal (*gubernaculum Hunteri*), or consists of a series of cysts.*

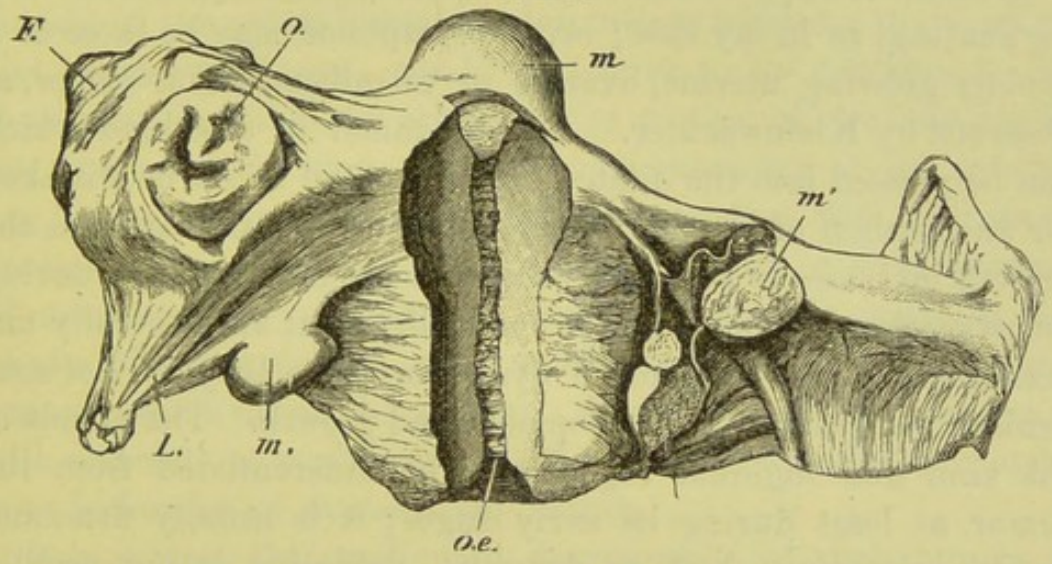
2. Of the neoplasms which affect the round ligaments our knowledge is greater. We find in them especially dermoid tumors of the following varieties: fibro-myomata, fibro-myxomata and fibro-sarcomata which may be intraperitoneal, in the inguinal canal, or external to it in the abdominal wall, pelvic connective tissue, vulva, or even in remote portions of the abdominal wall. Of the intraperitoneal variety only three tumors have been reported, viz., by Duncan, Kleinwächter and the

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**Vide* p. 48, Raschdorff, *loc. cit.*

author. A true intracanalicular dermoid of the round ligament has hitherto not been observed, though tumors from properitoneal development frequently present cord-like prolongations in the inguinal canal. Such tumors are most frequently developed external to the canal, in the inguinal region at the insertion of the ligament, in the abdominal wall, the labia majora, linea innominata, or in the pelvic cavity. During the early stages, the tumor is invariably located in the region of the external inguinal ring, at the inner third of Poupart's ligament, or at the spine of the pubic bone as in Verneuil's case. As is the fact in inguinal hernia, these tumors are most frequently devel-

FIG. 116.



Pedunculated Myoma of the Right (*m*) and Left (*m'*) Ligaments and Fundus Uteri (*m''*). F, right tube; O, ovarian cystoma; L, right ligament; *o. e.*, external os uteri.

oped toward the labia majora (Spencer Wells, Duplay, Palletta and Hofmokl), in exceptional cases they grow upward (Leopold), or expand in all directions (Sänger).

Pathological Anatomy.—These tumors are composed of connective, muscular and other tissues, as myomata of the uterus. Most of them are myo-fibromata; Duplay has reported a myxo-fibroma; Leopold, a myoma lymphangiectodes, and Sänger, a fibro-myo-sarcoma. The tumor observed by Duncan contained deposits of chalky material. In Hecker's case, there was an ovarian hernia in addition to the tumor; in that of Hofmokl, a second fibroid; in my case, probably the most interesting of all,

there were two myomata as large as a bean, in corresponding portions of each round ligament, and they are shown in Fig. 115.

Ætiology.—The number of cases hitherto observed is too small to warrant any general conclusion. It is a remarkable fact that of 11, 8 were situated on the right side, 2 upon the left, and 1 was bilateral. Sänger calls attention to the corresponding greater frequency of inguinal hernia upon the right side. Age was apparently without any predisposing influence; all the patients were parous women. In several cases it seemed probable that the tumor increased in size during pregnancy, or resulted from a trauma, as from pressure by an ovarian tumor or an unsuitable truss.

In small intraperitoneal tumors characteristic symptoms may be wanting, as in my case; or, the symptoms may be those of a rapidly growing uterine, ovarian or intraligamentous tumor, as observed by Kleinwächter. A small tumor of this kind which can be pressed into the dilated inguinal canal might be mistaken for an inguinal or ovarian tumor, especially for the latter, as the growth increases in size, and becomes tense and sensitive during menstruation. Tumors of the round ligament are generally unaccompanied by symptoms of dysmenorrhœa; they are not congenital, but gradual in development and growth. The glands of the skin and inguinal region may be differentiated from the tumor, at least during its early stages; it is usually firm, and rarely œdematous, soft or doughy. Palpation is not usually painful; yet, even without pressure, there are attacks of lancinating pains which dart into the pelvis, loins and thighs. As the tumor enlarges the peritoneum is pressed inward, and the abdominal walls outward. The menses may be normal, deficient, absent or painful; if the tumor grow into the pelvis, various symptoms of pressure, such as dysuria, ovarian neuralgia, and abdominal and sacral pain, occur; emaciation and feebleness may follow. When malignant degeneration occurs the cachexia is not long wanting.

The **diagnosis** of intraperitoneal myomata is difficult, but it is possible. They may be mistaken for subserous uterine myomata, intraligamentous tumors, cystic and solid ovarian tumors, myomata of the wall of the bladder, even for fecal masses which

have been lodged between the uterus and the wall of the bladder. They must also be differentiated from small malignant tumors of the peritoneum, encapsulated exudates, anteuterine hematocele, and anterior parametritis. Yet more various are the tumors with which myomata in the inguinal region, in the abdominal walls and in the labium majus, may be confounded. Excepting enlarged inguinal glands in which inflammatory symptoms or some primary affection of the vulva can be found, there are a number of diseases to be excluded in diagnosis, among these being the larger herniæ with firm contents, such as omentum; further, lipomata, fibromata, sarcomata and elephantiasis of the vulva; then abscesses, and finally, cancerous diseases of the cæcum and vermiform appendix. Sarcoma of the psoas muscle, of the pelvic bones, ovarian tumors adherent to the pelvis and echinococcus cysts would also have to be considered. In those cases in which the presence of a portion of the intestine in the tumor can be excluded, the solid character of the growth can be demonstrated by an exploratory puncture with a Pravaz's syringe. The character of the tumor, whether fibro-myoma, fibro-sarcoma or cysto-fibroma, will be recognized partly by the results of the puncture, partly by the mode of growth and the general condition of the patient. Rapid growth, in connection with emaciation, weakness, and grave constitutional disturbance, is an indication of sarcomatous disease.

It is evident that malignant degeneration of such tumors is favored by their location in the loose pelvic tissue and near the inguinal canal, their copious blood supply from the branches of the epigastric artery, and their exposure to external irritation. Sänger has observed such a case.

Treatment.—Early extirpation is clearly indicated, and resection of the abdominal muscles and peritoneum with ligation of the epigastric artery may eventually be necessary. Large tumors of this kind projecting into the true pelvis are not suitable for operation.

CHAPTER II.

AFFECTIONS OF THE BROAD LIGAMENTS.

Inequality of the broad ligaments has already been considered in connection with similar deformities of the uterus, tubes and ovarian ligaments.*

The neoplasms of the broad ligaments are numerous; many of them, as, for example, (1) myomata, are not primary, but have originated in the walls of the uterus. Nevertheless, primary myomata of the broad ligaments have been observed.

2. There are also connective-tissue tumors, of soft consistence, which like subserous ovarian cystomata elevate and elongate the uterus. They might be confounded with herniæ, and may invert the vagina into the vulval orifice, or grow into the sciatic foramen; three cases of the latter variety have been reported by Stein and two by Schröder.†

Pernice, in a patient 64 years of age, extirpated a lipoma of the right broad ligament weighing 30 pounds, the patient recovering. Klob and Orth have seen similar tumors.

Operations upon sarcomata of the broad ligament have been recently reported by Chenieux, Duplay, Gorter and Hages.

3. *Cysts of the Broad Ligament. Parovarian Cysts and Cystomata.*

Small subserous cysts about the size of a pea are very frequently found on the tubes and broad ligaments, but are of no importance. According to Luschka Morgagni's hydatids are found in about one-fifth of all subjects.

Other cysts of this region are developed from the parovarium, which is the remnant of the Wolffian ducts, and the analogue of the epididymis; these cysts are found between the ovary and tube, and on the free edge of the broad ligament near the fimbriæ.

According to Waldeyer, the vestiges of the renal portion of the Wolffian bodies persist in the form of small canals lined with epithelial cells, and located between the parovarium and the

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* *Vide* Fig. 20, p. 227.

† "Lehrbuch," VI Aufl., p. 476.

uterus; perhaps some of the cysts of the broad ligament originate from these remains.

The walls of cysts of the broad ligament are composed of peritoneal epithelium, connective tissue, vessels and non-striated muscular fibres derived from the muscles of the ligament (Spiegelberg, Klebs and Fischel). Their inner surface is sometimes lined with ciliated epithelium, or with non-ciliated, flat or cylindrical cells. In the outer sheaths of such parovarian cysts between the muscular fasciculi, Fischel has found glands as round or irregularly transverse clefts, flattened columns, lined with flat cylindrical epithelium and entirely empty. The inner surface is smooth or wrinkled, and contains no glands, but warty prominences, covered with straight or fungiform papillæ (Fig. 117). Unilocular parovarian cysts which show no trace of septa, can only originate from the Wolffian bodies; the external glands previously mentioned must, therefore, be the remnants of the tubes which have been pushed to one side. The contents of the cysts are almost exceptionally quite clear, deficient in albumin, of low specific gravity and small in amount.* From one cyst of this kind, however, I removed 14,920 grams (29 pints) of a clear fluid; there was no sediment, and when boiled it became clouded, the cloudiness not disappearing upon the addition of an acid. The reaction was alkaline, and, when the fluid was boiled after being acidulated, from one-sixth to one-fifth per cent. of albumin by volume was deposited. This tumor was extirpated, and had walls similar to those described by Spiegelberg,† with the exception that no ciliæ could be found upon their inner surface. Spiegelberg found the fluid evacuated by exploratory puncture to possess all the characteristics of ovarian fluids; paralbumen, granular débris, decolorized and shrivelled red blood corpuscles, scattered white corpuscles, large granular fat cells and plates of cholesterin were present. The contents did not coagulate spontaneously.

Small accessory cysts are frequently found in the vicinity of the chief cyst, as in the cases of Spiegelberg, Olshausen and Fischel; the occurrence of groups of warty prominences upon

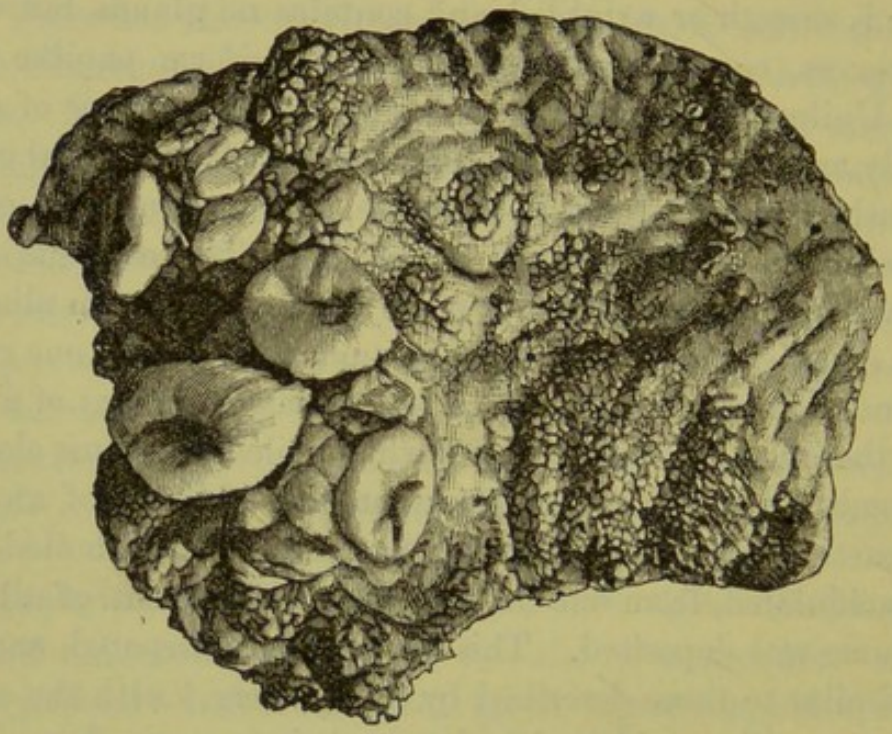
Vide Mundé, *loc. cit.*

† *Archiv*, I, p. 482.

the inner surface of some parovarian cysts is more remarkable, Olshausen and Fischel alone having hitherto reported such cases. I am indebted to the courtesy of Dr. Fischel for a photograph of these excrescences, which has been engraved in Fig. 117.

Fischel and Olshausen agree that these anomalies are cystomata which have originated in the parovarium and grown into the ovary. Those ovarian cystomata lined with ciliated epithelium must be derived from the parovarian tissues through the

FIG. 117.



Inner Surface of a Parovarian Cyst with Warty Prominences. (Fischel.)

cells of the granular layer, and not from the parovarium or the so-called organ of Rosenmüller. The tumors belonging to this class may also be intraperitoneal; their intraligamentous development depends upon their origin in the hilum of the ovary.*

Schatz collected 24 cases of parovarian cyst from the literature of the subject to 1876; two years later there were in all 38 cases, in which operations were performed. In 450 autopsies I met with 25 cysts of the broad ligament, an average of 5.5 per cent.;

*Archiv, IX, p. 120.

of these 7 were as large as a bean, 2 the size of a cherry, and 1 that of a walnut.

Usually these cysts are so small that they cause no symptoms.* When the cyst is large, menstruation becomes irregular, both as to time of appearance and quantity, as a consequence of the distortion and the nutritive disturbances produced in the ovary. Striæ appear when the abdomen is much distended, and dyspnœa, palpitation, cough and difficulty in walking occur.

The larger cysts of the broad ligament are most frequent during the child-bearing period and rare after the menopause. Of the cases collected by Schatz, 10 patients were single and 8 married; of the latter 3 were sterile, 1 had given birth to one child and then remained sterile, and 4 had several children. In 1877 I discovered in a robust child born at term, a congenital parovarian cyst as large as a bean; there were also a number of cysts in the left ovary.

The disease is variable in duration; in the cases hitherto observed it lasted from 9 months to 11 years. A cure may be expected from puncture when the contents are thin and of low specific gravity; not, however, if the cyst or cystoma contains a fluid rich in albumin and of high specific gravity. Such must be totally extirpated, or caused to atrophy by partial extirpation.

Diagnosis.—If in the hypogastrium of a woman at the child-bearing period a unilocular cyst is found everywhere fluctuating distinctly, originating from the uterine appendages, and extending below the pelvic inlet; if puncture evacuates a clear fluid of low specific gravity, containing ciliated epithelium and but little or no albumin, and no other formed elements; and if the tumor disappears entirely after the puncture, no trace of a pedicle being found, and then ceases to grow, the diagnosis of cyst of the broad ligament can be made with reasonable certainty. Köberlé and the author have thus repeatedly made the diagnosis. It is different when the contents are similar to those of an ovarian cyst, and the sac refills soon after puncture. Keith tapped such a cyst five times. Charles Clay in forty cases of this kind saw

* *Vide* hydatid of Morgagni, p. 492.

the cyst refill only in six. The diagnosis of cysts of the broad ligament is thus in some cases impossible. I was unable to make the diagnosis in the case of a parovarian cyst upon which I operated, though both ovaries could be distinctly felt after the sac had been evacuated; the right ovary appeared to be enlarged, and near it a resistance could be felt which we concluded was a cyst in connection with the ovary; during life the two could not be separated, and the character of the contents and the thick walls did not indicate a cyst of the broad ligament.

Treatment.—The practical conclusion to be deduced from the difficulties of diagnosis in all abdominal cysts, especially when of ovarian origin, is that fluctuating unilocular cysts should first be punctured and completely evacuated. The fluid must be submitted to careful microscopical and chemical examination, the physician in the meantime observing whether the sac is refilled. If the tumor appears again, an attempt at total extirpation may be made. Köberlé has successfully performed this operation twelve times. In one case I enucleated the cyst from the tissues of the broad ligament. It may, however, be impossible to complete the operation, as occurred in Schatz's and Arning's cases. When the radical operation is impossible on account of the extension of the tumor into the mesocolon, a portion of the cyst may be excised and the remainder included in the abdominal wound; a drainage-tube must then be placed either in the lower portion of the wound, or pass through Douglas's cul-de-sac into the vagina. With suppuration the cyst shrinks, and finally obliteration follows.

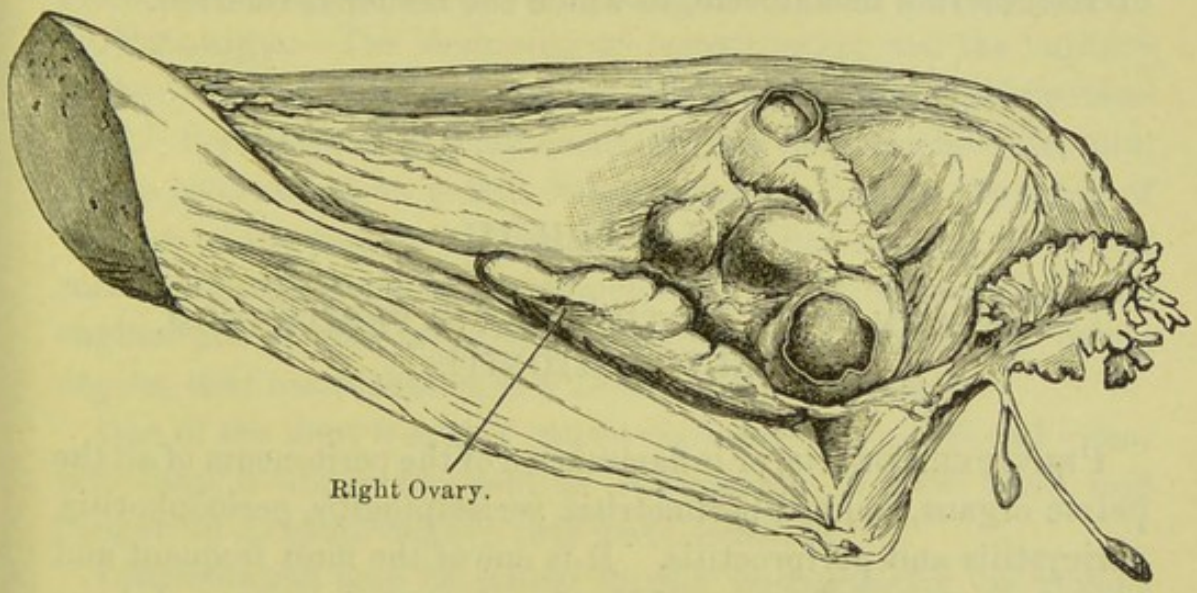
4. In concluding this subject, I wish to call attention to phlebectases in the vicinity of the ovary, known as *parovarian varicocele.*

Two varieties of this affection are recognized by me, viz., superior parovarian varicocele, lying between the tube and the ovary, and inferior varicocele, situated beneath the ovary. I have found instances of marked varicosity of this character 10 times in 300 autopsies. The most interesting case was the following: A patient, 45 years of age, dead from cancer of the liver, had an intraparietal myoma of the uterus about the size of an apple, and upon the anterior surface of the right broad liga-

ment, just below the round ligament, a tumor as large as a walnut, containing a yellowish granular matter, On the posterior surface near the right ovary there was a tumor as large as a walnut, containing many prominent veins, some being thrombosed and eroded at one point, as if from a recent perforation, as shown in Fig. 118. The peritoneum of Douglas's cul-de-sac was thickened, contained warty excrescences, and was in places slate-colored.

In another instance I found a cavernous tumor of the right broad ligament in a patient 61 years old, who died from tuber-

FIG. 118.



Parovarian Varicocele with Thrombosis.

culosis ; she had a retroflexed uterus, and the left ovary contained a cyst as large as a walnut. In the author's Atlas, p. 97, attention is directed to the fact that these tumors might easily be mistaken for dilatation of the ureter, such as has been observed by Hildebrandt in retroflexions of the uterus.

Should these phlebectases rupture into the peritoneal cavity, they may produce retrouterine hematocele; if the rupture is internal, it causes subperitoneal hematoma of the pelvis. In such cases in the non-puerperal state, owing to the density of the structure, the tumor seldom becomes very large; it may, however, separate the peritoneum from the uterus and extend to the other

side; this occurs more usually posteriorly to the uterus, rarely anteriorly.*

The symptoms of these subperitoneal extravasations are similar to those of hematocele; they are violent pain and pressure, dislocation of the uterus and finally manifestations of anemia. The subperitoneal location of the tumor is proved by its close and firm connection with the uterus, its lateral position and the absence of a tumor in Douglas's cul-de-sac. It is differentiated from parametritis by its sudden origin, without fever, and by the absence of the usual causes of non-puerperal parametric exudations. The prognosis is favorable; the absorption is usually rapid and complete. The treatment is precisely similar to that of retrouterine hematocele, to which the reader is referred.

CHAPTER III.

INFLAMMATION OF THE PELVIC PERITONEUM. PELVIPERITONITIS.

Pelviperitonitis, or inflammation of the peritoneum of all the pelvic organs, includes perimetritis, perisalpingitis, perioöphoritis, pericystitis and periproctitis. It is one of the most frequent and most important affections of the female sexual organs. I have found it in more than 33 per cent. of all autopsies. In slight cases the peritoneum of the uterus is only somewhat opaque, and here and there somewhat roughened, thickened, hyperemic, and shows delicate membranous deposits, as seen in Figs. 42, 44, 89, 91, 96 and 102. Very soon slight adhesions are formed between uterus and rectum, and at a higher level between ovary and tube or between uterus and bladder. These adhesions

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* Baumgärtner, *Deutsche Med. Wochenschrift*, 1882, No. 36. A. Martin, *Zeitschrift für Gebh. und Gynäkol.*, Stuttgart, 1882, VII, pp. 476 and 523. Balleray, "Subperitoneal hematocele," *Med. News*, Phila., 1883, XLII, p. 358. Grynfeld, "Un cas d'hématocèle sous-peritonæale," *Gaz. Hebd. d. Sc. Méd. d. Montpellier*, 1883, V, pp. 421 and 505.

gradually become larger and stronger; terrace-like layers may also be formed which bind the organs more and more firmly together, render them immovable until all the contents of the pelvis finally become so firmly adherent to each other that it is difficult to separate them. Later, adhesions with the small intestine and the omentum are formed; serous or sero-fibrinous exudations occur between the septa, which may rupture and hemorrhage take place into the spaces between them, thus leading to the formation of one variety of retrouterine hematocele. The exudation may perforate the various pelvic organs, as the rectum or bladder, fistulæ thus being formed; or it may pass along the rectum and thus find an exit, or over the ilium into the groin. Diffuse peritonitis rarely originates from this affection.

Ætiology.—The beginning of menstruation and the rupture of the Graafian follicles furnish a frequent source of pelviperitonitis. Pelviperitonitis may occur during intrauterine life, and, as has been stated on p. 230, fœtal peritonitis may be the cause of various malformations of the internal genital organs. It is not certain, though probable, inasmuch as it produces catarrh of the vagina, uterus and tubes, and chronic hyperemia of the pelvic organs, that masturbation is a cause of perimetritis.

One of the most frequent causes doubtless is gonorrhœal infection, even if not so frequent as Noeggerath, in New York, and Sänger, in Leipsic, believe they have found it.

Inflammation may be caused during menstruation by violent over-exertion, or by the jarring and irritation from coughing, cardiac disease or affections of the lungs; also by trauma from the use of the sound or during operations upon the vaginal portion; or from venereal excess, as in prostitutes. In short, there is scarcely any affection of the internal genital organs which does not to some extent involve the pelvic peritoneum, and secondary pelviperitonitis is, therefore, a very common affection.

The **symptoms** of pelviperitonitis, which may be acute or chronic, need scarcely be described here, as they have been presented in connection with the various acute or chronic inflammations of the uterus, tubes or ovaries.

The **prognosis** of pelviperitonitis depends upon its cause, the age at which the affection appears and upon its extent and ten-

dency to recur. The prognosis with regard to life is favorable in the non-infectious cases. The disease is, as a rule, unaccompanied by high fever or severe pain, and the patient is confined to bed for a short time only. The prognosis is far less favorable in those cases which are due to gonorrhœal infection. Noeggerath has shown that death ensues with symptoms of acute peritonitis; and although the disease may, in other cases, not terminate fatally, it lurks in the tubes, and recurrences from this source are so frequent that complete recovery seldom or never occurs. Sterility often results in both varieties of the affection from permanent displacement of the uterus, ovaries and tubes. According to B. S. Schultze, the exudates and adhesions may disappear to such an extent that the normal mobility of the organs is partially restored, but these cases are exceptional. Abscesses form and rupture into neighboring organs, death ensuing from decomposition of the discharges. Even in those cases in which the symptoms do not become grave and the processes apparently run a favorable course, there are such frequent recurrences and the patient is so distressed by the distortion and tension produced by the adhesions, that life is made a burden, and it is only after the occurrence of the menopause that there is a diminution in her many discomforts.

The **treatment** is essentially the same as that indicated for peritonitis. The pain in acute cases may be relieved by an ice-bag applied to the abdomen, or, if this cannot be borne, by warm compresses; leeches may be used when the pain is circumscribed. Everything must be avoided which tends to cause congestion of the pelvic organs. The action of the kidneys and of the bowels must be regulated. The absorption of the exudates in chronic cases will be promoted by baths and compresses, in connection with the internal administration of iron and quinine, while the pain will be relieved by narcotic injections, or rectal and vaginal suppositories. Massage is contraindicated as long as there is any fever, but when this has disappeared and exudation ceases, manipulation may be employed with advantage. Painting the abdomen with tincture of iodine and the application of iodoform and solutions of iodide of potassium to the vagina will then be of service in many cases.

As soon as fluctuation can be detected, abscesses must be opened with antiseptic precautions; it will often be necessary to make drainage through the vagina or externally. In two cases in which such an abscess had ruptured into the bladder, K. Schröder opened this viscus by the high operation, healed the abscess, and subsequently closed the vesical fistula. The value of laparotomy with salpingo-ovariotomy has been discussed in the chapter on salpingitis; in pelviperitonitis the conditions for this operation are not favorable.

CHAPTER IV.

INFLAMMATION OF THE PELVIC CONNECTIVE TISSUE. PARACOLPITIS AND PARAMETRITIS.

Definition.—Parametritis is an affection of the connective tissue surrounding the vaginal vault and cervix and found in the sacro-uterine and broad ligaments. The connective tissue becomes sodden and gelatinous and is abundantly infiltrated with small cells. The disease may extend from the broad ligaments to the bones of the pelvis, along the round ligaments, behind the peritoneum, toward the kidneys, in short, in all the directions taken by puerperal parametritis. We thus find this yellowish gelatinous infiltrate in the form of large or small tumors, small band-like cords, or delicate strands in all portions of the pelvic cavity.

The inflammatory hyperplasia of the pelvic connective tissue terminating in cicatricial contraction, first described by W. A. Freund, and recognized by him as a prominent source of hysteria, differs from this acute affection of the pelvic connective tissue; this condition was recognized by him as a frequent cause of hysteria. The contractions cause stenosis of the veins and other disorders of the circulation, resulting in atrophy of the pelvic connective tissue, and premature senile atrophy of the entire genital canal.

Ætiology.—Freund attributes chronic atrophic parametritis

to excessive stimulation of the genital nerves and the loss of vital fluids. Injuries to the genital mucous membrane, with simultaneous infection, are the most common cause of acute non-puerperal parametritis. I have frequently observed it follow gonorrhœal infection without involving the peritoneum, the process apparently extending from the cervical mucous membrane to the parametrium. Again, it may appear after operations upon the vaginal portion, infection ensuing from the non-observance of antiseptic precautions; or, after dilatation by unsuitable dilators or dilators that have not been disinfected, such as sponge or laminaria tents; I have also seen it caused by stem pessaries. In these cases infectious germs, such as bacteria or gonococci, have entered the involved structures; their presence could be proved in fatal cases by post-mortem examination, or, when abscesses form, by examination of the discharge.

Symptoms.—When acute parametritis results from an injury or from dilatation of the cervix, there is an almost simultaneous occurrence of rigors, fever, pain, exudation, weakness and great exhaustion. The pain varies according to the location and extent of the exudation, radiating into the bladder, rectum, and into one or both of the lower limbs. The patient is unable to stand or walk, and when the disease has extended to the corresponding ilium, the thigh is flexed upon the pelvis. Obstinate constipation often results from displacement of the uterus, and when there is an infiltration of the sacro-uterine ligaments, defecation and subsequent tenesmus may cause almost intolerable suffering. The tumor is at first usually unilateral or somewhat posterior to the uterus; after reaching a certain size, however, it will remain apparently stationary for a time; the exudation then often becomes retrouterine and extends to the other side of the uterus, continuing to advance with exacerbations of fever, while absorption begins at the original site of the disease. In grave cases the exudation soon reaches entirely around the uterus, enclosing the organ in a solid mass.

Course.—The disease may continue for months or years; the terminations are various, according to the intensity of the inflammatory processes. In acute cases resulting from septic wounds, death may occur from septicemia in a very short time.

When the exudation is extensive, rigors and fever may announce the formation of abscesses, which open by perforation into neighboring organs, as the bladder, rectum or vagina. In other cases the exudation may remain unchanged for months, but complete absorption eventually occurs in the majority of cases. Absorption, however, does not mean perfect recovery, as the uterus is rarely left in its normal position; the exudation pushes it to one side of the pelvic cavity, while the subsequent shrinking and contraction of the exudate may draw it to the opposite side and fix it in this position. There is a bare possibility that the cicatrices thus formed will gradually become stretched, the uterus finally recovering its normal mobility; cases of this kind have been described upon pp. 310 and 331. In one very important case, in which I observed two attacks of gonorrhœal parametritis, a cancroid papillary tumor appeared upon the vaginal portion immediately after the second attack.

Diagnosis.—Vaginal examination, even in the early stages of the affection, will reveal unilateral or bilateral puffiness and increased resistance in the vicinity of the uterus; and that this is not intraperitoneal is evident from its lateral position and the absence of a tumor in Douglas's cul-de-sac. As a rule the hypersensitiveness of the peritoneum soon disappears. The fever, rigors and lateral position will guard against confounding this affection with hematocele. Uterine myomata are circumscribed, unaccompanied by fever, rarely painful and grow slowly; the exudation, on the contrary, increases rapidly, is at first soft and associated with fever, becoming harder and smaller as the latter subsides. The differential diagnosis between an ovarian tumor and an exudation of this kind has been considered in a preceding chapter. Inflamed ovarian tumors and myomata are not so easily differentiated from parametritic exudations, because their surfaces are usually fixed to the adjoining tissues by exudations and deposits. The diagnosis is definitely ascertained only after prolonged and careful observation of the subsequent changes in the character of the tumor.

Treatment.—The first indication is the removal of all existing causes of the disease, *i. e.*, intrauterine pessaries or uterine tents must be at once removed. The second indication is thor-

ough disinfection of any wound which may be present, by exposing the vaginal portion and washing any ulcer found there or in the cervical canal with a solution of carbolic acid, or 1–1000 corrosive sublimate. The bowels must then be evacuated by cathartics, and when there is pain an ice-bag placed upon the hypogastrium; tepid compresses renewed every half hour are suitable for those cases only in which the hyper-sensitiveness is slight.

After the tumor has ceased growing, the internal and external use of the preparations of iodine are indicated. General brine baths, peat baths and compresses, and hot sand baths, are of service. Hot vaginal injections, 37°–43° R. (115°–129° F.), have been generally recommended within recent years and used with good effect. Massage should not be employed as long as any fever is present. Complete absorption may be expected even when the exudation is extensive, and incisions are therefore never to be made except when fluctuation is distinctly felt and rupture feared. After the pus has been evacuated and the cavity of the abscess closed, absorption of the remainder of the exudate may be produced by the treatment previously suggested. In conclusion, it may be stated that but little good can be expected from the employment of sitz-baths, while cold baths, sea and river baths may promote complete recovery after the exudate has in great measure disappeared.

CHAPTER V.

INTRAPERITONEAL EXTRAVASATION OF BLOOD INTO THE TRUE PELVIS. RETROUTERINE, PERIUTERINE AND ANTEUTERINE HEMATOCELE.

Pelvic hematocele is an encapsulated extravasation of blood into the true pelvis, located, as a rule, in Douglas's cul-de-sac, and displacing the uterus forward. When the hemorrhage is profuse, the blood fills the cul-de-sac and then covers the broad ligaments and the uterus. Primary anteuterine hematoceles of the vesico-uterine cul-de-sac with encapsulation occur rarely and

only in small degree. I have seen one case of *hemorrhagic pachyperitonitis* of the vesico-uterine excavation, and this was found in the dead subject. The majority of the cases of this affection described were, as K. Schröder has shown, instances of hematocolpos or hematometra, either a single or double genital canal being present. Nélaton, in 1850, first recognized the condition known as hematocele, and we are indebted to K. Schröder for a critical study of its ætiology and course.

The source of the hemorrhage may be the ovaries, tubes, uterus, broad ligaments, an extrauterine ovum or the peritoneum.

Hemorrhage into the peritoneum results from rupture of a Graafian follicle or of one or more follicles which have been distended by apoplexy, as seen in Fig. 114, p. 587. Ovarian phlebectases may rupture during menstruation or in the course of a septic affection (Zwicke); these anomalies, however, are of such rare occurrence that the possibility of their existence has only been established by post-mortem examinations; they are seldom thought of as a cause of hematocele.

Blood may be poured out of the oviducts into Douglas's cul-de-sac, if at the time of menstrual congestion excessive quantities of blood are secreted by the tubal mucous membrane; or if in case of a hematosalpinx the tube by rupture discharges its contents into the abdominal cavity. In both cases the mass of blood is only exceptionally so considerable* that it forms a distinct swelling; nevertheless, as a rule, death speedily follows the rupture of a hematosalpinx.† Tubal pregnancy, according to J. Veit, is one of the most common causes of hematocele, yet this variety of the disease is more frequently followed by recovery than was formerly believed.

Hemorrhage from the uterus into Douglas's cul-de-sac may result from excessive distention of the uterine cavity in consequence of atresia of the os; this presupposes the tubes being permeable and the pressure exerted by the uterine walls forcing the blood through them. It may also be caused by traumatic rupture of the varicosities which are found upon the surface of

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* *Vide* Johnson, *loc. cit.*, p. 570, and Chase, *loc. cit.*, p. 581.

† *Vide* chapter on Tubal Hemorrhage, p. 497.

the uterus during pregnancy; a fatal case of this variety is reported by Fritsch, upon p. 341 of the edition of his *Lehrbuch*, published in 1881; both are, however, rare conditions.

Another source of hemorrhage may be varicocele of the broad ligaments, as I have demonstrated in an instance mentioned upon p. 605; such varicosities are not infrequent, and bleeding from this source certainly occurs oftener than has heretofore been believed. Rupture of large veins best explain how in so very short time such enormous intrapelvic collections of blood may form.

An extrauterine ovum, as, for instance, found upon the posterior wall of the uterus or the ovary, may be the source of considerable hemorrhage, its envelopes being ruptured and the placenta detached or injured.

Peritoneal inflammations, with recent vascular adhesions, are often the cause of retrouterine hematocele; cases have recently been reported by Bernutz, Cerné, Lerch, Soller and the author. Serum may accumulate between these membranes lying over Douglas's cul-de-sac, and a hemorrhage into the closed cavity thus formed also occur. Credé has reported a most interesting case,* in which he had punctured a tumor of this kind and at first evacuated serum, then serum with blood and finally, pure blood; two days later, so much pure blood was discharged that puncture was discontinued. These conditions of the peritoneum are analogous to *pachymeningitis hemorrhagica*, described by Virchow.

The amount of hemorrhage and the time of its occurrence will depend in all cases upon the lumen of the lacerated vessel, the degree of congestion and the obstruction to the flow. The patient who is pregnant or menstruating, or who suffers from varicosities is therefore predisposed to these severe hemorrhages, while numerous adhesions prevent large extravasations, and by exerting pressure upon the bleeding surfaces promote the arrest of the hemorrhage. If the hemorrhage occurs rapidly and is unobstructed, the tumor is not circumscribed or encapsulated; if adhesions are already present in Douglas's cul-de-sac, or have

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* *Monatsschrift*, IX, 1.

properly formed, or if as the result of a previous hemorrhage adhesions of the intestines have occurred at the pelvic inlet, these constitute the walls of the capsule. The accumulation will no longer recede before the examining finger, and tumors may be formed which extend from the symphysis to the umbilicus; they are enclosed at the sides by loops of intestine, and are hard, nodulated and immovable. The blood which is effused from one or other of these sources into the peritoneum soon coagulates; serum is absorbed, and the tumor, which at first was globular, tense and elastic, becomes hard and uneven.

Ætiology.—If the hyperemic pelvic organs are injured, as by a blow, concussion or a dislocation from violent exertion, the vessels of the parts are often ruptured. French authors attribute this accident to coition during or immediately after menstruation (Barth); many of the patients examined by me have admitted the possibility of this cause. A violent concussion of the body, lifting heavy objects and great straining in defecation may cause the rupture of a pregnant tube. Bleeders and scorbutic patients are, of course, especially predisposed; the occurrence of hemorrhage is made more liable by fatty degeneration of the vessels, as in cases of phosphorus-poisoning; though it must be remembered that acute phosphorous-poisoning is usually rapidly fatal, and that an encapsulated hematocele is rarely formed, though hemorrhage in the tissue of the ovary and into the peritoneal cavity has been observed. In most cases, the hematocele does not occur suddenly while the patient is in perfect health, but there is a history of irregular menstruation, abdominal pain and symptoms of inflammation, perimetritis. The statistics relating to the frequency of hematocele are not uniform, for it has not yet been determined whether the majority of the patients are parous or have had repeated attacks of puerperal diseases. Scanzoni and Schröder affirm that hematocele is rare, while Seyfert found 5 per cent. and Olshausen 4 per cent. of all female patients suffering from it. I have not observed it oftener than in 0.5 per cent. of my cases; the difference in the statements of authors is probably due, first, to the fortunate fact that hematocele is rarely fatal, and second, that it is doubtless often confounded with other tumors of the pelvis.

Symptoms.—Severe pain and great irritation of the peritoneum are the first indications of effusion of blood into the peritoneal cavity; these are followed by weakness, attacks of syncope, pallor, small and frequent pulse and other symptoms of hemorrhage. The anemic condition is often plainly shown at the vaginal entrance, and it may be clearly seen in the non-menstruating uterus, dislocated upward and toward the front, by examination through the speculum.

When the symptoms of peritonitis are very decided, they are accompanied by a rigor or chilliness, followed by more or less continued fever. As a rule, the temperature soon falls to normal, and the patient is free from fever long before the tumor has disappeared. Abscess and sloughing may follow, however, if septic material gains access to the tumor.

One symptom often observed in retrouterine hematocele, but which has received too little attention from authors, is the discharge of blood from the uterus. K. Schröder states that the discharge of the bloody fluid or the occurrence of even a profuse hemorrhage under such circumstances, is the result of the congestion produced by the dislocation of the uterus or of the general hyperemia of the pelvic organs. I have seen protracted discharges of blood in cases of hematocele, but never a profuse hemorrhage. The discharge has this peculiarity, that the blood is not fresh, but dark-colored and viscid or even thick; I cannot, therefore, accept the view that the fluid thus evacuated from the uterus has been forced through one of the tubes, the fimbriated extremity of which is supposed to dip into the collection of blood forming the hematocele. This theory supposes a kind of natural cure; germs and other injurious material might also pass into the extravasation. The quantity of blood discharged through the tubes could not be great, because the latter are displaced, the blood thick and the patient is resting. The condition would thus be somewhat similar to that observed in the tubo-ovarian cyst with evacuation of the contents through the uterus.

Not only the uterus but also the bladder is dislocated, and the ovaries, rectum, ureters and sacro-ischiadic plexus subjected to pressure by the extravasated blood. We therefore find disordered function more or less marked in all the pelvic organs,

there being dysuria or ischuria, rectal tenesmus, constipation, dysmenorrhœa, neuralgia, painful twitchings of the lower extremities. These symptoms are, however, often comparatively slight even when the tumor is large, and may be entirely wanting after the first acute attack has subsided.

When the distention and pressure are great, the painful affections of the various pelvic organs may be very intractable and distressing to the patient, especially if there are frequent relapses after the grave symptoms have partially or wholly disappeared. She is usually able to locate the affection by the pain above or within the true pelvis, and the presence of a hard sensitive tumor just above or at one or both sides of the mons veneris.

After reaching its maximum the tumor remains apparently stationary for a time, and then gradually becomes smaller, harder, uneven and less sensitive. Complete absorption is the usual termination when the disease has been recognized and properly treated. I have had many cases of hematocele under my charge, but have never observed a perforation or sloughing of the tumor; neither have I ever lost a patient thus affected; using the greatest care in all my examinations, I have never punctured or incised the tumor, although the patient may have had some fever or other symptoms of an abscess. The rupture and evacuation may occur into one of the adjoining cavities: into the rectum, vagina (de Sanctis), abdominal cavity (Troquart) or the bladder; the first is of most frequent occurrence, although the bladder and rectum may be simultaneously perforated, according to de Sanctis. There is always danger of suppuration of the cyst walls after perforation, from decomposition of the contents, with subsequent peritonitis or septicemia. Recurrences have been observed in cases in which the hematocele was preceded by frequent attacks of perimetritis; I had in my clinic a short time ago a patient in whom, within the last three years, similar manifestations suddenly appeared three times; the third was positively recognized as retrouterine hematocele.

Diagnosis.—The affection is recognized without difficulty, as in addition to the history of the case, the tumor is characteristic, being situated behind the uterus and displacing this organ upward and forward. Douglas's cul-de-sac is distended, its lower

portion becoming globular; rectal touch allows the finger to pass behind the tumor, and its boundaries can be definitely ascertained by bimanual examination.

The fundus of the uterus may be palpated above the pubic symphysis, and can be separated from the tumor, which feels tense and elastic. Crepitation, somewhat like that obtained by compressing a snowball, has been noticed by various authors when the coagula were compressed; I have never recognized this sound. When Douglas's cul-de-sac is shortened or partially closed by adhesions, the distention caused by the hematocele is unequal, the tumor in the true pelvis appearing nodulated and irregular instead of globular. The irregularity of the surface of the tumor above the pelvic inlet may likewise be due to adhesions.

Palpation is difficult in nulliparæ with rigid or fat abdominal walls; under such circumstances it may be necessary to chloroform the patient.

Hematocele is most frequently confounded with uterine retroflexion, especially with retroflexion of the gravid uterus. In a case coming under my observation, that of the wife of a ship captain, her physician took the greatest pains to replace the tumor, which he mistook for the retroflexed uterus. He was unsuccessful, but continued his efforts until finally the resolute captain compelled him to desist, because the patient was in great pain and resisted as much as she was able; fortunately she was not injured by the physician's manipulations.

Such mistakes ought to be prevented by due attention to the position of the uterus, the origin of the tumor, the unchanged direction of the os, the thinness of the lips of the uterus and the anemic condition of the genital tract. In doubtful cases a careful bimanual examination should be made while the patient is under the influence of chloroform, before attempts at reposition.

Perimetritis and the exudation caused by it are differentiated from hematocele by the sudden appearance of the latter, its comparatively rapid development, the increasing tension, the coexisting anemia and the final disappearance of the tumor; combinations of the two affections have been observed. Incision may be made in extreme cases, thus aiding the diagnosis, but really intended for therapeutical purposes only.

Prognosis.—The prognosis is good in those cases in which the retrouterine hematocele is recognized in the beginning and properly treated, and the less operative interference, the better the prognosis. As a rule complete absorption occurs in a few months. Recurrences are, on the whole, rare and their symptoms are less grave, and the hemorrhage less profuse than in the original attack. When suppuration and rupture occur, the prognosis is not so good. The results of operative measures are decidedly unfavorable. Perforation into the rectum seems to be the most favorable; but the prognosis is not so good when openings occur in different parts; the most unfavorable complication is perforation into the abdominal cavity. Death often results from septicemia and peritonitis; nevertheless, when strict antiseptic measures are employed, abscesses and other complications of hematocele may often be prevented or cured.

Treatment.—The first indication in the treatment of recent hematocele is to arrest the hemorrhage. For this purpose the patient should lie down, remaining absolutely quiet; an ice-bag should be laid upon the abdomen, the rectum evacuated, the heart's action reduced and the pain relieved by opium internally and morphia hypodermatically. These remedies alone, when constantly and energetically employed, have never failed to relieve my patients. Frequent examinations, strong compression of the tumor or puncture and incisions of it are admissible only as extreme means. Action of the kidneys and bowels must be regulated and the activity of the skin promoted; the diet should be chiefly liquid, and must not contain much that increases the fecal mass. Obstinate constipation must be relieved by injections, cathartics and the milder purgatives, such as magnesia, bird-cherry bark, sulphur and rhubarb; or by the bitter waters, such as Friedrichshall, Püllna, Ofen and Hunyadi-Janos in gradually increasing doses.

Operative interference is admissible only when rupture of the tumor seems inevitable, and then a free incision must be made at the point nearest the threatened perforation, antiseptic precautions being strictly observed. Subsequent evacuation will be secured by regular irrigation of the sac or by drainage through the vagina or abdominal walls. The communication with the

rectum is usually a diagonal valve-like canal, which prevents the entrance of feces or gas into the sac; in such cases we should avoid examination with the finger and sound, as decomposition may thus be caused.

After a portion of the extravasation has been absorbed, this process may be favored by the administration of iron and the use of baths. The patient must for a long time avoid excessive bodily exercise, especially at the time of the menses, when it is better that she should be in bed.

CHAPTER VI.

PARASITES OF THE FEMALE GENITALS AND OF THE PELVIC CONNECTIVE TISSUE.

a. Echinococci of the Genitals and the True Pelvis.

The statistics of Neisser, from which Schatz eliminated the cases falsely described as hydatid moles, show that of 960 cases of echinococci 40, or about 4 per cent., were found upon the genital organs and on the true pelvis. While, however, this disease occurs more frequently in women than in men, which is partly to be connected with their more frequent occupation among dogs, partly with their employment in milking, according to the investigations of Schatz, keeping in view the fact that the female genital organs are twice the extent of those of the male, show that the former, in proportion to their more frequent affliction with echinococci in general, display no increased frequency of this disease of the genital organs. However, the more frequent occurrence of echinococci in the female appears to be a fact.

Sixty-six authors cited by Schatz have reported 52 cases of echinococcus of the pelvic organs. These statistics cannot be complete, however, as the case of subperitoneal echinococcus in the puerperal uterus described by me in the "Pathologie d. Weibl. Sexualorgane," p. 194, Plate XXIV, has not been recorded. They were observed as follows, in the different organs: the uterus, 14 times; the ovaries, 7 times; the broad ligament, 7 times; the anterior half of the pelvis, 2 times; the posterior half of the

pelvis, 22 times. The uterus and ovaries are accordingly most frequently affected, the tissues about the rectum coming next, and the bladder last.

In the uterus they are generally submucous, depending, as Schatz correctly observes, upon the increased flow of blood to the uterine mucous membrane, especially during menstruation. These submucous tumors may become polypoid and be discharged as fibrous polypi are. They differ from the multiple myxomata of the chorion by the absence of prolongations and connection with each other. Intramural and subserous cysts are easily confounded with myomata; the presence of several globular tumors of the same size near each other is of much diagnostic value, but the "purring" hydatid tremor can rarely be detected. The diagnosis can be made clearer by exploratory puncture, to obtain some of the clear fluid which contains the typical hooklets; an exploratory incision may occasionally be necessary. As a precaution, Schatz has called attention to the fact that after the incision, an intramural or subserous echinococcus cyst may look exactly like a myoma. Uterine echinococci may rupture into the bladder and rectum, as in the cases of Freund and Chadwick; or internally, as in the cases of Hirschfeld and the author; or into the peritoneum, which was the termination in Wilton's case.

They vary in size from a pea to the fist, but the cavity may be partially or wholly obliterated by shrinking after the rupture and evacuation.

It is often impossible to differentiate echinococci of the ovary and of the broad ligaments, but the multiplicity of the tumors and the absence of connections between them are here of the greatest diagnostic significance.

Subperitoneal echinococci situated between the organs of the pelvis may rupture into the vagina, bladder, rectum, or perineum.

Echinococci of Douglas's cul-de-sac, if intraperitoneal, are of frequent occurrence; they develop slowly, remain for a long time without change, and cause but little disturbance of the functions of adjacent organs. They are not movable, but fixed, and under favorable conditions the uterus and ovaries may be separated from them by palpation. Sometimes they are remarkably like

solid tumors, as in Wiener's case. In my own patient the diagnosis was made with certainty during her pregnancy.

The prognosis is favorable when there are no echinococcus cysts in other organs of the body, and when all the operations and manipulations are performed with strict antiseptic precautions.

Treatment. — Isolated small cysts of the female genital organs may be completely evacuated by puncture or incision through the vagina, and eventually cured by drainage. In multiple tumors of this character, one may follow Küchenmeister's suggestion, and attempt to at least temporarily reduce the size of the tumor by the internal administration of iodide of potassium with tincture of kamala, or by electrolysis. The treatment of uterine echinococcus is in many respects similar to that of myoma, as when the tumor is submucous the preparations of ergot are employed. Laparotomy may be necessary in intramural and subserous tumors. Schatz cured his second patient by this means, there being a subserous sac which reached to the umbilicus, besides a collapsed sac in the left broad ligament and another one in the omentum.

In deep-seated intraligamentous cysts, laparotomy and puncture or incision through the vagina would be indicated, the operation being necessarily similar to that for subserous and parovarian tumors. When echinococci are subserous in the pelvis, and intraperitoneal in Douglas's cul-de-sac, a free incision should be made through the vagina, to be followed by irrigations through a metallic drainage-tube.

Should spontaneous perforation occur, the opening must be enlarged, or a counter-opening made and a drainage-tube inserted.

b. Professor Birch-Hirschfeld found a calcified ascaris lumbricoides on the posterior wall of the uterus and the left broad ligament. A drawing of the specimen is given in Plate XL of my *Pathologie d. Weibl. Sexualorgane*, and the manner of its migration discussed on pp. 321–324. I do not think it reached this location by perforating the intestine, as it was 7.5 centimeters (3 in.) long, 0.5 centimeter ($\frac{1}{5}$ in.) thick, and completely calcified; perforations which permit the passage of such large bodies are

almost always fatal. While the parasite was immature, it might have been thrown into the vagina and uterus by injections, and have made its way thence into the tubes or Douglas's cul-de-sac, which view is supported by the statistics of Davaine who found thirty-seven cases in which parasites had been discovered in the gall-ducts. Hennig * mentions Bizzozero's case in which an ascaris had passed from an aperture in the rectum into the right tube, the mucous membrane of which was congested. In our patient, 34 years old, deceased, with tuberculosis of the meninges, lungs and intestines, there were no signs of recent or old peritonitis, and no perforation cicatrices, although numerous tuberculous ulcers had formed in the ileum.

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* "Krankheiten der Eileiter," Stuttgart, Enke, 1876, p. 53.

SECTION VII.

ANOMALIES AND DISEASES OF THE MAMMARY GLANDS.

INTRODUCTION.

As the female breasts belong to the sexual organs and stand in most intimate relation with them, it is therefore the duty of the gynecologist to consider their affections in a text-book on the diseases of women. In the works of such recent authorities as Duncan, Edis, Emmet, Fritsch, Hart and Barbour, Martin and K. Schröder, this subject has received no attention whatever; an exception must be made, however, as to the second edition of Fritsch's treatise. This omission is partly due to the fact that most diseases of the mammary glands require surgical treatment, and the larger experience of the surgeon is recognized, at least in all affections which are non-puerperal in character. When comparing the number of diseases of the breasts with those of the other sexual organs which have come under my notice, I find that the average is remarkably low, there being only about 150 cases, or 1.5 per cent., in a total of 10,000 patients. Nevertheless, I consider it the duty of gynecologists to make the most of their limited experience, and especially so because they only are in a position to observe in largest number the most important changes which the breasts undergo in the life of the woman, that is, the puerperal, to determine their significance with regard to non-puerperal maladies of the same organs. This field of observation is almost entirely removed from the surgeon; both should work hand in hand in the investigation of these diseases.

During my residence in Rostock, Dresden and Munich, I have observed the following non-puerperal anomalies of the mammary glands:—

1. Anomalies in development (supernumerary glands) ..... 4 times.
2. Malformations and irregularities..... 1 time.
3. Affections of the nipples ..... 3 times.
   (ectases of the lactiferous sinuses)..... 1 time.

4. Neoplasms:—
   - *a.* Nodules not examined anatomically..... 19 times.
   - *b.* Benign tumors, { fibromata..... 3 "; myxo-adenomata..... 1 time; adenomata ..... 5 times.
   - *c.* Malignant " { acinous cancer..... 47 "; tubulous " ..... 13 "
5. Nutritive disturbances:—
   - herpes of the mammary areola ..... 6 "
   - syphilitic, papular and areolar ulcers ..... 2 "
   - chronic mastitis ..... 1 time.
   - fistula of the gland ..... 2 times.
   - occasional swellings ..... 7 "
   - anomalies of secretion (galactorrhœa) ..... 6 "
   - lessened secretion during other diseases ..... 3 "
6. Neuralgia ..... 15 "
7. Injuries ..... 4 "

The Development of the Mammary Glands.

The researches of Rein, of St. Petersburg, show that the epithelial portions of the glands are developed from the superior germinal layer, and their connective-tissue stroma from the mesoderm; they are organs *sui generis*. Their development takes place with the closure of the germinal clefts, and in the human embryo traces of the gland can be first seen during the second month. The primary epithelial layer is first developed from the local accumulation of cylindrical cells of the embryonic epidermis; it then penetrates the embryonic cutis, from the cells of which, interlaced with non-striated muscular fibre, the areolar zone is developed in the human embryo at the end of intrauterine life. The primitive germinal epithelium throws out one or more secondary prolongations after having reached a certain depth, and simultaneously the stroma of the gland is developed from the connective tissue of the cutis in concentric layers about the areola. The primary epithelium then degenerates up to the orifices of the excretory ducts; at the end of intrauterine life three portions of the secondary epithelial layers may be recognized, namely, the excretory ducts, the milk sinuses and the milk ducts with the acini. These three portions together with the short orifices may be differentiated in human adults and animals. In the

beginning of extrauterine life, all the principal portions of the mammary glands are perfectly formed in both sexes, and are capable of secreting milk. The so-called glands of Montgomery are rudimentary milk glands. The nipples are almost perfectly developed at birth. According to Kölliker, the gland ducts are much dilated during the first year so that cavernous spaces lined by flattened epithelial cells are formed; this process may even develop into a mastitis, which results in partial arrest of development of the gland in females otherwise well-formed.

The perfect terminal vesicles, at first club-shaped and surrounded by a hyaline, firm, nucleated connective tissue, are not formed until the age of puberty; the grape-like acini are then developed from the terminal vesiclès by proliferation of the epithelium; capillaries and firm connective tissue are afterward formed around the acini. During the first pregnancy the lobes of the gland greatly increase in size by the development of parietal acini. In places the inter-acinous structure, as shown in the accompanying illustrations, is extremely thin, the wall of the vesicle consisting almost wholly of epithelium. During lactation the excretory milk ducts are dilated into lactiferous sinuses, which are surrounded by a network of muscular fibres, thus making the nipple erectile. According to Hennig, these muscular fibres extend deeply into the gland, forming uninterrupted layers which surround not only the excretory ducts, but also the separate lobules of the gland.

The examinations of Lister, Robert, Meissner and Escherich,* have proved that the secretion of the mammary glands is free from ferments and organic germs.

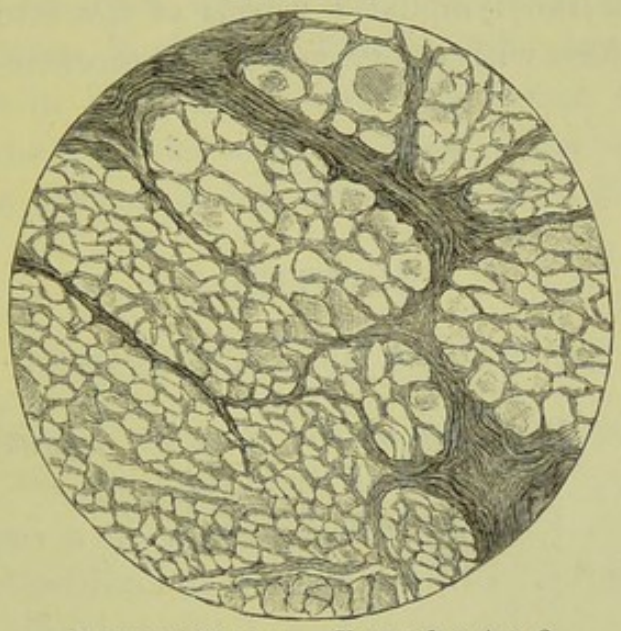
At the end of lactation the connective tissue of the glands usually remains lax and fibrous, and rapidly undergoes fatty metamorphosis.

Atrophy of the mammary glands occurs at the menopause, by disappearance of the glandular epithelium and collapse of the acini, nothing remaining except the excretory ducts, lined with imperfect epithelium, and traces of the collapsed canaliculi. This atrophy of glandular structure is replaced by

* "Fortschritte der Medicin," 1885, No. 8.

the deposit of fat. Cystic ectases of the milk ducts, with the formation of a brownish, greenish, bloody, thin or viscid secretion, are very common in old women, according to Billroth.

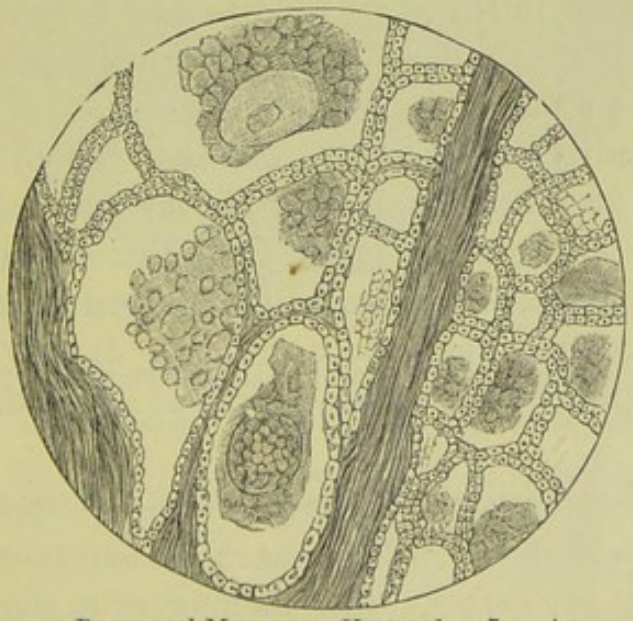
Fig. 119.



Puerperal Mamma.—*Hartnack*, s, 4, o. 2.

As a rule the mammæ are unequal in size, the right being somewhat larger and heavier than the left. The glands are

Fig. 120.



Puerperal Mamma.—*Hartnack*, s. 7, o. 4.

very vascular, the arteries being from the internal mammary and long thoracic arteries; the veins form a fine plexus beneath the

skin, many of them emptying into the external jugular vein. Numerous lymphatics arise in the papillæ of the areola, form cutaneous and subcutaneous plexuses, the majority being connected with the lymphatic glands of the axilla; others communicate with the lymphatic vessels of the intercostal spaces and through these with the glands of the thoracic cavity.

CHAPTER I.

ANOMALIES OF DEVELOPMENT.

1. *Absence of the Mammary Glands, Amazia. Rudimentary Development of the Glands.*

Säxinger found both mammæ wanting in a case of total absence of the uterus. Billroth states that Louisier had observed a case of congenital absence of one of these glands. Froriep and Schlözer have reported congenital absence of one mamma and the principal portion of the pectoral muscle, in a case in which there was also union of the third and fourth ribs with the sternum. Pears, Cooper, Caillot and Laycock have reported cases in which both breasts were in the same condition as before puberty, and the ovaries imperfectly developed. Rosignol found the mammæ rudimentary in a patient who had no vagina.

Great inequality of the breasts was observed by me in an unmarried lady, 22 years of age, the right mamma being of normal size, while the left was not larger than that of a child, but the nipple was developed. Examination showed that the internal and external genital organs were normal. It may be proper to state that the patient was under treatment for ichthyosis.

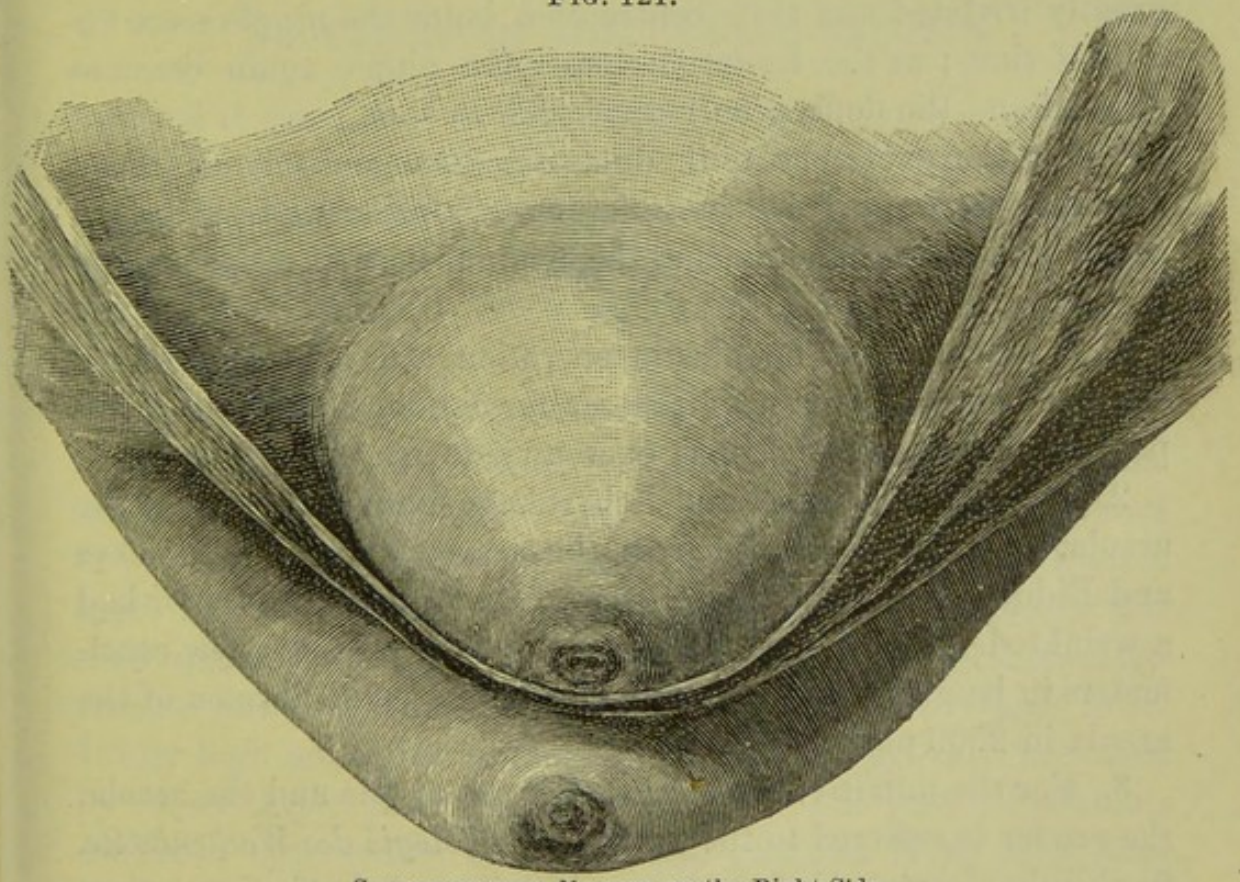
2. *Supernumerary Mammary Glands, Polymazia.*

According to Meckel von Hernsbach the embryo of the human female contains the germs of five mammæ, as in the bat; two are situated in the middle of each half of the thorax, one in each axilla, and one above the umbilicus just beneath the sternum.

Gorré saw a woman in whom the five mammæ of this primitive

division were well developed. According to the researches of Leichtenstern the majority of the supernumerary glands are found toward the median line, below the normal glands and rarely in the axilla. Cooper, Lee, Shannon, Champion and Gardner have observed females with four mammæ, and Dreger, Bartolin, Hannäus, Borle and Jussieu three mammæ. Robert reports a case in which milk could be drawn from a supernumerary mamma on the outer surface of the left thigh; the mother of the patient had a double nipple. Billroth has ob-

FIG. 121.



Supernumerary Mamma on the Right Side.

served only one case of double nipple; an acinous carcinoma had developed in the mamma of this patient. The author has seen four cases of small supernumerary glands, varying in size from a bean to a walnut, on the right side and at the lower portion of the normal gland. The second gland had a small, prominent nipple surrounded by a pigmented areola; colostrum could be pressed from this supernumerary organ. The accompanying figure shows the location and comparative size of the second gland. I have never seen two or more nipples on the same mamma.

CHAPTER II.

MALFORMATIONS AND DISEASES OF THE NIPPLE AND THE AREOLA.

1. *Retracted Nipple.*—The most frequently observed malformation is a too flat or retracted surface which makes the nipple appear umbilicated. It is obvious that this condition is associated with shortness of the excretory milk ducts, as, when the nipple is drawn upon, the unstriated muscular fibres of the cutis are greatly irritated and their contraction holds the nipple erect for a brief time; as the irritation ceases the nipple again becomes relaxed and the depression reappears. In such cases it is possible that the excretory milk ducts were congenitally small, or that they were shortened by inflammatory processes in the early period of extrauterine life, and the original normal nipple drawn inward.

It is evident that no plastic operation can be suggested for cases of congenital or acquired malformation, because it is impossible to lengthen the short excretory ducts.

2. *Neoplasms.*—Russel and Lebert have found atheroma of the areola, probably developed from the areolar glands. Kalischer and Bidder have treated papilloma of the nipple; the tumor had a wrinkled or mulberry-like surface and a pedicle a few centimeters in length. I have found one case of small fibroma of the areola in 2500 puerperal women.

3. For the nutritive disturbances of the nipple and the areola, the reader is referred to the author's *Pathologie des Wochenbettes.* Syphilitic ulcers are inflammatory non-puerperal affections; they may be primary or secondary, the latter occurring in the form of broad condylomata. I have twice seen syphilitic ulcer of the right breast; once in a patient in the third month of pregnancy (case No. 215 of the Dresden Policlinic, 1880), the other in a sextipara, at Dresden, in 1882. Peyrot describes lymphangitis which developed after an erosion of the nipple, and was transmitted to the other breast and the axilla by the superficial lymphatic plexus.* Chalot reports an annular phlegmon of the

* *France Méd.*, Paris, 1881, II, pp. 878–882.

areola,* and these are the only cases of this kind found in recent literature. I have repeatedly seen inflammation of Montgomery's glands, forming furuncular prominences, which were very painful and often suppurated, so that an incision was necessary. In 2300 nursing women I found 26 cases of follicular abscess of the areola.

CHAPTER III.

NEOPLASMS OF THE FEMALE BREASTS.

A. Benign Growths.

In 11,140 women with tumors, Gurlt found 6138 tumors of the sexual organs, and of these 1514, or 25 per cent., were situated in the breasts; 15 were benign growths, consisting of 7 fibromata, 2 papillomata, 1 atheroma, 4 cysts and 11 adenomata.†

1. *Tumors of the Connective Tissue, Fibromata.*

Those nodules which are developed from the connective tissue surrounding the acini of the mammary glands, are usually round or oval in form, moderately vascular, and vary in size from a hazel nut to a hen's egg. They are rarely homogeneous but show spaces formed by the dilated, elongated and branched excretory ducts of the gland, containing a serous viscid fluid. Under high power, the microscope shows that the walls are lined by several layers of cylindrical epithelium, and that the contents consist of degenerated cells and fine granules lying in a clear homogeneous substance, as shown in Fig. 122. These tumors are often found in virgins and nulliparæ; the terminal vesicles forming, according to Billroth, a predisposition to cysto-sarcoma.

Symptoms.—As a rule, the patient, while washing or dressing herself, accidentally discovers a hard nodule in the breast. Tumors of this kind not larger than a bean are usually painless; they are most common between the sixteenth and twenty-fifth

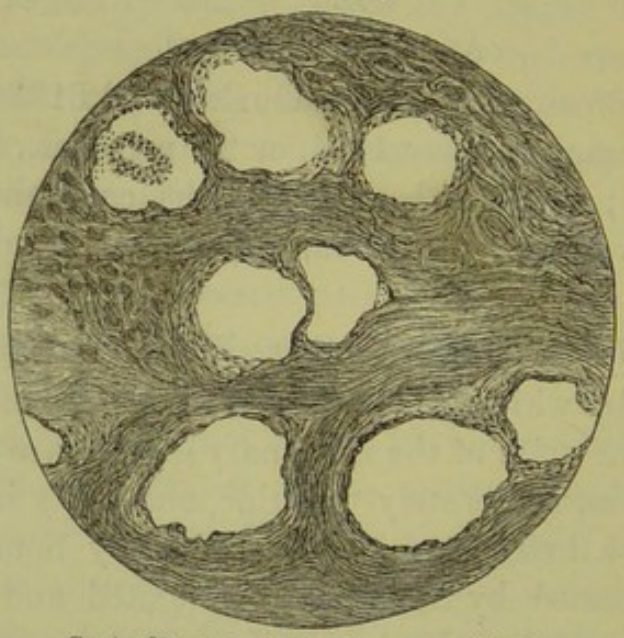
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* *Gaz. Hebd. d. Sc. Méd. de Montpellier*, 1881.

† *Langenbeck's Archiv*, xxv, Heft 2.

years. Although found on either side, they rarely occur on both sides at the same time, and are of slow growth; the small cystic spaces found in them are never distended with fluid, and are of minor importance. It is quite possible that they may degenerate into sarcoma, as shown by Lerat's case; but the development of carcinoma is more probable, and Billroth believes that he saw an instance of this kind. I have seen many mammary fibromata both in young girls and in married women. One patient under my observation for eight years had a uterine myoma and also a fibroma as large as a hen's egg in the left breast; during this

FIG. 122.



Cysto-fibroma of the Mammary Gland.

time the fibroma showed no change in size, consistence or sensitiveness. Nineteen of the patients above mentioned suffered from such fibromata. I am enabled to confirm Billroth's statement that several tumors are occasionally found in one or both breasts.

2. *Lipomata, Fatty Tumors.*

Lipomata of the breast are of rare occurrence, although the glandular tissues atrophy after the menopause, and the whole structure of the mammæ is transformed into fatty tissue. The cases heretofore described as lipomata of the breast (Billroth,* Velpeau,

* *Loc. cit.*, pp. 45–46.

Portalupi and Lebert) are not really of this character, the tumor not being a portion of the gland but of the adipose tissue near it. These tumors vary in size, push the gland in front or to one side of them, grow more rapidly than fibromata, are lobulated and elastic. They cause a burning pain, or distress the patient by their size and weight. Since the publication of Billroth's work, the literature of mammary affections contains no case of lipoma of the breast. I have never met with one.

3. *The Formation of Cartilage and Bone.*

According to Billroth, the only undoubted case of partially ossified chondroma is that described by Astley Cooper. The patient was thirty-two years old, and had the tumor for fourteen years. It was hard, and besides also, before menstruation and at other times, very painful, and after extirpation had the appearance of cartilage: a portion was osseous. Virchow cites cases of Nélaton, Cruveilhier, Warren and E. Wagner in which some cartilage was probably mixed with the other tissues of the tumor. Billroth found in a case of large myxo-sarcoma of the mamma a number of small hard nodules of "true bone" which had developed from connective tissue. The case described by Velpeau is said by Billroth to have really been calcification in the walls of old cysts, or calcified epithelium or sand-like bodies in small cysts. Recent literature shows, however, that cartilaginous and osseous tissues are not so rare in tumors of the mammary gland as has heretofore been thought, for in the cases reported by Bryk, Pied, Lange and Hacker their existence cannot be doubted.

Bryk's patient was sixty-two years old, childless, and had her attention first called to the tumor eleven months before by the severe pain; it was then as large as a pea. It grew to the size of a goose egg, was hard, nodulated and painful, and, on section, showed general calcification of the interglandular connective tissue, with destruction and atrophy of the glandular structure.

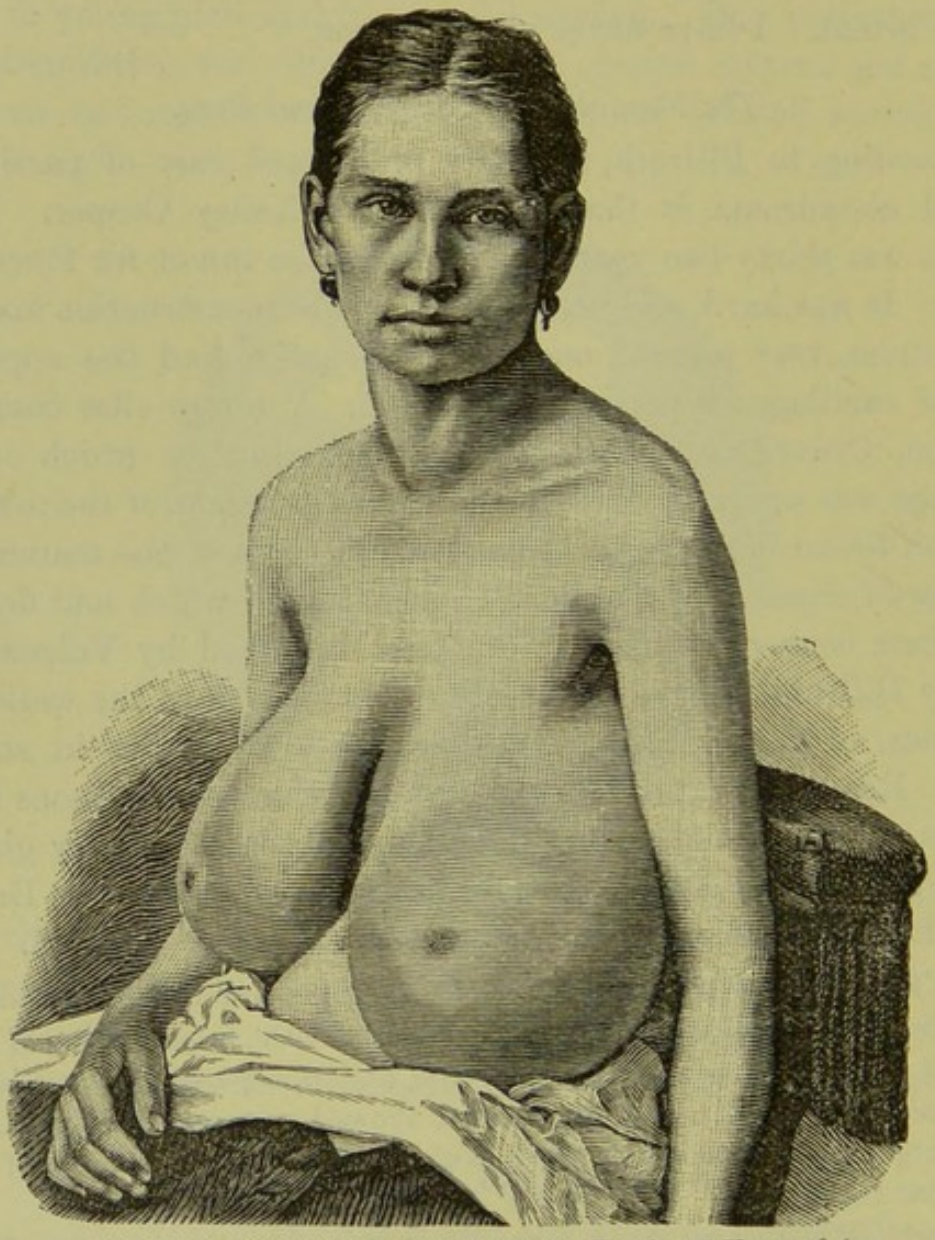
Hacker (Billroth's assistant) carefully examined a mixed tumor of this kind containing bone and cartilage. It was developed from a cystic adenoma of the gland, which had afterward undergone carcinomatous degeneration. Under the continued irritation, the peri-acinous connective tissue had developed a hyaline myxo-fibroma, and had gradually been transformed into osseous and cartilaginous structures.

We will return to this subject in the section on sarcomata.

4. Hypertrophy of the Breasts, Adenoma and Cysto-adenoma of the Mammæ.

Hypertrophy of the epithelial, connective tissue and vascular elements forming the mammary gland may be general or partial; the former is a rare affection.

Fig. 123.

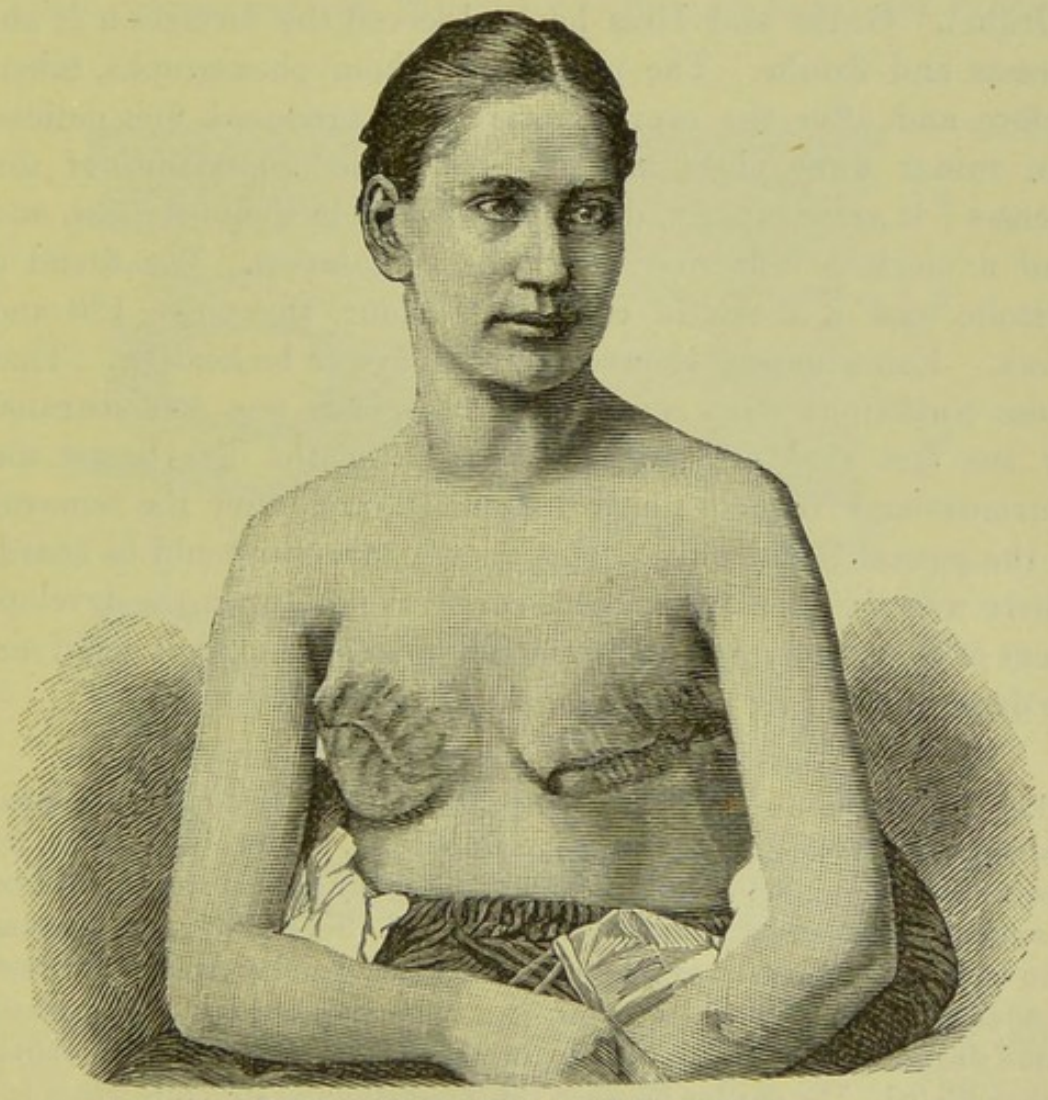


General Hypertrophy of Both Breasts in a Virgin, 17 Years of Age.

General hypertrophy usually occurs at the beginning of menstruation or soon afterward, cases having been reported by Babington, Benoit-Monteils, Dorsten, Fingerhut, Glück, Grähs, Guston, Hey, Marjolin and Osiander. Occasionally, it appears a few

years later, Dahl's case being in a virgin twenty-five years old. The breast grows rapidly during the first pregnancy (Jördens, Lotzbeck, Skuchersky), and remains stationary after reaching a certain size, in Benoit's case being 105 centimeters (42 inches) in circumference and 10 kilos (25 pounds) in weight. Even in this condition the breasts are rarely equally large, in my case the

Fig. 124.



The Patient after Removal of the Breasts.

left being the larger. The growth seldom begins after the first confinement, as in Cerrutti's case. The skin shows no striæ, but often appears thickened or œdematous; the nipple is not prominent but flat or umbilicated, and the subcutaneous veins are often enormously developed. In young unmarried persons there is no secretion from the gland, but it begins in pregnancy and may be

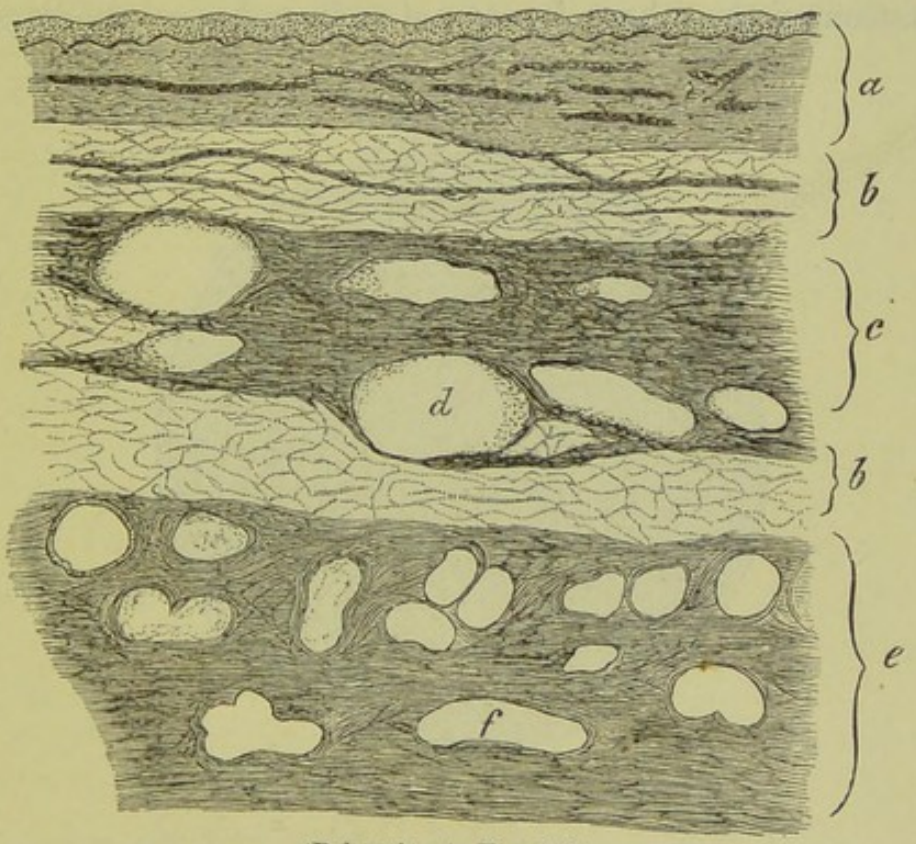
normal in character, as in the second case. The menses are variable, often absent or scanty. The weight of the breast prevents the patient from attending to her usual duties, causing her to be poorly nourished. The tumors are not generally very painful. They may be borne for a long time, as in the case of Grähs, 18 years. In the cases hitherto reported death has resulted from other diseases, or from septic fever after an operation (Huston), from erysipelas (Billroth), or from rupture of an ovarian cyst (Grähs). Grähs and Hess have observed the formation of abscesses and fistulæ. The patient of whom photographs, taken before and after the operation, are here produced, first noticed the tumor some eight months before the appearance of the menses; it grew rapidly, descended almost to the umbilicus, and had a marked influence upon the circulation. We found a systolic and a diastolic cardiac murmur, the pulse 120 and weak. Examination showed the kidneys to be healthy. That these conditions were caused by the breasts was demonstrated by the fact that after the extirpation of the left breast the murmurs and frequent pulse diminished, and after the removal of the second breast only a faint anemic murmur could be heard. There was, therefore, a probable connection between the development of these tumors and the vascular system, though it could not be demonstrated by microscopical examination.

Fig. 125 represents a section through the upper portion of the mamma, and shows (*a*) the cuticle, (*b*) subcutaneous tissue, rich in elastic fibres, (*c*) a layer of non-striated muscular fibres, with many dilated vessels, (*d* and *e*) mammary tissue, with glandular spaces (*f*). Several of my colleagues who had the kindness to examine the extirpated gland arrived at different conclusions. Prof. Weigert called it a mammary fibroma. The gland tissue was comparatively scanty, the cells of the alveoli small, their lumina rather dilated. The portion between the interglandular structure was much increased, and consisted of an ordinary connective tissue with few cells and little fatty formation. These tumors accordingly are examples of elephantiasis, except that the corium is not involved. Prof. Leopold found that the tissue was chiefly fibromatous, and in some places similar to fibromyoma. He found the blood vessels numerous and having thick walls, but did not consider this condition pathological. White blood corpuscles were discovered in the vicinity of the smaller vessels. Prof. Klebs also held that the tumor was fibromatous, in fact a *fibroma mollus-*

cum lymphangiectaticum with large numbers of lymph spaces, some being lined with endothelium.

My second case was a primipara 23 years old, a blonde, strong, of medium size; her mother had some spinal affection, her brother was said to have died of tuberculosis, but her own health had always been good. Her menses appeared at 16½ years, were regular, of the four-weeks type, lasted three or four days and were painless. Since the advent of menstruation she says she has had shooting pains in both breasts; they then began to grow and soon became very large. After confinement in June, 1885, the breasts measured 20 centimeters (8 in.) in length and 39 centi-

FIG. 125.



(Belonging to Fig. 123.)

meters (16 in.) in circumference. There were several pigmented scars on the left breast, the result of mastitis caused by a blow. Two years ago she attempted suicide; she has been treated a long time for hysteria. The right nipple is flat, but the left one cannot be grasped or drawn forward. The patient had no fever after confinement, though the breasts were much swelled.

Treatment.—The use of medicines given internally to diminish the size of the breasts, as iodide of potassium, besides remedies applied externally such as belladonna, compression, the

seton, have no effect. In my second case the right breast increased in size after delivery; the mother could only partially nurse her child with the right breast, the nipple of which was good; as long as she was in the clinic no decrease in size could be detected.

When the breasts become a burden on account of their size, bilateral amputation is the only means of affording perfect relief. Manec, Hess, Glück, Dahl and the author have performed this operation with success, but most operators remove one breast at a time. In some cases,* one breast diminishes in size after the amputation of the other; it was not so in mine.

FIG. 126.



Cysto-adenoma of the Breast. (S. 4, o. 2.)

It is advisable to pass an elastic ligature about the base of the gland to guard against profuse hemorrhage during the operation, or it may be constricted in portions, as in my case, and then removed. When the patient loses much blood at the first operation, or when the operator desires to ascertain whether the other breast will spontaneously lessen in size, she should be allowed a certain time to recover from the effects of the operation. In one

* Hey, "Practical Observations on Surgery," London, 1803, and Swiney, *Dublin Quart. Journ.*, XI, p. 11, 1869.

case the patient became pregnant and had a normal confinement before the second operation.

According to Billroth, partial hypertrophy occurs in two forms, either as fibrous, lobulated adenoma or as a soft cysto-adenoma.

The first is a multiple, lobulated fibroma, and consists of a number of hard, granular nodules imbedded in the normal gland tissue. In the second form the acini become dilated and the partition walls very thin or disappear entirely, the epithelial cells become soft, viscid and are exfoliated, thus forming large spaces which are often filled with cells; quite frequently papil-

FIG. 127.



Cysto-adenoma of the Breast. (S. 7, o. 4.)

lary proliferations are formed. Cysto-adenomata developing late in life are liable to degenerate into carcinoma. I have seen two interesting examples of this change.

The first case was a married woman, 24 years old, and sterile. Her menses began in her fifteenth year; then ceased for one year, when they returned; were of the four-weeks type, lasted three or four days, and were scanty and painful, the pain decreasing with the development of the tumor. For one year she has had a nodule in the right breast, at first painless, and which has grown rapidly during the last six or eight weeks, and is now 22 centimeters broad, and elevated. The principal portion of the tumor is above the prominent nipple, and the veins of the

skin are much dilated; the tumor was movable and several smaller painless nodules were situated near it. The glands of the axilla were enlarged to the size of a bean. The left breast was small and normal. The tumors varied in consistence; some fluctuated while others were firm; a secretion could be pressed from the nipple. The skin was movable over the tumor, but contained little fatty tissue. The diagnosis of myxo-adenoma was confirmed by the extirpation of the growth. The patient made a good recovery, and there was no recurrence.

The second patient was 33 years old, married and sterile. An adenoma of the right breast as large as the fist had been enucleated in March, 1878, and the patient discharged cured. She had no recurrence up to 1883. She was married seven years, had aborted once in the third month, and has not been pregnant since. The menses were irregular, but not profuse. The tumor was movable, nodulated, elastic, painless, and the skin was traversed by dilated veins. She first saw the tumor five years ago; it grew more rapidly during the last two years. I had her under observation from June, 1876, to March, 1878, during which time the tumor grew but little, and I then operated. The intimate structure of the tumors is well shown in Figs. 126 and 127.

5. *Cysts.*

Beside the cysts which are developed in sarcomata and adenomata we may find solitary and multiple isolated cysts in the mammary glands. This is an uncommon affection; the cysts grow slowly, being rarely larger than an orange, and are seldom found before the fortieth year. They are invariably developed from dilatations of the small excretory ducts, and remnants of the division walls may be distinctly seen in the larger cysts. The inner surface is undulating, and exceptionally shows papillary excrescences; some traces of epithelium may be seen in the larger cysts. The contents are thin or viscid and greenish or brownish. Microscopical examination shows the presence of granular cells, translucent globular bodies, hematoidin, cholesterin and fat crystals. The pigment is often an intense biliary green. The brownish color is probably produced by thrombosis of the vessels or by hemorrhage from the exceedingly vascular cyst walls. Calcification may take place in the latter, and then the contents are colorless, yellowish or white.

In rare instances the cysts contain a substance resembling oil, cream, butter or mortar, which according to the researches

of H. Klotz, consists of saponified fat, and, in his opinion, this abnormal secretion, as well as the normal, depends upon the influence of the secretory nerves.

The presence of these cysts at a time when the breast is not secreting might be regarded as the result of retention of abnormal secretion due to any cause, or of unequal retraction of the connective tissue during involution, dilatation of some of the glandular structures with compression of others, and a resulting exudation. They might also be caused by degeneration of the epithelium; these are, however, simply hypotheses (Billroth). Personally, I have never met with a case of isolated cyst of the female breast. The disease known as *maladie cystique des mamelles*, as described by the French, consists, according to Reclus, of a large number of microscopical cysts of the milk ducts and acini, while the inter-acinous tissue remains normal; the disease affects both breasts. Reclus operated upon two patients for this affection; at the end of one and a half years there was no recurrence.

6. Atheromata and cholesteatomata also occur in the breasts, being probably developed from the sebaceous glands of the skin covering the breast.

b. Malignant Tumors of the Breasts.

Gurlt found among 1516 malignant tumors of the breast 150 sarcomata and 1306 carcinomata.

1. *Sarcomata of the Female Breast.*

Sarcomata are classified as round-celled, spindle-celled, giant-celled, soft and hard; besides these the proliferating cysto-sarcomata form an additional variety. Quite a large number of cases are reported in recent literature, but many of these, especially of cysto-sarcomata were probably examples of soft carcinomata. Billroth has never met with cases of pure spindle-celled sarcomata, myxo-sarcomata or plexiform sarcomata in the breast, although spindle cells and myxomatous tissue were occasionally observed in portions of proliferating cysto-sarcomata.

Soft sarcomata of the breast may occur at any age, appearing upon one side as movable, encapsulated tumors of the paren-

chyma of the gland, seldom diffuse, in both breasts, at the same time. They grow slowly at first, but more rapidly during the second year; they are not very painful; the axillary glands are not invariably enlarged. Recurrence happens soon after extirpation, death occurring in from one to four years with metastases in the lungs and liver. The author has never met with a case of sarcoma of the mammary glands.

Billroth describes a case of medullary granulation (round-celled) sarcoma in a patient aged sixteen years; the tumor contained numerous newly-formed striated muscular fibres. Such a case has never been reported by any one else, and it was Billroth's opinion that germinal elements of the pectoral muscle had been deposited in the gland tissue, either during intrauterine life or at the age of puberty, and that their growth had subsequently become stimulated by the development of the sarcoma.

Billroth also observed a case of lympho-sarcoma of both breasts, which developed rapidly during pregnancy. No typical acini could be found in the periphery of the tumor. He could not determine, with certainty, whether some of the larger alveoli corresponded to the acini of the mammary gland; in the centre of some of these alveoli he found collections of dark punctiform masses which were not fatty, such as are often found in the alveoli of the lymphatic glands. He also saw in the connective tissue large spaces partially filled with lymph cells, which he thought were dilated lymph spaces. Pinner has also recently described a *lymphangioma cystoides* of the breast.*

Billroth also describes a case of alveolar melano-sarcoma† of the right breast, the patient being sixty-five years of age. He had examined the extirpated tumor both macroscopically and microscopically. The diagnosis of sarcoma of the breast was justified by the following conditions: There was brownish-black pigmentation; the arrangement of large-celled elements, partly in a closely-woven cellular network, and in part densely packed in the alveoli; the glands of the axilla contained round alveoli filled with large pigmented cells; finally, the fact that proliferating melanomata always are sarcomata. Although larger than a child's head, it was extirpated, together with the axillary glands. The patient had given birth to ten children, but had nursed none of them. She always had noticed a bluish nodule under the right eye, and another in the supra-spinous fossa. She was discharged when the wound had healed, and a short time afterward a blackish spot appeared on the right side of her back, and developed into a tumor, similar nodules having formed in its

* *Centralblatt für Chirurgie*, Leipsic, 1880, VII, pp. 177–180.

† *Loc. cit.*, p. 57, Fig. 18, and Plate II.

vicinity. The cicatrix and the axilla remained free. The patient died of marasmus after many years' suffering.

Billroth finally describes an alveolar giant-celled sarcoma of the right breast in a patient forty-two years of age. It was as large as the fist, grew rapidly, was extirpated and recurred in the cicatrix and axilla. After the second operation, the patient died from erysipelas, with bilateral pleurisy, peritonitis, cystitis, endometritis, salpingitis and oöphoritis.

Stilling has recently described a special variety of sarcoma—the so-called osteoid-sarcoma.

In three cases he found tumors, arising without apparent cause, the patients being parous women over fifty years old. They began as isolated tumors, displacing the tissue of the gland as they grew, and remained solitary. Their malignancy was apparent from the extension of the tumor to the subcutaneous tissues, from its rapid growth, quick recurrence and the development of metastatic tumors in distant organs. Microscopically, the tumor consisted of a network of osteoid strands filled with cellular elements. The osteoid substance showed the configuration of true osseous tissue; the hyaline striated matrix contained alveoli often having prolongations in which globular cells were formed. The central portions of the strands in the older portions of the neoplasm had become calcified and had non-petrified tissue on each side; from the latter there were prolongations sent out into the interspaces of the network, forming a kind of reticulated structure about the cells. The cells between the strands of osteoid tissue were fusiform, round or polygonal in shape, and of varying size, some of them strongly resembling isolated cartilage corpuscles. The metastatic tumors in the lung were similar in composition to the recent portion of the primary tumor. The osteoid strands were only partially calcified; there was a limited quantity of cartilage, and many elements resembling cartilage corpuscles. Stilling considers the case of Bonet* probably, and that of Heurtaux† certainly of this character, and thinks the same may be true of the cases of giant-celled sarcoma described by Robin, Lancereaux, Paget and Billroth.

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* "Sepulchretum. Lugduni," 1700, tom. II, p. 522.

† *Mém. Soc. d. Chir.*, Paris, VII.

A peculiar variety of sarcoma is

The Proliferating Cysto sarcoma.

Synonyms: Intracanalicular myxoma (Virchow), sero-cystic sarcoma (Brodie), cellular hydatids (Cooper), glandular proliferating cyst (Paget), tumors adénoïdes (Velpeau).

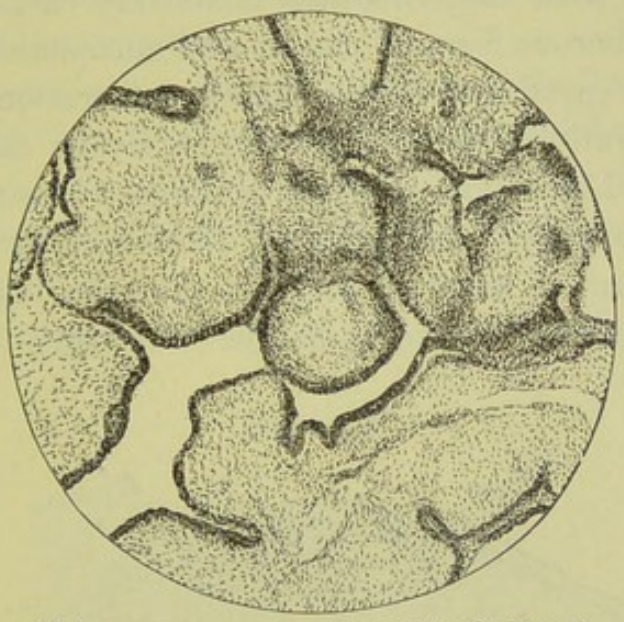
Proliferating cysto-sarcomata are encapsulated, nodulated tumors of variable consistence, reddish-gray or pale on section, often gelatinous and œdematous, containing extravasations or more firmly fibrous. There are irregular spaces filled with thin mucus, into which polypoid or leaf-shaped proliferations project; besides these there are numerous cystic cavities, branched rather than rounded.

The cysto-sarcoma nodules arise from a proliferation of the layer of hyaline connective tissue which surrounds the acini. As the space is increased the epithelium of the acini is correspondingly multiplied, the acini being drawn out into narrow canals and the ducts dilated. The epithelium of the acini becomes stratified, and of a cylindrical character on the surface; pearls are formed by the aggregation of the epithelial cells, or they may dissolve into a homogeneous mucus which fills and distends the canals. The structure is composed of a somewhat œdematous connective tissue, arranged in fasciculi and rich in cells; it is partially myxomatous or lymphoid, but it rarely contains spindle cells. I am indebted to Dr. Wyder for the preparation from which Figs. 128 and 129 are taken.

This variety of tumor is more frequent in the third and fourth decades, and is more common in the married than in the unmarried, mostly in women who have borne children, rarely in the sterile. The tumors are always movable, never becoming adherent to the thorax. Their growth is variable, being sometimes rapid and at others slow. They may become of large size, the dimensions in Velpeau's case being 36 centimeters (14.4 in.) in vertical diameter, 30 centimeters (12 in.) transversely and 120 centimeters (48 in.) in circumference. Billroth operated upon 19 cases of this kind, in 12 of which there had been no recurrence two to ten years after the operation. Local recurrences may take place, for, as a rule, not the entire breast but the

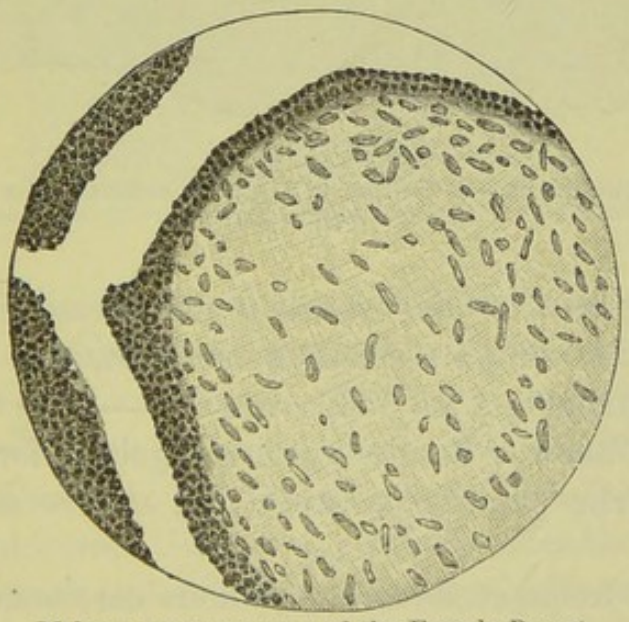
tumors only are removed. Billroth operated five times upon one patient within four years, and she was without a recurrence for nine years after total extirpation of the breast. Cysto-sarco-

FIG. 128.



Melano-myxo-sarcoma of the Female Breast.
(*Hartnack*. s. 4, o. 2.)

FIG. 129.



Melano-myxo-sarcoma of the Female Breast.
(*Hartnack*, s. 7, o. 4.)

mata seldom become infectious; cases occur, however, in which there are metastases to the pleura, ribs and pericardium, without involvement of the lymphatic glands.

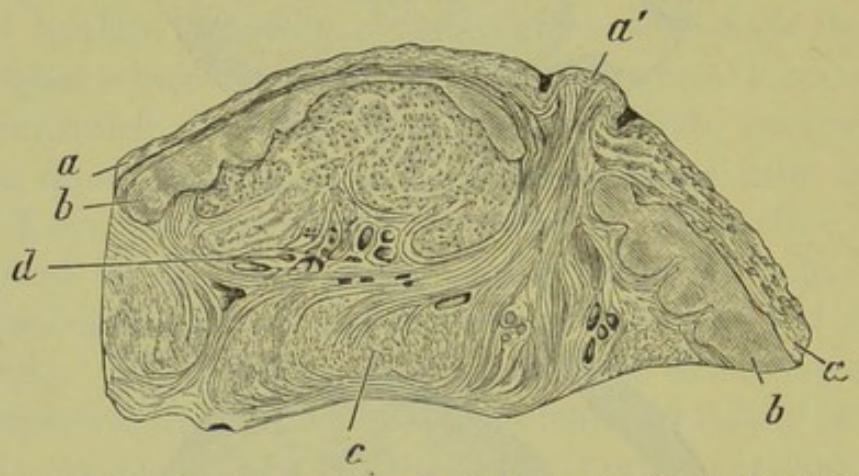
2. *Carcinomata of the Female Breasts.*

Billroth recognizes four varieties of mammary carcinoma.

Acinous carcinoma consists of hard and soft carcinomatous nodules, designated by various authors as "Markschwamm," fibrous cancer with large nodules, medullary carcinoma, lobular carcinoma, tuberous form of cancer and encéphaloïde.

The *tubular carcinoma*, carcinomatous infiltration or carcinoma simplex, generally involves the skin, partly in the form of an infiltration and partly as multiple nodules. It is also known as fibrous cancer with small nodules, lentil-like cancer (Schuh), infiltrating form of cancer (Birkett), squirrhe tégumentaire ou en cuirasse, squirrhe lardacé, kéloïdes (Velpeau).

Fig 130.



Acinous Cancer of the Breast.—*a*, cuticle; *a'*, nipple; *b*, subcutaneous fat; *c*, carcinoma; *d*, soft vascular portions.

The *atrophying cicatrizing cancer* of the breast is the scirrhus of Billroth, the atrophic scirrhus of Gross, and the squirrhe rétractile ou atrophique of Velpeau.

Gelatinous Cancer.—Its synonyms are gelatiniform carcinoma (Gross), squirrhe gelatineux alvéolaire, cancre colloïde (Velpeau).

a. The most frequent form, the acinous carcinoma, appearing 47 times in 60 of my cases, shows upon section a grayish-red surface traversed by a paler network of strands. The neoplasm is not encapsulated, but passes into the adjoining tissues with a more or less sharply defined boundary. The central portion of the soft varieties appears yellowish from fatty degeneration,

while the cortical substance is of a whitish color. The so-called cancer-juice can be scraped from the surface upon section; it consists of large round and angular cells, having large nuclei and shining nucleoli which collect into round masses and branched cylinders, and under low power appear as acinous and tubular glands, but without cavities.

The microscopic appearance of the structure from which this juice exudes, is that of a more or less firm mesh of connective tissue, from the alveoli of which cells from four to six times as large as blood corpuscles may be collected by agitating or brushing the section.

Carcinoma generally consists of two varieties of cells, namely,

FIG. 131.



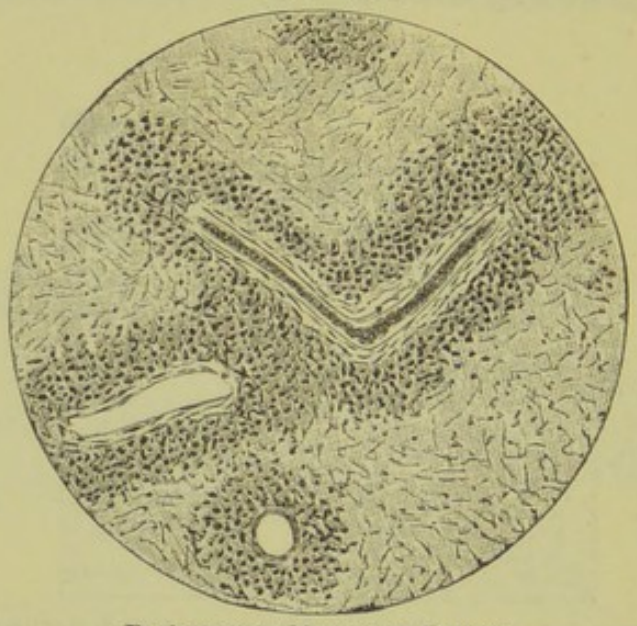
Acinous Mammary Cancer.—*a*, chiefly normal structure; *b*, carcinomatous tissue.

the large epithelioid cells of the alveoli and the smaller cells, about the size of white blood corpuscles, which are infiltrated between the fibres of the stroma. The former multiply by fission and budding, while the latter do not. The origin of the small cells is as yet doubtful; they may be developed from the vessels or from the connective tissue, but probably from the former. According to Thiersch and Waldeyer, the large cells originate in the glandular epithelium. Billroth says: "It appears that the small epithelial cells of the acini or gland ducts do not multiply beyond the usual number for several generations (in some carcinomata, perhaps, never), but begin to increase in size at a late period, when they are released from the pressure of the surrounding con-

nective tissue by some process of softening and attain the size that we find them in fully developed carcinoma." The clubbed ends of the glands become filled with cells after the disappearance of the acini, increase in size, retaining for awhile the gland form until they grow beyond the boundary of the surrounding connective tissue, finally becoming confluent, and thus transforming the acinous into the alveolar type.

b. The tubular form of cancer of the breast is not of common occurrence, there being only 13 cases among the 60 in our records. It consists of branched cylinders or tubules, which soon

FIG. 132.



Perivascular Mammary Cancer.

extend beyond the boundaries of the original acini, becoming confluent more rapidly than in the acinous form.

The cancer cells are not as large as in the soft acinous variety; instead of the nodes and nodules met with in the latter there are infiltrations which often undergo partial cicatricial contraction. When the tissues surrounding the vessels are greatly infiltrated, the perivascular cancer thus developed appears in the form of long tubular strands, as in Fig. 132.

The small-celled infiltration in the two forms of cancer first described is similar to the infiltration from chronic inflammation, the tissues becoming softer and more elastic and the capillaries and veins always increased in number, frequently causing chronic

hyperemia and œdema. As the disease extends to the skin, changes occur in it which are very similar to those in chronic eczemas or in the early stages of varicose ulcer; vesicles, scabs and scars are formed upon the reddened and rigid skin beneath which the tissues gradually degenerate, superficially at first, but the ulceration finally extends into the deeper structures.

The same processes involve the deeper tissues; the proliferation of the cells soon causes compression of the nerves and vessels, that of the latter resulting in stasis, thrombosis and fatty degeneration of the cells and thrombosed vessels. A pulpy mass, similar to that observed in tuberculosis, is thus formed in acinous carcinomata. When this degeneration is rapid and accompanied by much exudation, the cavity opens upon the surface, the contents are evacuated, and the edges of the abscess turn outward, forming the fungoid ulcer so characteristic of large carcinomata.

In the tubular varieties the degeneration is far less rapid, the débris being partially removed by the veins, while some is left; the infiltrated tissues around the latter then contract, thus forming an interstitial cicatrix. The tissues first infiltrated are transformed into firm, callous, scirrhous cicatricial tissue. The retraction is apparent upon the skin, the nipple and the pectoral muscle, all of which may be displaced.

c. When decomposition of the carcinomatous infiltration occurs soon after its appearance, it seems that contraction follows immediately. Such carcinomata have been described by Billroth as scirrhus (κατ' ἐξοχήν); they consist for the most part of hard structure formed of connective tissue and abundant elastic fibres, in the fatty, yellowish-red boundary lines of which the narrow tubular cancer bodies can be demonstrated. It, therefore, appears probable that a carcinoma of the breast might heal spontaneously by decomposition of the cell elements and contraction; such a recovery has, however, not been observed.

d. Gelatinous carcinoma of the breast is rare. Simmonds describes two cases in his own practice, and collected eighteen others from the literature of the subject. The nodule may be as large as a walnut, the fist, or even larger, have inequalities upon its surface and present upon section a honeycomb appearance. The cavities contain epithelial cells, collected in round masses,

and surrounded by a translucent homogeneous layer of colloid substance, which is separated from the connective-tissue stroma by a well-defined boundary line. The small-celled infiltration is very irregularly distributed, being uniform only at the borders; in some places the epithelium has undergone fatty degeneration; contraction apparently never occurs, probably because the colloid substance is absorbed with such difficulty. It is not definitely known whether the colloid matter is derived from the epithelial cells (Klebs, Billroth) or by a metamorphosis of the connective tissue into myxomatous tissue or whether it is exuded from the vessels (Doutrelepont). Simmonds recognizes each of these three origins.

Clinical Course of Mammary Carcinomata.—As a rule, a single lobule or several lying close together are involved at the same time; more rarely several lobules at various parts; still more rarely the entire gland at the outset. It cannot be positively stated whether the epithelial proliferation or the infiltration of the connective tissue is the initial process; this probably varies in different cases. The disease extends in all directions, the skin first becoming infiltrated, then the retro-mammary fascia and, lastly, the pectoral muscle—the time usually being about two years. This infiltration appears in strands or in disconnected nodules. After the pectoral muscles have become affected, the disease soon extends to the periosteum, the ribs, the costal pleura and, finally, to the pleura covering the lungs.

The lymphatic glands of the axilla are affected in about sixteen months from the first appearance of the disease; the same tissue-changes occur in them as in primary cancer, but this is not true of the other organs just mentioned; the infiltration occurs in hard, fatty or irregular masses like the rind of bacon. Cancer cells may be transmitted to various parts of the body by the veins and lymphatics. Billroth states that he has repeatedly seen the lymphatic systems of the pleura and diaphragm completely filled with carcinoma-cells. It is, therefore, highly probable that the continuous, as well as the interrupted extension of the disease, is rendered possible by transmission of the corpuscular elements, and, according to Billroth, these elements of the small-celled infiltration are frequently infectious.

The large, soft nodules of acinous carcinoma run the most rapid course, this being from six months to one year; that of the infiltrating tubular variety is less rapid, lasting from two to six or even eight years. In Doutrelepont's case of colloid cancer, the disease lasted thirteen years. According to Simmonds, gelatinous cancer grows more slowly than any other form; the axillary glands are less frequently involved; metastases occur later; recurrences are more rare, and it is therefore of a more benign nature than any of the other varieties. The atrophic, cicatrizing variety of cancer may continue more than twenty years.

The external surface of the gland is more frequently affected.

The axillary and infraclavicular glands are always affected before the supraclavicular, the superficial before the deep glands. In some cases in which the cancer is unilateral the glands of both axillæ are affected; and in some instances only the glands of the opposite axilla are involved (Volkmann). Inflammatory swelling of the glands subsides after the operation; fatty degeneration and contraction occur, or the gland may remain without change for a long period. When the operation is performed before the glands have become perceptibly involved, the patient will survive for a much longer period; even when recurrences take place, the operation not only prolongs life by lengthening their intervals, but may even effect a permanent cure.

Metastases appear, on an average, in about two years, most frequently in the liver, then in the lungs, bones and brain.

Billroth has not rarely seen a subsequent involvement of the other mamma; this has also been observed by the author in a number of cases.

Recurrences take place either by *continuity*, at the point of operation, from portions of the tumor which had not been excised; by *infection* of the neighboring glands, already involved before the operation; by *regional* disease, near the cicatrix, being new or primary affections; or by *metastases* to distant organs. Whether these develop from the lymphatic glands or from the primary carcinoma is difficult to decide; the former is probably the source. According to Winiwarter's statistics, recurrences take place within the first three months after operation in 82·4 per cent. of all cases! Billroth states that when an experienced

surgeon is unable to detect recurrences one year after the wound made by the operation has healed, the patient may be considered as radically cured. He has had fifteen cases in which patients were free from recurrence of the disease for from thirteen months to twelve years after the operation. The percentage of cures by different surgeons is as follows: Fischer, 10 per cent.; Heineke, 10.5; Henry, 6.5; Oldekop, 12.8; Sprengel, 14; E. Küster, who in operating completely removes all diseased tissue from the axilla, 25; and Kocher, almost 30 per cent.

No length of time will protect from regional recurrences.

Billroth and Winiwarter placed the average duration of life after operation for carcinoma, when the glands of the axilla were not involved, at fifty months; for all others, at twenty-nine months.

Ætiology.—The puerperal processes in the female breasts certainly exert a great influence upon the origin and growth of neoplasms in them. Billroth found only 2 cases of adeno-fibroma in 282 mammary tumors which were developed during puberty. The author has observed a similar number, although the cases treated did not nearly equal those of that operator. Billroth has likewise seen but two cases of sarcoma or sarcoma with carcinoma developed during pregnancy. Furthermore, Lücke, Volkmann and Winiwarter claim to have demonstrated a marked influence exerted by pregnancy upon the growth of mammary carcinoma.

The proportion of unmarried females suffering from this disease, in whom the mammary glands had never exercised their function, is from 9 to 15 per cent., which, when compared with that of the married, is not much less than the general proportion of single women; sterility is, therefore, to a certain extent a predisposing cause. It cannot as yet be decided that mammary cancer is more common in those who have borne many children than in the sterile, for of women suffering from mammary carcinoma the proportion of sterile (11–16 per cent.) to parous women (84–89 per cent.) is about the same as in health; and yet the number of women with cancer of the breast, who have had more than six children, is remarkably large—14 to 24 per cent.; according to Sprengel, 14 per cent.; Fischer, 15 per cent.; Oldekop, 18.2 per cent.; Henry, 21.9 per cent.; Heineke, 8 per cent.

My own limited observation has been that the left breast is affected three times as often as the right. Heineke found the right affected 46 times, the left 47; of 928 cases of mammary carcinoma in the Vienna General Hospital, 446 were of the right breast, 450 of the left, and 32 of both; there is, accordingly, ittle if any difference in predisposition.

In regard to the earliest time of its development, carcinoma of the breast has never been observed before the occurrence of menstruation. According to Winiwarter (whose observations were of Billroth's clinical material, composed chiefly of Hungarian and Galician Jewesses), the time of life predisposing most to the disease was between the 41st and 45th years. Fischer found this at about 46.9 years of age; Oldekop, from the 46th to the 50th year; Sprengel, at 50.4 years of age; Heineke, at 46.76 years, and Velpeau, from the 51st to the 60th year. Beyond question, the largest number of cases occur about the end of the menstrual life, a time peculiarly favorable for development of cancer.

With regard to other mammary tumors, the third decade seems to favor the development of fibromata, and the fourth, cysto-sarcomata; these results are, however, based upon too small a number of cases, as most mammary tumors (82 per cent.) are carcinomatous, 18 per cent. only being of other varieties.

As exciting causes, the following statement may be made: Mechanical injury was the presumable factor in 7 per cent. of Winiwarter's cases; but even in this small number the cause was questionable; nor has pressure from a corset been proved to be a cause. Carcinomatous growth was observed by Paget in fifteen patients, and by Billroth in one, in whom chronic eczema and psoriasis of the nipple and areola preceded. Winiwarter found two cases of fat women with intertrigo, in whom carcinoma appeared in the sulcus between the skin of the breast and that of the thorax. Of patients in whom carcinoma resulted from injury, Sprengel records 25 cases in a total of 131; Henry, 33 in 196, and Heineke, on the contrary, only 9 in 100. Protracted irritation may produce carcinoma just as probably as a single severe irritation.

The possible connection between carcinoma and former attacks of mastitis is of great importance. According to Winiwarter's

statistics, we must conclude that women who have had mastitis are especially predisposed to carcinomatous disease, he having found 21 per cent. in 114 cases. Puerperal mastitis had occurred in 30 per cent. of Sprengel's patients; in 34 per cent. of Oldekop's; and in 38.8 per cent. of Fischer's. I have observed it in but 6 per cent. of my cases of carcinomata. It is evident that this relationship would be the more clearly marked if it could be shown that carcinoma appears in the *portion* of the gland which had been inflamed. Even more important, it appears to me, is the question as to whether deep lesions of the nipple, which continue to be irritated by the nursing child, do not predispose to malignant disease; the number of cases in which mastitis is not developed, or, when present, ends in recovery without suppuration, is much greater than that of those in which suppuration occurred. One of my patients, for example, had given birth to three children and nursed each for a year and a half; after her first confinement she had a sore nipple for three months, which was cured by applications of ordinary glue. Twenty-five years later, after she had suffered for some time from sharp, lancinating pains, a carcinoma was rapidly developed in this nipple. Another patient was confined with her first child when 34 years old, and with the second at 39 years; while nursing the last child, there was a number of lesions of the left nipple, but they did not cause mastitis; nevertheless, a fibrous carcinoma appeared in the left breast during her forty-third year.

As to the influence of heredity in the origin of the disease, it may be stated that of Winiwarter's 170 cases, there were 10, or an average of 5.8 per cent., in which the parents had carcinoma. Sprengel found this relationship 13 times in 109 cases; Fischer, in 8 of his 64 patients, and Heineke twice in 47 cases. From this it appears that there is an hereditary predisposition in more than 8 per cent. of all cases. The almost simultaneous occurrence in a mother and her daughter of cysto-fibromata, with intracanalicular polypoid proliferations, has been reported by Puls, who observed the cases in Czerny's clinic; the diagnosis was confirmed by microscopic examination. Broca has reported an instance in which the inheritance of carcinoma by several generations of one family, and by several members of the same

generation, had been observed. Kompe relates that an autopsy had been performed in the Munich Pathological Institute * upon a young man, 21 years of age, dead from carcinoma of the colon, whose father had been in the same institution for carcinoma of the sigmoid flexure, and whose grandfather had died from sarcoma of the cervical vertebræ. His mother had cancer of the uterus, and his grandmother cancer of the breast. Sprengel operated on a woman for mammary carcinoma whose brother, father and two other members of the family had died with symptoms of cancer of the liver. We can, therefore, conclude that there may be an hereditary predisposition, in addition to a congenital tendency.

The theory of Cohnheim that the real cause of tumors must be sought in the failure or irregularity of the embryonic predisposition renders by no means superfluous a study of the influence of temporary and local irritations which may induce such predisposition, as stated in the chapter on cancer of the uterus, on p. 362. As Billroth has correctly observed, the expression "embryonic predisposition" is too restricted when applied to the mammary gland, if its three periods of development be considered. Finally, it would scarcely be possible to demonstrate the existence of the various anatomical anomalies, such as constricted acini. It is certainly the duty of both the surgeon and the gynecologist to examine each case in regard to its history and pathological anatomy, in order that, by their mutual labors, the interesting and perplexing question as to the ætiological relations of these tumors may finally be answered.

Symptoms and Diagnosis of Mammary Tumors.—The discovery of nodules or indurations in the breast is made quite accidentally by many patients, while bathing, or on pressure, or by the occurrence of lancinating pains. Others experience a sensation of tension, followed by the discharge of a serous, brownish or bloody fluid from the nipple. Such swellings, appearing before the age of puberty, are almost invariably of an inflammatory character, but may, very rarely, indicate the presence of soft sarcoma. If the tumor is globular, lobulated, pain-

* J. D. Kompe, über Darmkrebs, Munich, 1883.

less, and growing slowly or not at all, and the patient between 20 and 35 years of age, it is probably a fibroma. If its growth is regular and uniform, either rapid or slow, in a woman of about the same age, it is, as a rule, an adenoma, sarcoma or cysto-sarcoma. If growing very rapidly, not especially painful, and of soft consistence, it is a medullary sarcoma. Cysts occur at any age, but when tense and deeply situated are difficult to diagnosticate. Great enlargement of both breasts, occurring about the time of puberty, is of a benign character, and not generally a progressive hypertrophy.

When an induration or nodule appears in the breast of a woman who has passed the thirty-fifth year, however, and the neoplasm cannot be isolated from the surrounding tissues, and continues to grow, becomes harder, and is more or less painful, there can be no question that it is a carcinoma. If the axillary glands enlarge, the prognosis is even more unfavorable, as it also is when the tumor rapidly softens, or when the skin in its vicinity shows small, hard, reddish nodules. The prognosis is very unfavorable when the disease rapidly extends from one breast to the other. Great retraction of the nipple results from interstitial cicatrization of a carcinoma in its vicinity, a condition often first noticed by the patient. The retraction may be only apparent, however, as, for example, when the disease has caused swelling of the areola, so that the nipple is surrounded by an elevation. The most terrible suffering appears during the course of carcinoma when, in consequence of extensive involvement of the axillary glands, these have become firmly adherent to the vessels and nerves; we then observe neuralgia of the arm which becomes œdematous, perhaps finally ending in enormous indurated elephantiasis of the entire member. Death from recurrent tumors of the breast has been discussed on p. 651.

Treatment.—As long as the diagnosis remains uncertain, or the patient will not consent to an operation, the application of ointments of vaseline or lanolin containing oxide of zinc or extract of belladonna is indicated; compresses of lead-water, frequently repeated, are also of service. The use of adhesive plasters and all remedies which irritate the skin should be avoided. Thoroughly washing the surface with soap, followed by

gentle friction, is of value in both benign and malignant tumors. The skin may be protected from pressure by a rabbit skin or cotton, but compression by bandages cannot be recommended.

If the tumor has a uniformly continuous growth, it must be extirpated, no matter whether benign or malignant.

The operation is not indicated when immobility of the axillary glands shows that they are adherent to the vessels and nerves, and when total extirpation of the carcinoma is impossible on account of extension of the disease to the supraclavicular glands, or to the skin at some distance from the site of the tumor.

Extirpation of benign and malignant tumors of the breast may be accomplished by the bloodless or by the bloody method. The bloodless removal of such tumors may be performed by the application of such caustics as arsenic, chloride of zinc or Landolfi's paste, by the actual or by the Paquelin cautery. The pastes just mentioned, although still much resorted to in France, are not often employed by German operators, on account of their uncertain action.

The "Paquelin" may be employed with advantage when the tumors are very large and vascular, or when the muscles of the chest or the ribs are already involved. The instrument is not suited for the removal of the axillary glands. Ever since Fabricius of Aquapendente and Fabry of Hilden first enucleated the glands by the fingers through a cutaneous incision, this method has been employed, and no improvement has been suggested.

Galen first described the operation for amputation of the breast by the knife. It was afterward suggested to use the actual cautery in connection with the knife.

Amputation may be either partial or complete, partial in benign tumors, but always complete in those of a malignant nature, whether the whole gland is involved or not.

After the patient is anesthetized, and the skin over the breast thoroughly washed with soap, a cutaneous incision is made corresponding to the longest diameter of the tumor; the latter, if enclosed by a capsule, may then be easily enucleated. When

the tumor is malignant the sound tissues should be excised for at least an inch beyond its margin. When the skin is not movable over the tumor but adherent, or is already diseased, it must be excised far beyond the limits of the involved tissues. When the pectoral muscle is involved, the diseased tissue must be removed, and it may even be necessary, under certain circumstances, to exsect a rib. Indurations found in any portions of the adipose tissue or at the base of the wound must be carefully removed by the scissors.

In order to extirpate the diseased axillary glands, the cutaneous incision should be extended, the fascia divided, and the fatty tissue with the glands removed by the finger. The vessels of the glands should be isolated by a blunt instrument, and then divided after tying with a double ligature. When the glands have become adherent to the vessels, the axillary vein may be injured, as occurred in my own experience; it must be simply ligated at both extremities at once; this will usually be in the vicinity of the thoracic vein. In some cases it becomes necessary to ligate the axillary artery; if the nerves are not exposed to any great extent, nor the collateral circulation interfered with, the arm will most likely not become gangrenous; the severest symptom will be œdema, or obstinate ulceration from the pressure of the bandages (Billroth). Before the wound is closed all hemorrhage must be completely arrested, ligatures being applied even to the smallest vessel. Billroth cautions operators against the use of styptics.

Helferich states that the proper and logical treatment to be pursued when the glands of the axilla are carcinomatous is to expose the infraclavicular fossa by forming a flap of skin and muscle, dissecting the pectoralis major from the thorax and clavicle, thus exposing the lax tissues of the fossa together with the glands.

When the tension of the skin is not too great, the edges of the wound are united with interrupted sutures of silkworm gut. If there is much tension, silver wire, passed through lead buttons and fastened by perforated shot, may be used instead, or silkworm gut suture passed at some distance from the edges of the wound, and secured by wooden buttons. Maas, of Würzburg,

suggested * that parallel incisions be made at some distance from the wound, the skin between the incisions dissected from the underlying structures, and the wounds partially closed by catgut sutures made aseptic by a solution of corrosive sublimate; a small portion of each wound is thus left open for the discharge of the secretions, and no special drain is usually necessary. If portions of the wound still remain open, all should be united by sutures as far as possible, and the remainder packed with sublimate or iodoform gauze.

Protective silk is placed over the wound, a fold of iodoform gauze applied over this, then thick layers of salicylated cotton, the axilla being filled, and mackintosh finally passed around the thorax. The arm is bandaged to the side, the forearm placed at a right angle and made immovable; this dressing must be firm but not too tight, and the fingers rest in a comfortable position.

Maas instead of this employs a dry, permanent dressing. He places over the protective silk a large compress of gauze made antiseptic by corrosive sublimate, the formula for which is bichloride of mercury 5 grammes (75 grains), common salt 500 grammes (7500 grains), glycerin 200 grammes (3000 grains), to 1000 grammes (15,000 grains) of gauze. Bandages of this gauze are passed about the thorax, shoulder and arm, the lower half of the forearm not being included in the dressing, but supported by a pillow. The skin is protected at the edges of the bandage by corrosive sublimate cotton This dressing is not changed for fourteen days, unless the temperature is high or the pulse frequent. The soiled gauze may be washed, disinfected and again dipped in the corrosive sublimate solution, so that the dressing is inexpensive. Using this dressing, the wound usually heals in about nineteen days. The normal mobility of the arm at the shoulder-joint is soon restored by massage and active and passive motion, after removal of the dressing.

When malignant tumors of the breast cannot be removed, frequent disinfections with chlorine water or solutions containing permanganate of potash, iodoform, chinoidin, charcoal or carbolic acid should be employed. A cooling effect may be produced

* Hoffa, *loc. cit.*

by applying cabbage leaves or an ice-bag. Billroth succeeded in deodorizing the ulcer by applying dried figs boiled in milk, thereby inducing a lactic acid fermentation. The use of artificial gastric juice is of little value for this purpose. Parenchymatous injections of nitrate of silver, as suggested by Thiersch, or of tincture of iodine, Fowler's solution, carbolic acid and mercury have proved ineffectual. Inoculation with the virus of erysipelas, as practiced by Fehleisen, is dangerous and its value doubtful. Electrolysis has produced no favorable results.

Iodide of potassium, arsenic, belladonna, condurango and Chian turpentine internally have been recommended and tried, but little can be expected from any of these. Narcotics will be required to relieve the pain, and among these are chloral hydrate, administered internally or by the rectum, morphia internally and subcutaneously, and for local anesthesia, cocaine in from 2 to 20 per cent. solution.

If hemorrhage arises from the erosion of large vessels, it must be arrested by styptic cotton and compresses secured by bandages. Powdered tannin dusted upon the wound, or washing with a decoction of oak-bark, will lessen the tendency to hemorrhage, diminish the amount of secretion and deaden the hypersensitiveness of the surface of the ulcer.

CHAPTER IV.

NUTRITIVE DISTURBANCES OF THE FEMALE BREAST.

Inflammations. Tuberculosis. Syphilis. Abnormal Secretion.

1. Inflammations of the breast may be acute, subacute or chronic; they are, however, only in rare instances non-puerperal.

In the new-born they are most common a few days after birth. Swelling is usually bilateral, the breasts enlarging to the size of walnuts; their ducts are dilated and almost cavernous (Th. Kölliker); the skin, at first pale, becomes reddened; the nipple is effaced or retracted; a few drops of colostrum may be expressed, and there is considerable pain. Abscesses are rare, as

most inflammations of this character are relieved in a few days by application of lead-water, inunctions of the breasts and dressings of raw cotton. In only a few instances have I found it necessary to incise abscesses in such cases. These inflammations, equally common in males and females, may be produced by injuries of the glands during or after labor.

Subacute inflammations or attacks of mastitis followed by formation of abscesses are sometimes observed shortly before or even after puberty or during pregnancy. A case begins with the formation of nodules in the breast, which enlarge and become adherent to the skin; the latter being congested, suppuration results, ending in perforation. The abscess may thus perforate the skin, but more frequently gradually disappears under the use of ointments, iodide of potassium and of belladonna or applications of lead-water.

Chronic inflammations and cold abscesses are of much less frequent occurrence. In some instances they are caused by diseases of the ribs; they may also occur in young scrofulous girls (Gross).

The descriptions of tuberculosis of the female breasts are not yet acceptable, as the typical bacillus has not been found in the nodules formed in the gland. The possibility of its presence cannot be doubted, but the cases must be extremely rare. In 1882, Ohnacker critically examined all the reports that had been published and added two new cases from the surgical clinic at Giessen, with illustrations and a description of the microscopical examinations. His illustrations showed the presence of only the giant-cells and epithelioid granulation cells; at the time his patients were operated upon, however, the tubercle bacillus of Koch was comparatively unknown. According to Ohnacker, the disease begins in the epithelium of the excretory ducts and extends to the adjacent tissues. Caseation of the glands and of the pus surrounding the indurated tissues is always present in tuberculosis of the breasts.

The occurrence of syphilitic diseases of the breasts is also extremely rare. Hennig reports a case in which a woman 55 years old was bedridden for four years from syphilitic disease of the bones, when a gumma of the breast appeared; the diag-

nosis is not beyond question, however, as no microscopical examination of the tumor was made. I have seen but two cases of indurated ulcer of the nipple or areola in more than 10,000 female patients.

Nodulated indurations and contractions of the parenchyma of the breast may develop as a result of chronic mastitis. Such affections begin as small-celled infiltrations, lead to dilatation of the excretory ducts and acini and form hard cicatricial tissue. The nodules are painless, freely movable over the pectoral muscles and unaccompanied by swelling of the axillary glands. This condition has been designated *cirrhosis mammæ* (Wernher), *elephantiasis mammæ dura* and *mastitis interstitialis diffusa et circumscripta.* Whenever the condition causes symptoms distressing to the patient, the best treatment is the removal of the diseased breast.

2. Abnormal secretion from the breast is not of infrequent occurrence in the non-puerperal patient. Galactorrhœa may have existed for years, being aggravated from time to time by puerperal processes. The breasts are usually shrunken and relaxed and their sensitiveness lessened; the quantity of the secretion is variable. The constitution of the patient suffers from the constant discharge; she becomes emaciated, loses her appetite and presents a miserable appearance.

The best results from treatment are obtained by administration of the preparations of iron, improvement of the nutrition, regulation of all the functions and protracted and uniform compression of both breasts by means of gauze bandages, a paste dressing or adhesive plaster.

The mammary secretion may be artificially produced at any period of life by placing a child at the breast. Baudelocque reports this condition in a girl 8 years old and Carganico in a woman 59 years old, who had not menstruated for ten years.

In various affections of the sexual organs, I have occasionally been able to express a small quantity of milk serum from the nipple; this is notably the case in ovarian tumors, in uterine growths of large size and in mammary myxo-adenomata. This symptom has no significance in diagnosis, except that it may lead to mistaking the condition for pregnancy. In a patient recently

operated upon by me for ovarian cyst, there was so much milk present in the breasts that it could be expressed in jets, yet three years had elapsed since her last confinement. The patient was not pregnant.

Retention of milk may occur during the puerperal state from closure of one of the excretory ducts, and may continue much longer than the lying-in period. The tumor known as the milk cyst or galactocele may be very large and fluctuate. Scarpa evacuated ten quarts of pure milk from a cyst of this kind, which had increased the circumference of the left breast to thirty-four inches, and which reached down to the patient's left thigh. The accumulation began ten days after the second confinement. I have never seen a galactocele. The treatment of such tumors consists of incision, evacuation and drainage, or excision of a portion of the wall and cauterization of the inner surface.

CHAPTER V.

MASTODYNIA, NEURALGIA OF THE MAMMARY GLAND.

This is a functional disease, consisting of attacks of pain of greater or less severity, which are protracted or recur at regular intervals, no inflammatory enlargements or tumors or changes in the structure of the gland being found on inspection or by palpation. My experience coincides with that of Gross and of Erichsen, who maintain that this is almost always associated with some anomaly of the sexual organs. Dysmenorrhœa, retroflexion of the uterus, myomata and ovarian tumors are very often accompanied with mammary neuralgia. We therefore find attacks of pain occurring at the menstrual period or shortly before its appearance, when the breasts are greatly congested. Sometimes the acini are more rigid when examined and sensitive to pressure, and yet no anomaly can be found when a portion of the breast is excised.* I have met with many cases of this kind, and most fre-

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* *Vide* Billroth's very instructive case, *loc. cit.*, p. 37.

quently relieved them by the application of belladonna ointment. The remedies which have been recommended are innumerable, among them being the application of warmth and of ice, the local abstraction of blood, the internal administration of quinine and iron, compression, avoiding the use of corsets, the employment of narcotics of all kinds, etc. The main indication is the removal of the cause of the genital affection. Cocaine may be of service, locally applied, but one must guard against furnishing the patient with opiates or allowing her to make injections of morphia, to avoid the formation of a bad habit. Von Nussbaum has successfully cured a case of neuralgia of the breast, which had previously resisted all other treatment, by stretching the brachial plexus.* Strict anti-hysterical treatment, according to the Weir-Mitchell and Playfair methods, is often of great service in the improvement of the patient.

CHAPTER VI.

PARASITES OF THE FEMALE BREAST.

Vegetable Parasites.—There is no doubt that spores and bacteria may develop in the crusts or scabs which form upon the nipple. The probable presence of *oïdium albicans* upon the nipple was shown during the last century by Mellin and Underwood. When the nipples are kept thoroughly clean and there is no acid reaction upon the surface this fungus ceases to germinate. The cases reported by Betscher, Girelli and Delpierre teach us that wet nurses thus affected may transmit the fungus from their nipples to the nursing child.

Animal Parasites.—Echinococci are the only animal parasites found in the female breast, and they are of very rare occurrence. Finsen found the disease in the breast but once in 281 patients treated for echinococcus in Iceland during a period of ten years. Haussmann found only 16 cases reported in the literature of the

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* Isenschmid, *Münchener ärztl. Intelligenzblatt*, 1883, bd. xxx, p. 299.

subject up to 1874, even these being very meagerly described. No involvement of the breast of this description was noted by the physicians of Mecklenburg in a total of 196 cases treated for echinococcus.*

In cases of this kind, the mother vesicle alone has hitherto been found in the breast, and this usually sterile, daughter vesicles being very uncommon. The cysts develop slowly and do not often attain a greater size than a hen's egg or a fist. Fischer's patient was 21 years old, had first observed the tumor in the right breast four years previously, when it was about as large as a chestnut. It became as large as the fist, but only a shrivelled sac was afterward found in the skin below the left axillary line. In Höppener's case the tumor, which was as large as a fist, after spontaneous rupture, evacuated a number of daughter vesicles, and then recovery occurred. Their growth may be accelerated by injuries; abscesses may be formed in the vicinity of the vesicle, causing the glands of the axilla to become enlarged. The clear fluid contained in the vesicle is free from albumin, provided the parasite has not died or pus has not entered the sac from without. Puncture is essential to establish a certain diagnosis, and tincture of iodine should then be injected, or the vesicle enucleated from its connective-tissue capsule; when drainage of the sac is made, perfect apposition may be expected.

CHAPTER VII.

FOREIGN BODIES IN THE FEMALE BREAST.

In women, needles may penetrate deeply into the mamma without causing immediate pain; only after the lapse of several months does pain set in. In one case of this kind, Von Nussbaum removed from the breast a fragment of a needle which had

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* O. W. Madelung, Rostock, "Beiträge mecklenburgischer Aerzte zur Lehre von der Echinococcenkrankheit," Stuttgart, 1885, Enke.

been embedded there for a long time, but the neuralgia was not relieved, and the brachial plexus had to be stretched before recovery took place.

Desprès found a piece of cloth and two fragments of matches in a mammary abscess. The patient had fallen upon her breast while holding three or four matches in her hand.

SECTION VIII.*

DISEASES OF THE FEMALE URETHRA AND BLADDER.

CHAPTER I.

THE EXAMINATION OF THE FEMALE URETHRA AND BLADDER.†

The means of accurate exploration of the female bladder and urethra have recently been greatly perfected. While formerly one had to be content with inspection of the mouth of the urethra and of the anterior vaginal wall, and touch and sight could be used in the recognition of abnormal conditions of the inner wall of the bladder only in those cases in which lesions in continuity of the vesical structure existed, in the remainder, however, restricted to examination and palpation of the inner surface of the bladder by means of elastic or metallic catheters

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* This part of the volume is chiefly a translation from Professor Winckel's monograph, "Die Krankheiten der Weiblichen Harnröhre und Blase," the second edition of which was published in 1885. But, as the original work contains 230 pages, it was necessary to condense certain parts and omit some others in order that the volume might not be too large, at least for an American handbook. The omissions have been, first, of parts that are considered in previous chapters, *e. g.*, cystocele; next, of those which have only an historical interest; and again, of conditions so rare that the general practitioner would have little or no interest in them.

Further, I have made some additions, more especially relating to American work, which seemed to me important. These additions are included in brackets, [ ].

† In the original work two chapters of the introductory portion are occupied with an Historical Sketch and Preliminary Anatomico-Physiological Remarks upon the Female Urethra and Bladder. Want of space in this work compels their omission. The beginning is made with the third chapter, which bears the title given above.

and sounds, we are now, by the efforts of a number of professional men, able to render almost the entire urethral and vesical mucous membrane accessible to the finger and the eye. It is to the credit of G. Simon to have perfected a method of rapid and safe dilatation of the female urethra, further to have given exact directions as to the degree of dilatation admissible and to have furnished practical proof of its harmlessness.

Simon's method is this: in the external border of the urethral orifice, which is the narrowest and most unyielding part of the urethra, with the scissors an incision one-fourth of a centimeter is made on each side above, and one of half a centimeter in the urethro-vaginal wall below. Then hard rubber specula, cut off even at the front end, provided with a mandrin, which look like round smooth plugs, are introduced one after another. Simon has seven sizes, the largest two centimeters, the smallest three-fourths of a centimeter in diameter. After the largest has been introduced the index finger of one hand is made to enter the urethra, while the corresponding ring finger is introduced into the vagina, and by pressure of the free hand upon the hypogastrium the bladder is pushed against the internal index finger.

By palpation in this manner only the highest lateral portions of the bladder attached to the bones cannot be perfectly accurately touched. Dilatation of the narrowest urethra can be accomplished in 5–7 minutes, and without violence. Simon has carefully indicated the degree of dilatation that can be employed without incontinence of urine resulting. In adult women dilating plugs of a circumference of 6–6.26 centimeters, = 1.9 to 2 centimeters diameter, may be used without danger; in extreme cases, which justify the application of somewhat more dangerous means, the dilatation may be carried to 6.5, and even to 7 centimeters; in girls the boundary must be within 6.3–4.7 circumference.

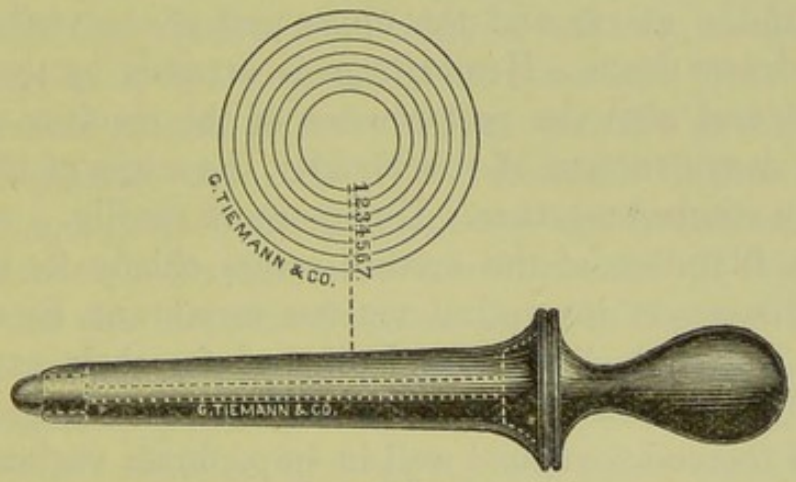
[It is well to add the statements made by some others as to dilatation of the urethra. Hybord * says that dilatation of the urethra beyond 3–3½ centimeters cannot be prudently done, and

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* "Des calculs de la vessie chez la femme et les petites filles." Paris, 1872.

is liable to cause lacerations. Skene* remarks: "Notwithstanding testimony to the contrary, I am sure that dilatation of the urethra to any great extent is dangerous. There is danger of lacerating the urethra and causing incontinence, which cannot be readily cured." Emmet† has met with two cases in which incontinence of urine followed dilating for diagnostic purposes in a total of eleven in which such means were used. He regards the fact as proving "the unjustifiable nature of the procedure." Unfortunately, neither Skene nor Emmet states the "extent" of dilatation which is "dangerous" or "unjustifiable;" nor does the latter state the dilating means which were used in those women who subsequently suffered from incontinence of urine.

FIG. 133.



Simon's Dilators.

On the other hand, Alexander Dunlap‡ has reported a case in which he extracted from the bladder of a woman, through the urethra by means of the lithotomy forceps, a stone having the following dimensions: Length 2⅛ inches, transverse diameter 2 inches, and vertical 1½. The urethra was dilated by the calculus drawn into it, and the dilatation was accomplished in forty to forty-five minutes; no incontinence followed.]

When dilatation of the urethra is not sufficient for the end desired, or would exceed the degree of safety, we can make use

* "Treatise on the Diseases of Women," 1889.

† "Principles and Practice of Gynecology."

‡ "American Journal of Obstetrics," 1881.

of another method, likewise recommended by Simon, that is, making an opening in the vesico-vaginal wall, so that through this the bladder can be inverted into the vagina and even to the vulva, and thus palpated and inspected. This opening of the bladder with artificial inversion is thus effected: one-fourth to half a centimeter below the anterior lip of the uterus, in the anterior vaginal vault, a transverse incision 3 centimeters long is made, and from its middle, toward the urethra, a second, 2 centimeters, so that a T-shaped section results. By means of a fine double hook, passed through the incision, the mucous membrane of the bladder is caught and drawn into the opening, while pressure is made with the other hand above the pubes. The incisions are best made if the vagina is dilated with Simon's dilators or with Bozeman's speculum and the bladder wall made tense, or if the uterus and the upper part of the vesico-vaginal wall are drawn down. Hemorrhage is arrested by the ligature or torsion, and after the performance of the requisite operation upon the inner surface of the bladder, the edges of the wound are finally stitched together. Union occurs readily.

Simple dilatation of the urethra serves chiefly for the diagnosis of diseases of the vesical mucous membrane, for the diagnosis of foreign bodies and calculi and for their extraction; further, for the cure of fissures of the urethra, for ascertaining defects of the vesico-vaginal wall in imperforate vaginæ, for the diagnosis of the seat and extent of growths and tumors of the bladder wall, for the extirpation of such tumors, for the cure of vesico-intestinal fistulæ, by cauterization of the vesical opening. It is also recommended for the treatment of obstinate vesical catarrh, for the application of powerful caustics to the bladder (Heath), for the detection, extraction and cutting out of renal calculi from the vesical end of the ureters and finally for the opening of a hematometra (Spiegelberg's case). In 8 of 48 cases of rapid dilatation of the female urethra by Silbermann incontinence of urine resulted; but as in most he did not use Simon's instruments or observe his precautions, this fact should not condemn the value of Simon's method.

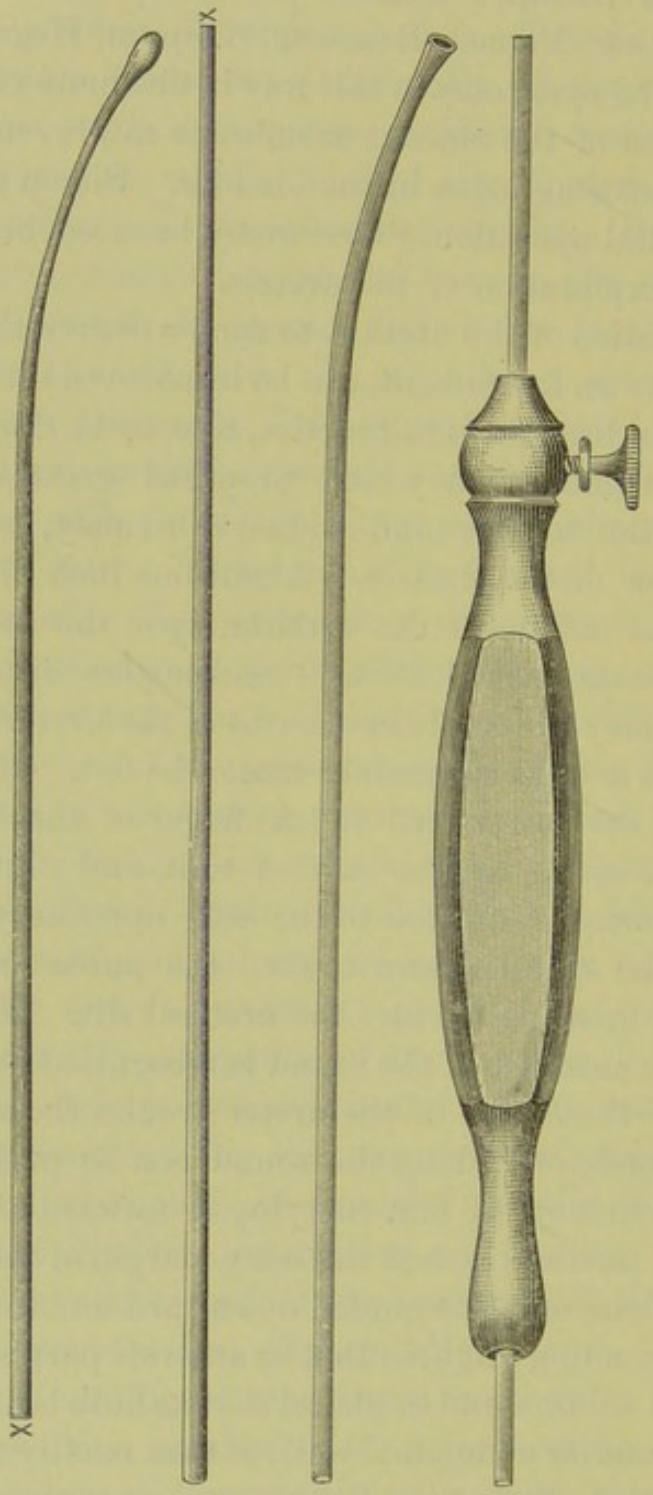
In case of very large calculi and considerable irritability of the bladder, in the extirpation of tumors situated so high in the

lateral portions of the bladder that they cannot be reached through the dilated urethra, and in operations for vesico-intestinal fistulæ that cannot be cured by the cautery after urethral dilatation, the T-shaped incision previously described would be necessary. Sims, Emmet, Bozeman, Simpson, Hegar and Simon have performed cystotomy in this way in obstinate vesical catarrh with ulceration of the mucous membrane to prevent the stagnation of decomposing urine in the bladder. Simon regarded it as an experimental operation. Cystotomy has also been employed by some for exploration of the ureters.

With dilatation of the urethra to such a degree that the finger, and by its side an instrument, can be introduced into the bladder, there has been brought into practice, also, by G. Simon, a further method of examination which promised great usefulness in diseases of the ureters and kidneys, namely, sounding and catheterization of the ureters. About one inch from the well-defined vesical ostium of the urethra, upon the so-called inter-ureteric ligament, and 1.25–1.60 centimeters distant from the median line, may be found the mouths of the ureters as a decided elevation; the mouths themselves cannot be felt. If this swelling is fixed with the introduced index finger of the left hand, the bulb of a fine sound can be carried to it, and while the handle of the instrument is directed to the side opposite to the ureter which is to be sounded, and toward the pubic arch, by gentle pressure, can be made to enter the ureteral slit. With the tip of the finger the entrance of the sound is recognized as one palpates the border of the mouth of the ureter around the sound. With instruments sufficiently long the sound can be pushed up to the pelvis of the kidney, by first carrying it outward about 7–8 centimeters, and having reached the bony margin of the pelvic inlet, the handle of the sound is guided downward and to the inner side of the corresponding thigh, so that its anterior part is parallel with the vertebral column and so placed that its bulb is directed rather toward the anterior abdominal wall; it thus readily enters the pelvis of the kidney. Simon has for this purpose two instruments (see Figs. 134 and 135), the ureteral sound and the ureteral catheter; they are 25 centimeters long and not flexible, because a yielding canula will not overcome the curvature which the ureter makes

from its vesical opening to the border of the pelvic inlet. In 11 women Simon has performed sounding 9 times, catheterization 8

Fig. 134. Fig. 135.



Ureteral Sound. Catheter.

times; in none was the least injury sustained. True, he has had no further opportunity of catheterizing the ureters in such a case,

but he believed that the diagnosis of stone in the ureter and in the pelvis of the kidney could be made certain by sounding; that, further, a special advantage would result if the urine were conducted directly from the kidney, without first passing into the bladder. Presumptively, stones which have been felt in the vesical portion of the ureter can be cut out or extracted, or lying near the pelvic ostium they may possibly be pushed back into the pelvis of the kidney. Perhaps also strictures could be dilated, and the frequent hydronephrosis closed as by a valve at the pelvic ostium of an otherwise pervious ureter, could be evacuated by the ureteral catheter. Opposed to these too sanguine expectations is the fact that sounding or catheterization is not always harmless, and that as greater or less traction is necessary to straighten the curvature described, injuries of the mucous membrane, from the tortuous course of the canals, even perforations of the ureter, may occur, especially in strictures, in narrowing, in displacement by tumors (on the part of the uterus, ovaries, vagina, pelvis, etc.), for instance, in abrupt movements by patients not deeply anesthetized, in severe vomiting during anesthesia—possibilities of so serious a nature in comparison with the doubtful advantages as to make necessary the greatest caution. Fortunately, the diseases for which the operation is indicated are so rare that its frequent abuse is not to be apprehended. An advantage which the ureteral catheter may really have in the operation for vesico-uretero-vaginal fistula will be subsequently brought out. Furthermore, in almost all cases in which I have dilated the urethra I have endeavored to introduce Simon's sound into one or the other ureteral slit, and must confess that notwithstanding great persistence, I have never been so fortunate as to find the canal with the sound.

[The subject of exploration of the ureters has quite recently attracted renewed professional attention. Skene regards their catheterization as "difficult, not without danger and of little practical value." Important contributions to the subject of examination of the ureters have been made by Pawlik, Saenger, Schultz,* Jacobs† and Kelly.‡ The last has given a good de-

* "Nouv. Arch. d'Obstet. et de Gynécol., 1887. † *Ibid.*, Oct. 1888.

‡ "Transactions of the American Gynecological Society, 1888."

scription of the method of palpating the ureters in the female. Schultz's article is a very complete one and includes both palpation and catheterization. Jacobs, considering the utility of catheterization of the ureters in uro-genital fistulæ, gives among his conclusions the following: "If the ureters are intact we can operate with certainty of success in the greatest number of cases. If, the ureter being intact, the vesical opening is found immediately in the vicinity of the loss of substance, the operation may be tried, but the chances of failure are very great."

My friend, Dr. Barton C. Hirst, has kindly furnished me with the following statement as to the method of catheterizing the ureters and his estimate of the value of the operation: "The woman is placed in the lithotomy position, two fingers of the left hand are inserted in the vagina and an effort made to palpate the ureters with the assistance of pressure from above by the free hand. It is usually possible thus to locate them. The fingers in the vagina are then so held that the ureter runs between their tips. The catheter is then inserted through the urethra into the bladder, its curved point deflected toward the two fingers resting against the anterior wall, and by gentle manipulation one tries to insert the catheter into the mouth of a ureter. If this succeeds, the instrument is felt to slip into a narrow opening and to be grasped quite firmly by its sides. When once experienced the sensation cannot be mistaken. The catheter is then gently pushed forward as far as it can be without the exercise of force enough to do harm. If it is desired to secure a specimen of urine from one kidney the free end of the catheter is stopped by a match or by a piece of rubber tubing bent on itself until the catheter is well within the ureter; the plug then being removed, the urine exudes drop by drop and is collected in a test-tube.

"In my estimate of the value to the clinician of this operation, I must say that after practical tests I have been disappointed. In many cases the introduction of a ureteric catheter is impossible; in many more success only comes after patient effort; in a few, the ease with which the opening of the ureters is found and the instrument inserted for a great distance, will surprise the operator. I have had one case in which the manœuvre gave me satisfaction. A woman, some days after labor, developed

high fever, with pain over the kidneys and scanty urine. There was pus in the urine. The ureters were catheterized with great ease, a flexible instrument passing, on one side, a distance of over eight inches. The pus was found to come mainly from the right kidney; an active counter-irritant treatment confined to that side gave relief in a short time. Wherever the catheterization of the ureters is practicable there is, no doubt, a gain in the precision of diagnosis. That it is possible to reach the pelvis of the kidney and apply local treatment by means of the catheter introduced through the urethra, I do not believe. I should think that in a case of contemplated nephrectomy for stone it would be of advantage to collect urine from each kidney separately, as valuable information might thus be gained, but it would be impossible, I think, to predict in any given case that catheterization of the ureters would be practicable."]

It had already formerly been attempted, by means of suitable apparatus, to illuminate the female urethra and bladder, for the purpose of investigating diseases of these by inspection.

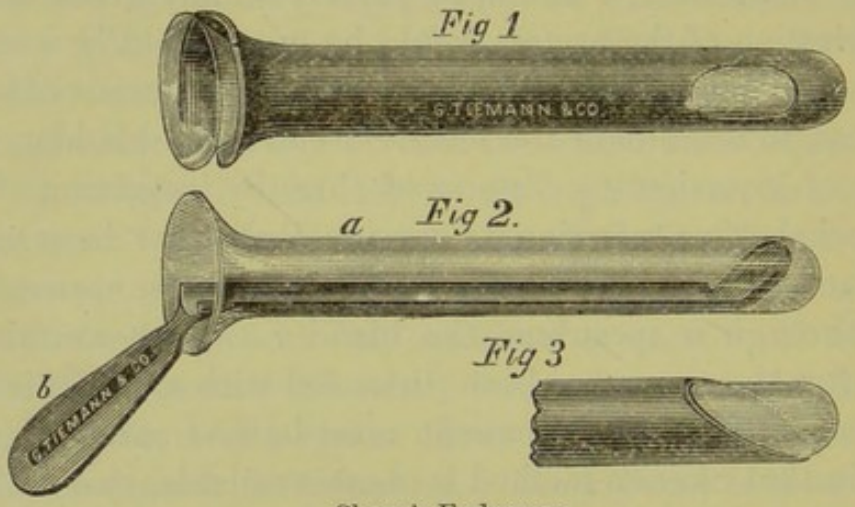
[Winckel, after referring to specula that have been used for this examination, describes in full Rutenberg's apparatus, by which, through a speculum, the bladder can be examined by sight, after the organ has been distended with air. This distention is so painful that the patient must be first anesthetized. It is certain that Skene's method is more available, and will prove sufficient in most cases, and a description of it is therefore substituted. Skene* states that for this examination he has devised, and for years employed, an endoscope which has proved of great service. "This instrument is composed of three parts. A glass tube (*a*, Fig. 136) is shaped like the ordinary test-tube used by chemists, except that the mouth is a little more flaring. The second part (*b*, Fig. 136) is composed of two pieces—a mirror and its holder. A piece of very thin silvered plate is made to fit nearly the whole length of the inside of the glass tube and about one-third of its circumference. To one end of this arrangement the mirror is attached at an angle of about 100°. At the other end a delicate handle projects at an obtuse angle. This part of

* Op. cit.

the instrument looks like a section of a tube that has been longitudinally divided into three equal parts, with a mirror attached at one end and a handle at the other. This piece is made perfectly black on the inside and answers two purposes—it holds the mirror and, when placed in position for use, darkens one side of the glass tube. It is seen that the mirror can be moved forward or backward and be turned around, so that, when the tube is introduced into the urethra or bladder, the exposed internal surfaces can be brought into view by moving the mirror while the tube remains stationary."

"Fig. 136[1] shows the glass tube placed inside of a fenestrated

FIG. 136.



Skene's Endoscope.

hard-rubber speculum, and Fig. 136[3] shows the glass tube inside of a glass speculum that is open and beveled at the end. These specula are used in making applications to the urethra and bladder."

The instrument is thus used: "The tube, with the mirror inside, is introduced into the urethra, and bladder also, if an examination of the lower part of the latter is desired. Light is thrown into the tube by the aid of a concave mirror. This shows that portion of the interior of the urethra or bladder which is opposite the mirror and in contact with the tube, and by moving the mirror backward and forward all the parts to be examined are brought into view in regular succession."

Dr. Skene finds that sunlight furnishes the best illumination, but the light may be insufficient, from the window not being properly situated, or the day may be dark and cloudy, so that he prefers gaslight, using the ordinary Argand burner.

He subsequently states that "the cystoscope of Nitze and Leiter is the only instrument for thoroughly investigating the bladder." He also gives from the *New York Medical Journal*, April, 1888, illustrations and a description of the cystoscope.

Winckel further considers, among the means of examining the bladder, the use of Napier's sound, of the manometer—a method of examination first described by Schatz—of percussion and auscultation and of Küstner's combined catheter and thermometer. But every practitioner recognizes the value of percussion and auscultation, especially of the former, in ascertaining certain pathological conditions of the bladder, while the other means referred to are of very limited utility, and therefore are omitted.]

CHAPTER II.

MALFORMATIONS AND DISEASES OF THE FEMALE URETHRA.

1. *Formation Failures or Congenital Malformations. Disorders of Form and Position.*

These include complete absence of the urethra, defectus urethræ totalis, absence of the inner portion, defectus urethræ internus, or of the external part, defectus urethræ externus, atresia of the urethra and duplicity of the urethra. (See page 20 for the origin of hypospadias and epispadias and page 22 for the treatment of the latter.)

[These anomalies are of such rare occurrence that no further reference to them will be made here, as of little interest to the general practitioner. The few who seek complete information will find it in Winckel's monograph.]

Disorders of Form and Position.—These include dilatation,

stenosis, the formation of diverticula, upward and downward displacement and prolapse of portions of the urethra.

(*a*) *Dilatation.*—This may be total or partial. The former, dilatation of the entire canal, is most frequently caused by the penis, in consequence of the vaginal entrance being closed or unusually contracted. See page 105 for reference to such use of the urethra. Winckel quotes from Scanzoni the case of a masturbating girl who caused dilatation of the urethra by the introduction of a wax candle. The urethra may also be generally dilated by the passage of a calculus from the bladder, either spontaneously or artificially. Winckel also mentions a case of vesical papilloma, under his observation, in which a part of the growth was forced through the urethral canal, moderately dilating it in its extension.

If incontinence does not occur, general dilatation of the urethra causes no essential trouble. In case of incontinence, cauterization with chromic acid has been successfully used by Kinny; Scanzoni observed good results from the application to the vagina and to the urethra of an ointment of tannin or ergot, and from a urethral injection of a solution of the sulphate of copper. Narrowing the canal by excising a piece from the urethro-vaginal septum, and then carefully stitching together the borders of the wound, may be successfully employed after the failure of other means.

["One of the methods recommended by Skene is the thermo-cautery, and the following are his directions: The long-pointed tip of the instrument, which is used for cauterizing hemorrhoids by puncture, should be chosen, and, having protected one side of the urethra with the speculum, a narrow strip of the membrane parallel to the axis of the canal shall be cauterized. Two or more of these cauterizations may be made at points equidistant on the circumference of the urethra. Operating in this way leaves pieces of normal membrane between the portions cauterized, which prevents stricture from occurring after healing—a misfortune which is sure to follow if the mucous membrane is destroyed by cauterization all around."

In an article by Engstrom, *Revue Médico-Chirurgicale des Maladies des Femmes*, March, 1888, upon the operative treatment

of dilatation and relaxation of the urethra in women, the author, after referring to the indirect methods of Rutenberg and Rose and the direct of Pawlik, of Franck and of Winckel, gives his own, which differs chiefly from those of the two last in that the flap he excises does not involve the mucous membrane of the urethra, as do those of Franck and of Winckel. Engstrom removes from the vagina, over the course of the urethra, an oval flap, and then unites the edges of the wound with sutures; even if primary union does not occur, the result of the operation is not compromised, for secondary union takes place, and the cicatrix causes narrowing of the urethra. Piedpremier, *op. cit.*, mentions the method pursued by Simon in a case of general dilatation of the urethra with many varicosities covering the urethro-vaginal septum. He first tied several varicose veins, and then cauterized the surface of the wound with chloride of zinc. The cure was complete.]

(*b*) *Partial Dilatation of the Urethra*, diverticulum urethræ, urethrocele, a sac-like formation, affects the posterior wall of the urethra several millimeters above the meatus.

[Winckel states that he can find only four cases of this affection reported; but while by no means frequent, urethrocele is not so rare as this statement indicates. Bozeman, Emmet and Skene, in this country, have described the affection and given directions for its treatment. The subjoined illustration is from Skene. The diagnosis is made by feeling upon the anterior wall of the vagina, in the course of the urethra, and at about its middle third, an elastic swelling, which disappears upon pressure and immediately returns when the pressure is removed; by passing a curved uterine sound with its concavity toward the inferior wall of the uterus, the point of the sound enters a depression in the urethro-vaginal wall and can be readily felt by a finger in the vagina as it presses at different points.

Treatment.—In the milder and in recent cases Skene states* that he has had satisfactory results by dilating the lower part of the urethra, and supporting the dilated portion either with a pessary or a tampon of marine lint; the urethra is thus kept

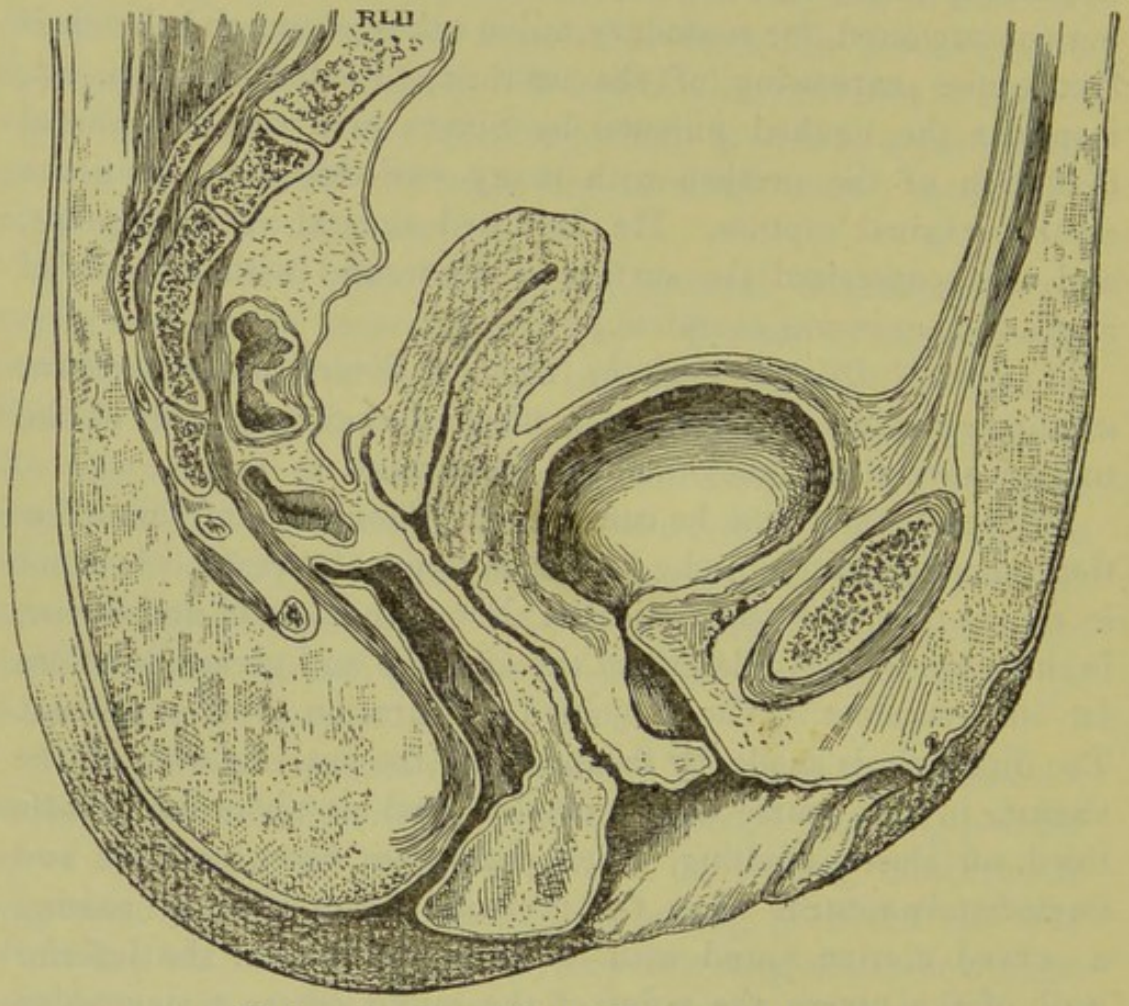
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* *Op. cit.*

empty, and then by frequently washing it out and applying such remedies as will cure the urethritis recovery will sometimes follow.

The method, however, which has been found useful in curing grave cases is by making a urethro-vaginal fistula, running along the median line of the swelling, keeping it open for a few weeks, during which urethral inflammation, if present, is treated; the

FIG. 137.



Urethrocele.—From "Skene's Diseases of Women."

walls of the sac, no longer distended by urine, shrink; then the fistula is closed. It is probably a matter of no great importance whether the incision be made with knife or scissors or with the button-hole scissors or with the thermo- or galvano-cautery; in any case a block-tin sound should be placed in the urethra at the beginning of the operation. Emmet seizes the centre of the urethrocele by a tenaculum, then with scissors cuts through to the

sound, enlarging the incision toward the neck of the bladder and to the meatus, of course not dividing either; the next step is to draw out through the opening the hypertrophied urethral mucous membrane, cutting it off, after which, by means of fine silk interrupted sutures the mucous membrane of the urethra and that of the vagina are stitched together.

An elaborate article upon urethrocele, by Priedpremier, will be found in the first four numbers of the *Revue Médico-Chirurgicale des Maladies des Femmes* for 1888. Among the author's conclusions are the following:—

1 Urethrocele is an affection more frequent than has been thought, and is of easy diagnosis. 2. Its pathogeny is multiple: accouchement, cysts of the vagina, traumatisms, calculi arrested in the urethra, blennorrhœa concur separately or simultaneously in its production. 3. The constant symptom is the presence of a pouch in the course of the urethra, which can be emptied by pressure.

6. Two methods of treatment should be adopted: section by the galvano-cautery or simple incision with the bistoury with or without excision of the pouch, and suture of the lips of the wound.

8. The cure follows in about fifteen days after surgical intervention.]

[Skene also describes dilatation of the lower and of the upper third of the urethra, the term urethrocele being restricted to such enlargement of the middle third. The first of these is very rare, has no symptoms and requires no direct treatment. Skene attributes dilatation of the upper third to a partial prolapse of the bladder and of the upper end of the urethra; the displacement implies a relaxation of the tissues, caused originally, it may be, by injuries during labor; the prolapse permits an unusual pressure of urine upon the upper end of the urethra, and dilatation is the result. He states that the only treatment is supporting the parts, for this purpose advising the pessary represented by Fig. 138, and which he also recommends for prolapsus of the bladder.]

Stenosis and Stricture of the Urethra.

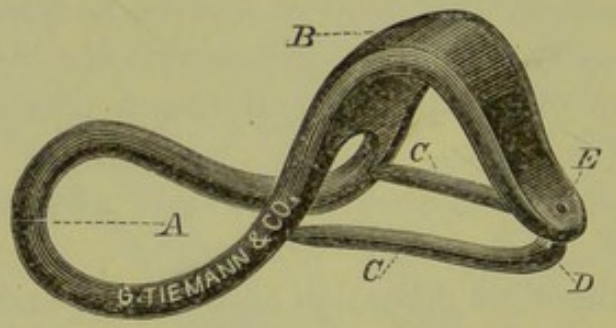
Winckel states that narrowing of the urethra in woman, stenosis and stricture, is rarer than dilatation. He gives as the three chief causes: injuries to the urethro-vaginal septum, especially in difficult labors with consequent cicatrices (cases from Scanzoni, Gayet and Ledetsch are cited in illustration), tumors in the urethral wall and urethral chancre. Another cause is vesico-vaginal fistula.

Treatment.—The important part of this is dilatation, and as a rule gradual rather than abrupt. In some instances cicatrices must be divided, and then by multiple rather than by single incisions.

Displacement of the Urethra.

[This may be complete or partial. The most important primary affection is prolapse of the mucous membrane. Winckel states

FIG. 138.



that while prolapse of a portion of the urethral mucous membrane is quite common, that of the entire mucous membrane is very rare, he having met with it but once. Complete prolapse presents itself as a tumor, possibly as large as a pigeon's egg, upon the vestibule, concealing the urinary meatus. At some point upon the surface of the tumor, usually at or near the centre, a uterine sound can be made to enter the bladder; the diagnosis being thus made, and the way indicated, a catheter is introduced, and probably a large quantity of urine will be evacuated, for usually the patient has been suffering for some hours with inability to urinate, and the tumor has made its appearance after days of scanty urination and violent vesical tenesmus. Winckel advises an effort to replace the prolapsed membrane—an effort

which, I venture to remark, is almost hopeless—and failure occurring, its excision, followed by silver sutures uniting the divided mucous membrane to the meatus; probably he would now recommend the continuous catgut suture. I have seen one case of prolapse of the urethral mucous membrane, and that many years since, in consultation; the patient was a girl twelve years old; the tumor was nearly as large as the first phalanx of the thumb; it was of a dusky purplish color, and sloughing off, spontaneous cure resulted.]

Dislocation of the Entire Urethra.

This is much more frequent than partial dislocation, but is usually secondary and of subordinate importance, following an analogous change of position of the bladder. Winckel further calls attention to a dislocation of the urethra in childbirth during the expulsive stage; the urethra is forced down by the presenting part of the child, and suffers compression with the tubercle of the vagina, which appears below the mons veneris as a dark bluish-red tumor. In addition to the dislocation, the swelling of the vaginal and urethral wall may cause urinary retention. According to Mattei and Olshausen a more frequent cause of this disorder is the sudden descent of the uterus after labor. The bending of the urethra renders the introduction of the catheter difficult, and if force be used, wounding of the urethral mucous membrane and hemorrhage may result. [Skene attaches greater importance to dislocation of the urethra. He regards a torn perineum and a prolapsed uterus as the usual factors in the production of dislocation of the urethra. In the treatment he advises that if these conditions are present, they should be first remedied; he also states that the chief indication is to retain the urethra in place, which can be done by using the pessary he recommends for prolapse of the bladder, Fig. 138.]

CHAPTER III.

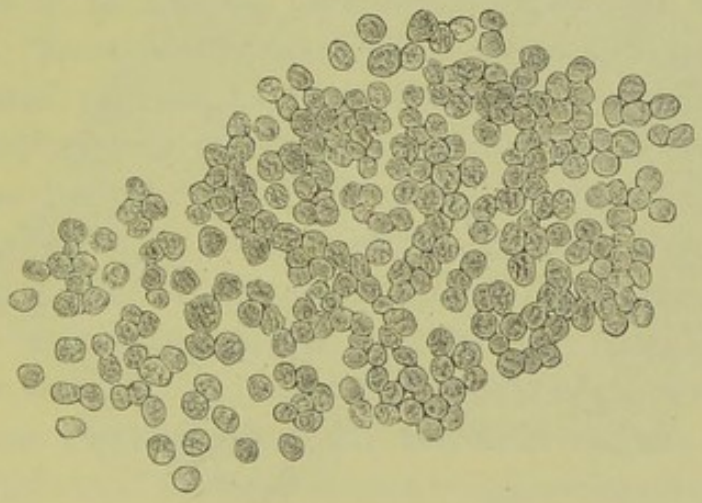
NUTRITIVE DISEASES OF THE FEMALE URETHRA.

Hyperemia, acute and chronic catarrh, ulceration and hypertrophy of the urethra, are found quite frequently in the female, although, as a rule, less frequently than the accompanying affection of the cervical portion; and on account of the relative smallness of the diseased surface, they are, as a matter of fact, not of corresponding importance symptomatically or therapeutically. The causes of these disturbances of nutrition lie either in the individual herself or they come from without. Then a particular condition of the urine may affect the urethral mucous membrane. Urine rich in salts, or ammoniacal, or containing fungi or membranous fragments (diphtheritis of the bladder) mixed with infected blood-clots, will cause hyperemia as well as catarrh and ulceration of the urethral mucous membrane. Vesical and renal disease thus predisposes to affections of the urethra, at times a direct lesion of the mucous membrane resulting from the use of the catheter. Chronic as well as acute inflammation of the labia, vaginal and cervical catarrh, often extend to the urethra. Urethritis has been found as a complication of the scrofulous diathesis, and to occur in impetiginous cutaneous eruptions; the urethra has been the seat of variolous pustules; typhus, dysentery, puerperal infection, scarlatina, rubeola, also not rarely cause disorders of nutrition in its walls. Further, the ulcerations of syphilis, lupus, carcinoma, tuberculosis, diphtheria and elephantiasis may extend from the nymphæ to the introitus and the urethra. Urethral disease may originate during pregnancy or labor, and in association with dislocations of the nonpregnant uterus, tumors and inflammations of neighboring organs and hemorrhoids. External injuries may be: Lesions from cohabitation, especially in young women, from catheterization, from attempts to introduce foreign bodies, as in masturbation, from falls or blows. The use of a dirty speculum and improper dilatation with the finger or tents may cause catarrh. Nevertheless, the most frequent diseases of the urethra occur in

connection with affections of the vagina, and especially with virulent vaginal catarrh.

The mucous membrane of the external meatus, normally of a light red, in hyperemia becomes rose, cherry or brownish-red; the mucous membrane is generally swelled; through the vagina the canal feels warmer and thicker; the secretion, however, is at first not increased. In urethral catarrh not only is the meatus reddened, the small glands swelled, but at the orifice there is often some clear, later mucous, muco-purulent discharge, sometimes mixed with air bubbles, which escape in larger quantities when pressure is made from the vagina upon the urethra, while the secretion of the undilated, normal urethra is slight and

FIG. 139.



not a drop can be expressed. The catarrhal secretion of urethritis contains pavement epithelium, mucous and pus corpuscles and vibrions.

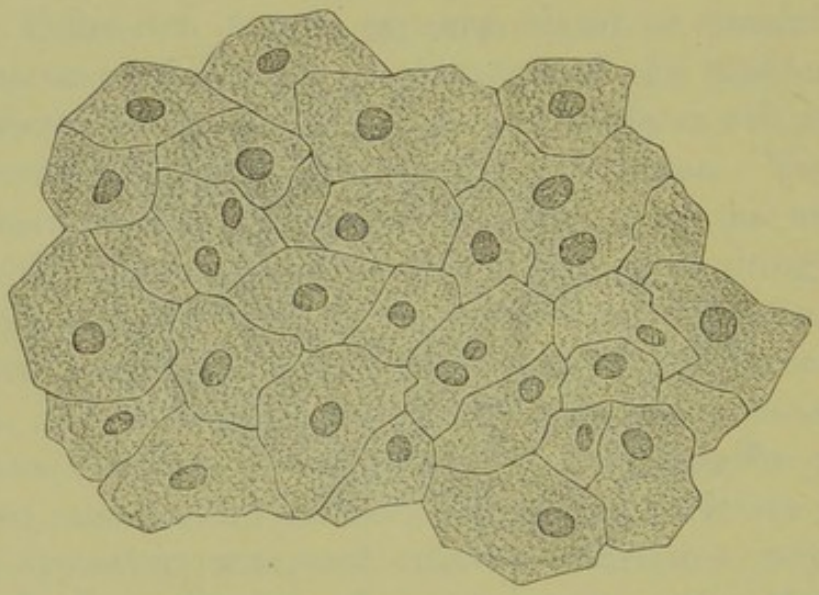
[Figs. 139 and 140, from De Sinéty, are introduced to show the characteristic discharge of acute urethritis, and that of urethrorrhœa.]

In gonorrhœa, virulent urethritis, the mucous membrane is first reddened, there is itching, gradually becoming pricking, burning pain, associated with pressure to urinate and pain in passing urine. After a few days, 3–4, a serous, viscid, albuminous secretion begins, which after 6–8 days becomes greenish, purulent, after 20 days diminishes, and in 30–40 may completely disappear

(Boys de Loury). [De Sinéty, however,* states that during the most acute stage of the disease the patient complains of a little burning in urinating and of some vesical tenesmus if the disease has reached the neck of the bladder. In many cases this pain is not seated in the urethra, and depends upon an associated inflammation of the labia majora or of the nymphæ; the urine then plays only the rôle of an irritant. Often, also, and particularly at a more advanced period, patients do not complain of any painful sensation.]

The diagnosis of hyperemia and of catarrhal or of virulent urethritis can be made only by the assistance of sight. The

FIG. 140.



nymphæ are separated, the secretion removed, and the mucous membrane of the urethra and adjacent parts examined. The finger in the vagina examines the thickness, hardness and sensitiveness of the urethra. Then, if the patient has not recently urinated, by pressing in the course of the urethra from the internal to the external meatus there will be forced out of the latter the characteristic secretion. The presence of gonococci will prove the specific nature of the urethral inflammation. [Martineau† states that a urethritis with non-blennorrhagic vulvitis

* "Traite Pratique de Gynécologie et des Maladies des Femmes."

† "Leçons Cliniques sur la Blennorrhagie chez la Femme."

is quite exceptional; the presence of urethritis ordinarily enables one to make the diagnosis of a blennorrhagic from a traumatic vulvitis. "In case of doubt, the evolution of the affection and especially the research for the gonococcus remove all uncertainty. The evolution of traumatic vulvitis is rapid. From the beginning the vulval inflammation is intense; in three or four days it attains its height, then it rapidly decreases under the influence of emollient applications. In eight or ten days the vulval affection is cured. It is the same of traumatic urethritis. In acute blennorrhagia, on the contrary, the vulval inflammation comes on thirty-six to forty-eight hours after exposure; it is gradually developed; it reaches its maximum toward the eighth or ninth day, then decreases according to the therapeutics employed."]

Treatment.—Winckel states that mild cases of urethral blennorrhœa in the female need no treatment, for spontaneous cure occurs. In stubborn cases most recent authors rely upon local treatment, at most aided by dietetic rules. Existing irritation is removed, rest, avoidance of sexual indulgence and cool mucilaginous drinks are directed. For the relief of the itching and burning injections of flaxseed tea are made 2–4 times daily into the vagina, and lukewarm or cool sitz baths, with the addition of bran or decoction of oak bark, taken. Anodyne vaginal suppositories may also be used for the relief of the irritation and pain. In case the hyperemia, the secretion and the painfulness are considerable, cold applications, cold vaginal injections, even the introduction of small pieces of ice into the vagina, are advised.

Great hyperemias—both acute and chronic virulent urethritis—are most quickly cured by the stick of nitrate of silver or by the lapis mitigatus, of a suitable size, rounded at the end, and carried 2–3 times successively along the entire length of the canal. In sensitive patients bougies may be made of tragacanth or of cacao butter, astringents being added, such as alum, zinc or copper sulphate.

[It may be useful to add to the chief means of treatment presented by Winckel the method employed by Martineau.* He rejects sitz baths, but recommends complete baths.

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* *Op. cit.*

The essential treatment is by urethral injections of a solution of corrosive sublimate, 1 to 1000, or even 1 to 500 in chronic cases of great obstinacy, and by the introduction of urethral bougies or suppositories. The suppositories are about two centimeters long, contain 6 milligrams of corrosive sublimate, with sufficient cacao butter. The syringe used has a canula about five centimeters long, with an olive-shaped extremity designed to fill up the neck of the bladder, thus restricting the fluid injected to the urethra; the perforations in the canula are 2–4, and so arranged as to give the jets a recurrent direction. As a rule, fifteen days suffice for a cure. An injection or suppository is used daily.

It may be added that some have recently successfully used creolin in the treatment of urethritis. Chéron, for example,* injected five grams of a 2 per cent. solution into the bladder every two days, causing neither pain nor poisoning; the effect was lessening of the urethral flow, which soon became mucous and then disappeared. It is quite probable that this will prove one of the best local agents in the treatment of virulent urethritis, but we cannot comprehend the propriety or the necessity of injecting the bladder, as was done by Chéron, instead of applying the remedy directly and solely to the diseased part.]

[Dr. Skene has described two glands in the female urethra which are known by his name. He states that "upon each side, near the floor of the female urethra, there are two tubules large enough to admit a No. 1 probe of the French scale. They extend from the meatus urinarius upward from three-eighths to three-quarters of an inch. Figure 141 is a drawing from a section of the urethra laid open by division of its posterior or vaginal wall. The tubules having been distended by probes passed into them, are plainly seen." "They are located beneath the mucous membrane in the muscular walls of the urethra. This is represented by Fig. 142, which is a drawing from a transverse section of the urethra, about a quarter of an inch from the meatus. The mouths of these tubules are found upon the free surface of the mucous membrane of the urethra, within the labia of the meatus urinarius."

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* *Revue Médico-Chirurgicale des Maladies des Femmes*, Sept., 1888.

In considering the diseases of these glands Dr. Skene refers, among other affections, to inflammation, especially gonorrhœal. In its treatment, when obstinate, he first resorted to injection of the tubules, using a hypodermatic syringe, the point of the needle being rounded, the ordinary solutions for the treatment of inflammation of mucous membranes being employed. He found this method useful, but tedious, and he substituted for it

FIG. 141.

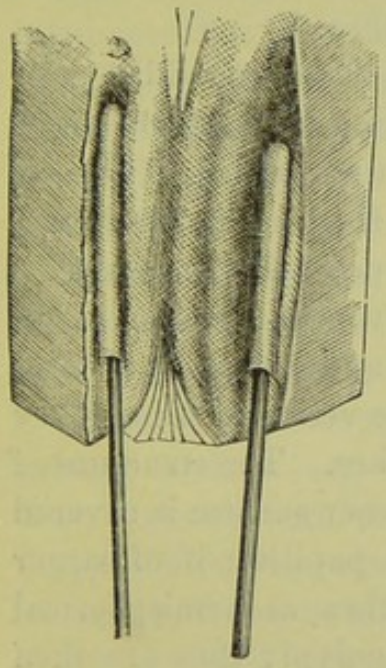
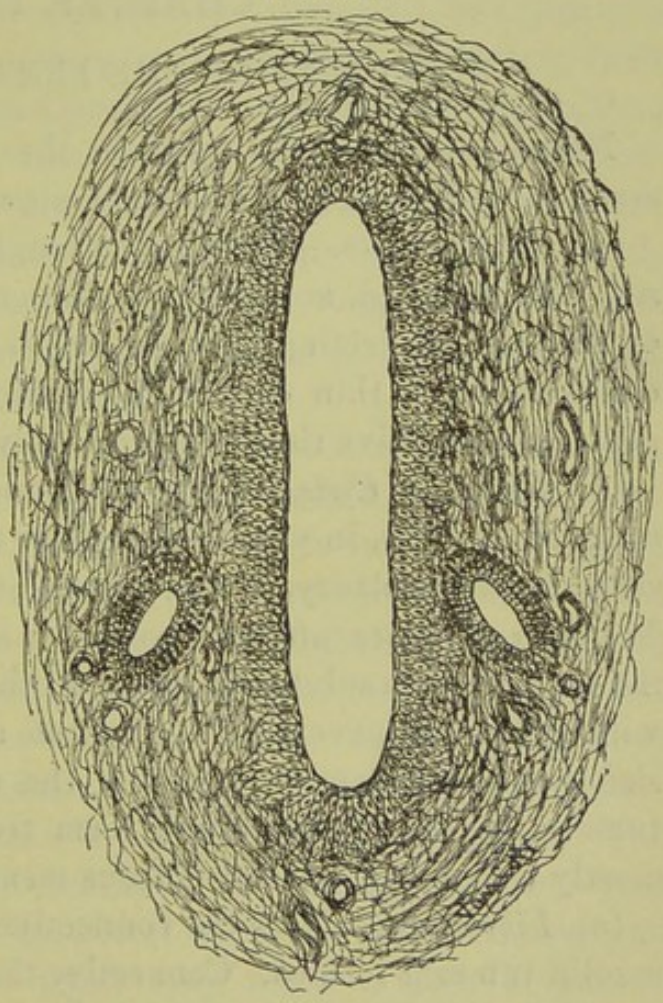


FIG. 142.



laying open the tubules their entire length. "The position and depth of the tubules having been first ascertained, the probe-pointed blade of a very fine scissors is then introduced, and the posterior wall divided its entire length." He further states: "Later still in my practice I have opened these ducts with a cautery. A probe is passed into the ducts, and the wall to be divided is made tense by making pressure outward with the probe. The tissues are then divided. This method has the

advantage of preventing hemorrhage, and also of preventing the parts from reuniting. Very little after-treatment is required. In the majority of cases recovery follows the operation of laying open the canals. Sometimes the inflammation lingers in a modified form, but yields to a few applications of nitrate of silver or sulphate of zinc."]

CHAPTER IV.

NEOPLASMS OF THE FEMALE URETHRA.

Numerous neoplasms occur in the female urethra; they are much more frequent than in the male urethra.

(*a*) *Condylomata.*—They have a rough surface, are reddish, pale red, pedunculated, not sensitive, do not bleed upon touch, single or multiple, projecting from the orifice of the urethra. They are composed of a thin epithelial covering, fasciculated or homogeneous connective tissue and tolerably wide capillary vessels.

(*b*) *Retention Cysts.*—These are found even in the fœtus at six or seven months, in new-born girls in the anterior part, in later years, on the contrary, in the vicinity of the vesical orifice. They do not in all cases project above the surface. The structure of the cysts shows a substantia propria; the inner surface is covered with numerous pavement epithelium and papillæ; if of larger size they not seldom project from the urethra as hemispherical tumors, develop pedicles and form true polypi; they are then mostly covered by normal mucous membrane.

(*c*) *Fibromata.*—Here the connective tissue predominates, and a solid tumor is formed. Connective-tissue tumors may reach the most considerable size of any neoplasm in this situation, even the size of a goose egg.

(*d*) *Myxadenomata.*—These tumors originate from proliferation of the glands and of the connective tissue of the mucous membrane. One such tumor has been described and represented by Beigel.

(*e*) *Sarcomata.*—The only known case of sarcoma of the urethra has also been described by Beigel. The tumor was extirpated, but it is not stated whether it returned or not.

(*f*) *Urethral Hemorrhoids.*—If the veins of the urethra are much dilated the varices may drag with them portions of the mucous membrane and form prominent tumors. These tumors are bluish-red, painless, compressible, are covered by intact mucous membrane, and may be situated in the lower as well as in the upper portion of the urethra.

(*g*) *Vascular Tumors or Polypi.*—These are the most important of all urethral tumors; they may also be called papillary polypoid angiomata. They vary in size from a hemp seed to a pea or a hazel nut, rarely somewhat larger, and appear as deep or pale red, raspberry- or cherry-red prominences at and protruding from the mouth of the urethra; their surface is but rarely smooth, usually somewhat granular; they often have a broad base; in other cases there is a distinct pedicle; they readily bleed upon touch. Upon microscopic examination G. Simon found many loops of blood vessel with hypertrophy of papillæ and connective tissue layer of the mucous membrane.

(*h*) *Lupus and Carcinoma.*—Lupous and carcinomatous neoplasms are very rare in the female urethra, and are usually secondary, extending from the external genitals or from the vagina.

Many of the neoplasms that have been described may be present without any manifestation but slight burning; among these are small condylomata, fibromata, small retention-cysts and polypi of the mucous membrane. If these tumors grow, however, in addition to the painful dragging in the pudendum, there is first noticed disturbance in the evacuation of urine. The patient is conscious of a sensation of itching, burning and pricking in the urethra, associated with desire to urinate and painful urination. These pains may reach a high degree of severity. As the tumor increases in size the urethra is gradually dilated, its mucous membrane irritated, hyperemic and catarrhal; the pains radiate to the hips, sacrum, thighs, even as far as the feet; the suffering is increased by standing and movements and at the menstrual period. The stream of urine is small, sometimes divided, frequently mixed with blood. In girls the itching may lead to masturbation. Polypoid angiomata may excite vaginismus, and thus cause sterility.

The diagnosis of the different varieties of neoplasms of the

urethra will be made by careful inspection, bearing in mind the special characteristics of each.

The treatment is excision by knife or scissors, after removal cauterizing with the actual cautery, nitric or chromic acid, the surface from which the tumor grew.

[Nevertheless, the editor ventures to add that the arrest of hemorrhage, the rapidity of healing and the prevention of return can be best secured by uniting the edges of the wound by means of the continuous catgut suture.

In some cases, Emmet's button-hole operation may facilitate, or even be necessary for, the removal of a urethral tumor.]

CHAPTER V.

NEURALGIAS OF THE FEMALE URETHRA. FOREIGN BODIES IN THE FEMALE URETHRA.

Pain in the urethra and spasmodic contraction are doubtless usually symptoms of the diseases that have been described, to wit, dislocations, hyperemias, catarrhs, ulcerations and neoplasms. While less frequent, however, than formerly thought, neuralgic affections may occur; their diagnosis will rest upon careful examination, by which the presence of any of the diseases mentioned is excluded.

[Skene states that so far as he knows urethral neuralgia is peculiar to young women, and that he has only seen it in young married women of marked nervous temperament, and who have not borne children.]

Winckel advises in the treatment tepid and warm sitz-baths, vaginal injections containing infusion of hyoscyamus leaves (15 : 200), or suppositories of cacao butter and extract of belladonna or extract of hyoscyamus or hydrochlorate of morphia. Further, gelatin bougies with extract of opium or morphia may be placed in the urethra, or rectal injections of flaxseed tea with ten to thirty drops of tincture of opium given. A solution of chloral by the rectum has also been used with success. If the urine is irritant to the mucous membrane, mucilaginous drinks

may be employed. Lupulin, with or without opium, extract and tincture of cannabis indica are to be recommended. Penciling the urethral mucous membrane with a solution of cocaine may be of great service.

The foreign bodies which are found in the female urethra, like those of the bladder, may come from within the organism, as portions of the intestinal contents, of the gall-bladder, gall-stones, from the kidneys, renal calculi and fragments of the kidney and of echinococci sacs, from the bladder, vesical calculi and pieces of the bladder wall, from the ovaries, hair, bones, teeth, from an ectopic gestation cyst, bones, or they may have been introduced into the urethra from without, and are thus extremely various: catheters, hair-pins, pins, grains of corn, pieces of wood, etc.

The diagnosis is made by inspection when the foreign body is near the urethral orifice, by touch from the vagina and by sound. If the foreign body has entered the urethra from the bladder, and is not too large, its removal may be attempted by dilating the urethra and using a forceps. If too large to be thus extracted, it is pushed back into the bladder, and its size lessened by lithotripsy, when the fragments can be readily removed. If it cannot be pushed back, the urethra must be opened, the foreign body extracted through the incision, which should be immediately closed by appropriate sutures. If the foreign body has entered from without, it is to be extracted with dressing forceps, if necessary first dilating the urethra.

CHAPTER VI.

INJURIES OF THE FEMALE BLADDER.

1. Urinary Fistulæ.

The Different Varieties of Urinary Fistulæ in Women.—1. Urethro-vaginal fistulæ, communications of the urethra and vagina. 2. Vesico-vaginal fistulæ, openings between the bladder and the vagina. 3. Vesico-uterine fistula, in which the bladder opens into the cervical canal. 4. Vesico-rectal fistulæ, when there are communications between the bladder and the rectum;

and 5. If the communication is with the small intestine, the fistula is known as vesico-intestinal. (Winckel, adopting the classification of Jobert, also gives the two varieties of superficial and deep vesico-vaginal fistula, according as the opening into the bladder is situated near the anterior lip of the womb or passes through it, a classification which seems confusing and is unnecessary. He likewise includes those cases, usually congenital, in which the urine escapes from the abdominal wall, fistulæ of the urachus or vesical cleft, or simple external vesical fistulæ.)

A ureter may open into the vagina, into the uterus, or into the intestines or externally (as in the case of G. Simon, after an ovariotomy). Hence there may be a uretero-vaginal, uretero-uterine, uretero-intestinal or ureteral fistula, making thus four varieties.

Two or more of the different fistulæ may be associated, and are then designated according to the parts concerned, *e.g.*, a urethro-vesico-vaginal fistula would be a communication between both the urethra and bladder and the vagina.

Causes and Origin.—The greatest number of fistulæ owe their origin to malignant neoplasms of the genitals; these very rarely call for operative treatment. The most of those which are treated have their origin in puerperal processes. Thus arises the division into puerperal and non-puerperal fistulæ. By puerperal fistulæ is understood those which have a causal connection with the changes occurring in pregnancy, labor or the puerperium. They may involve the urethra, the bladder, the ureter or the uterus, and hence are known as urethro-vaginal, vesico-vaginal, uretero-vaginal, vesico-uterine fistulæ. They occur spontaneously or as a result of violence.

Among spontaneous causes are: tearing of the cervix and of the vesico-vaginal wall, by the downward pressure of the head when there are rigidity and cicatrices; contusion from exostoses of the pelvic wall, from vesical calculi, and from cancer of the cervix and of the vagina; necrosis from pressure during birth in a contracted pelvis; gangrenous or diphtheritic ulceration occurring during the puerperium. The first is as frequent as the last are rare, partly because the patients often succumb before such disturbances arise, and partly because these processes most

frequently affect the vaginal entrance and the posterior rather than the anterior wall. It may happen, however, that parts contused inter-partum subsequently during the puerperium are infected from other sources and become gangrenous. The extent, the situation and the time of formation of such fistulæ vary greatly: according to the condition of the tissue involved, its vascularity, its infiltration with serum, the duration of the pressure, the condition of the compressing body and the intensity of the pressure. A firm, resisting head, or one of unusual size, as from hydrocephalus, a face presentation, a pendulous abdomen, an unusually high pubic symphysis (Hecker) are predisposing causes.

There was a time when the origin of vesico-vaginal fistulæ was chiefly attributed to obstetrical operations, and the forceps especially was thought the most common cause. This opinion was first opposed by W. S. Schmitt, in 1828; he attributed most of the cases of vesico-vaginal fistulæ to the continued pressure of the impacted head and to failure to assist labor by the use of instruments. Although the aversion to the forceps is not so great to-day, Charles West, Simon and Baker Brown maintain that in the great majority of cases the lesions undoubtedly originate from too long delay in using instruments in protracted labor. The truth, however, may lie between these opinions, for in 204 different fistulæ of Bouqué's collection, 118 occurred after delivery, and of the latter in 65, or 55 per cent., the labor was terminated by instrumental means. I have in one year examined and operated upon six fistulæ, in cases in which artificial means had been employed in labor, these being followed by the fistula, and in each instance the operation could be traced as the cause of the injury.

(Winckel believes that a decision as to whether the fistula was caused by the contusion of labor or was a result of the operation will depend upon a careful examination of the seat, the size, the borders of the fistula and its outline; fistulæ resulting during spontaneous delivery are usually situated in the upper portion of the vagina, are either superficial or deep utero-vesico-vaginal or utero-vesical fistulæ; if there are large cicatrices, extensive adhesions, stenoses or atresias of the vagina, it is probable the injury was done by the forceps.)

[It is well to introduce for comparison the opinion of Emmet:* "I do not hesitate to state that I have never met with a case of vesico-vaginal fistula which, without doubt, could be shown to have resulted from instrumental delivery. On the contrary, the entire weight of evidence is conclusive in proving that the injury is a consequence of delay in delivery."]

Urinary fistulæ resulting from violence inter-partum, may be caused by instrumental or by manual interference. Of the previously-mentioned 65 deliveries collected by Bouqué, 37 were by forceps, 7 by the lever, 12 by means of cephalotripsy, craniotomy or embryotomy, 3 by the blunt hook and 5 by turning. The forceps may produce the injury directly or indirectly; directly, by cutting the vesico-vaginal wall with the sharp border of the blades in withdrawal, in premature application before complete dilatation of the os, from an abrupt change of position, or from rotation about the long axis of the instrument to alter the position of the head. If the blades are in an oblique pelvic diameter, the anterior one may cut the vesico-vaginal wall in the middle, otherwise, the sides of the vagina may be injured. Cuts by the forceps in the vaginal wall are found very frequently, even after easy operations, as depressions 2–3 centimeters long, somewhat gaping, with well-defined margins, usually upon the posterior wall; they are caused by the border of the blade while the handles of the instrument are being elevated.

As stated, fistulæ caused by the forceps are usually in the lower third of the vagina, and are often variously complicated, as they usually result from compressive necrosis. Direct cuts and tears are, however, not rare. Forcible catheterization during labor may result in perforation of the bladder. Pessaries have caused perforations of the vesico-vaginal, as also of the recto-vaginal wall.

Ulcerative processes in carcinomatous diseases of the uterus and vagina are the effective causes of the formation of fistulæ. Whether tubercular or syphilitic ulcerations may cause urinary fistulæ is by many regarded as doubtful. (See, however, cases of Freund and Beckwith.)

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* "Principles and Practice of Gynæcology."

At times it has happened that the vaginal vault has been perforated by a forceps blade; the same thing has been caused by the scissors-shaped perforator. The parts of the parturient have been frequently torn with the sharp hook, also by fragments of bones after perforation and craniotomy by inexperienced operators; for instance, the case by Saxtorph. Turning may result in injury of the bladder, first, if the hand, violently forced through the insufficiently dilated os, tear the cervix and bladder wall; further, if, as in a case observed by Spiegelberg, *horribile dictu*, the hand of the obstetrician be introduced into the urethra instead of the vagina, and, finally, if, when the foot is grasped and turning of the child is difficult, the hips are dragged down so that they violently compress the anterior pelvic wall. The bladder has been incised in synchondrotomy during labor.

Ulcerative, so-called diphtheritic processes of the vagina in puerperæ and ulcers of the bladder wall, with rupture into the vagina, have also been given as causes of the formation of fistulæ. As perforation of the bladder wall is not rare with carcinomata, with para- and perimetritic processes and with ovarian abscesses, the possibility of such an origin is to be recognized.

The non-puerperal fistulæ are likewise traumatic or spontaneous. The former have been observed following perforations with the calculus sound, with the lithotriptor, from foreign bodies, especially hair-pins, after falling upon sharp bodies, after puncture of the bladder for urinary retention, as in retroflexion of the gravid uterus, or in attempted vaginal puncture of an ovarian tumor; further, after vesical lithotomy; the bladder has also been injured in amputation of the neck of the prolapsed uterus, also in ovariotomy, and in attempts with the knife to render permeable a closed vagina.

Among the diseases of the bladder which may finally result in a fistula is, first of all, calculus; further also, chronic ulcerative catarrh, with the formation of diverticula; then malignant carcinomatous degenerations. Finally, disease in the neighborhood of the bladder wall has led to the formation of fistulæ: thus, perforations by pelvic abscesses or of suppurating hematoceles into the bladder and vagina, of ovarian abscesses and of extra-uterine gestation-cysts.

(There follow sections upon the anatomical relations of urinary fistulæ in women, the condition of the margins of the fistulæ, changes in distant and in contiguous organs, the formation of concretions and the symptoms; but want of space compelling their omission, we pass directly to the diagnosis.)

Diagnosis.—If a woman, after a difficult labor, or if one suffering with carcinoma, upon whom a surgical operation upon the internal genitals has been performed, as the removal of the vaginal portion by the écraseur or by the galvano-cautery, complains of any difficulty in micturition or only of painful desire to urinate, a thorough examination of the genitals should be made. It is possible that upon palpation with the finger a contused part of the vesico-vaginal wall or of the anterior wall of the still gaping cervix may at times be recognized as especially painful, thus really anticipating the formation of a fistula; but I know of no instance of this recorded in the literature. Usually, the physician as well as the patient is surprised by the suddenly occurring, involuntary discharge of urine, and is met by the by no means always easy problem of accurately ascertaining the situation, the size, the complications of the fistula. If the fistula be no larger than a centimeter in size, and its situation upon the anterior vaginal wall between the orifice of the urethra and that of the uterus, digital exploration alone suffices at once to recognize the fistula, and the introduction of a catheter from the bladder through the fistula is a proof of the accuracy of the diagnosis. The recognition is far more difficult if the fistula is small and lateral in situation, for instance, if it be situated in the depth of a cut from the forceps. The finger cannot enter the cut, nor the sound through it the bladder, nor the catheter the vagina through the bladder. In such a case, and in that of minute, hair-like fistulæ upon any portion of the vesico-vaginal septum, the bladder should be first emptied by the catheter and an examination made to determine whether the urine is bloody or not, if the bladder contain urine at all. Should no urine be obtained, the patient is directed to pass none for one or two hours, a dry napkin is placed under her, this subsequently examined, the catheter again introduced and the urine analyzed quantitatively and qualitatively. If a diagnosis cannot yet be made, the patient is

placed in the dorso-coccygeal position, Simon's duck-bill speculum introduced upon the posterior vaginal wall, the mouth of the uterus exposed and finally plugged with a piece of white cotton, which shall remain visible between the lips; now by means of Hegar's funnel from one-fourth to half a liter of dark-colored fluid is allowed gradually to flow through a perfectly clean catheter into the bladder; then an examination should be made to determine whether and at what point the fluid escapes through the anterior vaginal wall; as soon as this point is found it is caught by tenacula and an attempt made to pass a sound through it into the bladder. The fluid may be milk or a solution of permanganate of potassium. It is self-evident that the vaginal wall must be perfectly dry, so that the least amount of fluid can be seen. Should not a drop escape into the vagina, there can be no vesico-vaginal fistula. If the fistula be vesico-uterine, the plug upon removal is found discolored, and the colored fluid passes out of the os uteri. The size and situation of such a fistula can be more accurately ascertained by dilating the os, drawing down the cervix or incising the commissures and examining the inner surface of the cervical canal with the eye. If the fluid injected into the bladder pass neither into the vagina nor from the os uteri, and the involuntary escape of urine, after completely plugging the urethra with a bougie, be confined by collecting in a clean porcelain vessel and examining the escaped fluid particularly for the presence of urinary salts, there can only be a uretero-vaginal or a uretero-uterine fistula. In the former there will be seen by the side of or behind the vaginal portion a small slit or a button-like prominence, with an opening into which a sound can be introduced more or less deeply, and it will be recognized, especially by shifting the specula, that from this opening a clear fluid escapes with varying intensity and in varying quantity. If the ureter opens into the cervix, the fact is known by the escape of urine from the os, and the non-escape of colored fluid injected into the bladder. If there be stenosis of the vagina, the narrowed portion must be first dilated with the colpeurynter or with tents or, after incision of cicatrices, with Simon's urethral speculum, and then the finger introduced. Simon recommended rapid dilatation of the urethra, and pal-

pation with the index finger. In this way it may be ascertained whether other organs communicate with the bladder, as the ovaries, the vermiform appendix or the small intestine.

The fistula having been found, and its exact seat determined, the condition of its margins, their fixation, tension and direction are to be ascertained, and the relations of the uterus and whether or not several fistulæ are present considered. In difficult cases, not one but repeated examinations must be made, the patient, if very sensitive, being chloroformed. In accordance with the situation and relations of the fistula, the patient may be placed in the dorso-coccygeal, the genu-pectoral or the left lateral prone position. Thoroughness of examination is necessary for accurate prognosis, as well as for the application of the appropriate remedies.

[The editor wishes to add one word upon the diagnosis of uretero-vaginal fistula, derived from his experience in a case under his care some twenty-three years ago,* and upon which he operated successfully. The means of diagnosis referred to by Professor Winckel were employed, although I was working out a problem entirely new to me, for there was no literature upon the subject at my command. But in addition to those means I had saved all the urine that escaped spontaneously in a given time, two to three hours, and compared this quantity with that which collected in the bladder during the same period: the quantities were essentially equal, and hence the probability that they came from similar sources, that is one quantity from one kidney, the other from the second. The fistula had originated in an instrumental labor fourteen years before the patient came under my care.]

Prognosis.—Urinary fistulæ always belong to the group of severe maladies, because they not only materially affect the health of the patient during their continuance and make her condition a most uncomfortable one, but are also permanently prejudicial constitutionally. Spontaneous cure may sometimes occur, but this is very rare in proportion to the number of fistulæ. Their is greater probability of such cure after a clean incision

* See *Western Journal of Medicine*, 1867.

than if the tissues have been bruised. Spontaneous cure will depend upon the situation of the fistula, the direction of its axis, the tension of its margins, as well as their thickness and vitality; besides, complications, as inversion of the mucous membrane of the bladder, etc., have an important influence. As to the prognosis of the individual varieties of fistula, it would *a priori* be expected that the lowest, because most easily accessible, would be the most readily cured. This is, however, by no means always the case. Simple urethro-vaginal fistulæ have sometimes been quickly and certainly cured: by Peccholi by cauterization with nitrate of silver, also by Da Costa Duarte, by Hobart by cauterization and suture, and by the author by suture. Of greater gravity are the injuries of the lowest portion of the bladder with involvement of the urethra. Not only is the urethro-vaginal wall much thinner than the vesico-vaginal, but to maintain continence in the operation the structure must be preserved, because the thickness of the muscular layer and of the wall diminishes from above downward, and with this the danger of incontinence increases (Simon). All authors have not been of this opinion, but it is the result of experience. On the other hand, many have considered fistula seated below the ureters, that is, at the entrance of the ureters into the bladder, as well as uretero-vaginal fistulæ, as the most unfavorable. This, however, is not always true, as Simon has shown. The first are entirely curable, and the isolated uretero-vaginal fistulæ also in large part.

In all, according to the most recent statistics of Boqué, 60 fistulæ of various kinds healed spontaneously; 109 were cured by cauterization; 25 of 34 by immediate secondary union; and 463 out of 639 by suture. Though the number of recoveries appears considerable, still there are more than one-tenth of all cases which, even in the best hands, are not to be cured; further, very many of those cured were operated upon not once, but several times; many operations have failed, though done by the most skillful operators, as Jobert, Bozeman, Simon, B. S. Schultze, Baker Brown, Schuppert, Courty, Spiegelberg, de Roubaix, Follin, Andrade; many, also, have at once been declared incurable on account of the loss of substance and the destruction of the urethra; even if the operation has been successful, continence

does not always follow, the urine escaping when the patient is walking or standing; in addition to all this, under certain circumstances the operation itself is dangerous, particularly when in the vicinity of the peritoneum, so that, with the best operators, death may result (Simon 4.4 per cent., also individual cases of Roux, Jobert, Dieffenbach, Follin, Spiegelberg, Schuppert, Sims, Heppner, Küchler, Courty, Wilms and others); so one must be careful in judging of a fistula, and avoid making too favorable a prognosis. It must not be forgotten, too, that in the various attempts at relief, whether with the cautery or with the knife, the condition of the patient may be made worse by the fistula being made larger, and this not only by inexperienced practitioners but also by the best. As an example, in case No. 2 (Simon, No. 10), operated on for the second time by Bozeman in conjunction with Simon, a fistula between the size of a lentil and a pea remaining after Simon's operation, after Bozeman's became large enough to pass the finger through. Finally, in determining the curability of fistulæ, it is to be remembered that many of them can only be closed by operative measures in consequence of which the patient will always be sterile, in that the posterior lip of the womb is stitched so as to close the opening or the vagina is transversely obliterated. At times, after transverse obliteration of the vagina, as well as in consequence of great stenosis, satisfactory cohabitation is no longer possible. Even after these operations the sufferings of the patient are by no means always removed, but death may follow, from intercurrent calculus formation, cystitis and pyelitis (Case 2 in Simon's concours), despite a successfully completed operation. The causes of death in patients not operated on are local or general: local inflammatory processes, peritonitis, ulcerations, general exhaustion, gradual loss of strength or tuberculosis. In the cases in which a fatal issue followed operations for fistulæ, death resulted from injuries of the peritoneum with peritonitis (Spiegelberg, Simon, Bozeman and others) or from pyelitis or from septicemia in consequence of suppuration of the connective tissue between the bladder, uterus and rectum.

On the other hand, however, after successful operations, even very weak, reduced patients often recover in a short time, to

such a degree as to be scarcely recognized, and it has repeatedly been observed that the distensibility of the bladder gradually becomes greater even though the cured fistula was quite a large one. After the cure, should conception take place, pregnancy, labor and lying-in may be quite normal if too extensive stenoses be not present. Recently, the favorable results of German authors, Simon, Hegar, B. S. Schultze and Spiegelberg, have risen to 85–90 per cent. of cures, while the mortality after operations is scarcely 2–3 per cent.

Treatment.—(In the first part of this section Professor Winckel urges the importance, in all recent cases, of first endeavoring to facilitate spontaneous closure of the fistula, and mentions various means that have been successfully used for this purpose. Among these are the continuous use of the catheter, position of patient, tamponing the vagina, pessaries, pressure of a dilated rubber bag or of a pig's bladder in the vagina. Next, the cure by cauterization is presented: he quotes Bouqué, an advocate of trial of this method, who says that the bloody operation should not be employed until after the futility of cauterization has been ascertained. In reply, Winckel states that the opinion of German authors is that in large fistulæ cauterization is quite useless—that severe cauterization, especially with the actual cautery, may, besides, often be directly injurious, in that the fistula frequently is made larger, and its borders over a large extent changed into firm, unyielding cicatricial structure; further, that a favorable result from cauterization can be expected only under certain definite conditions; in the smaller openings, and in such with margins granulating and not too thin; thus in recent fistulæ in childbed, or in minute fistulæ, which remain as openings in the line of union, or as thread-like perforations after an operation. Should cauterization not speedily accomplish the desired end, in Germany it is soon desisted from, as it lessens the chances of success of a subsequent bloody operation (Hegar). Next, a history of the application of sutures in the treatment of urinary fistulæ is given. As far as the age of the patient is concerned, Simon successfully operated upon a girl eight years old, and operations upon women more than sixty years old, as well as during menstruation and

during pregnancy, have been successful, though in the last premature labor has in some cases followed. Contraindications for operation are, besides carcinoma of the vagina and of the uterus, conditions of exhaustion in which a fatal result would soon occur independently. It is advisable not to defer the operation longer than six or eight weeks after delivery.

Preparatory treatment is next considered. Professor Winckel states that in most cases this is not necessary; a special preparation is not necessary when there are not extensive cicatricial bands or numerous ulcers in the vagina and at the vulva, and even then, in the first instance, according to Simon's experience, in numerous cases preparatory measures are best directly associated with the operation. Winckel presents Bozeman's plan of treating cicatrices in preparing for the operation, adding that it has received the approval of other eminent operators, as Bandl, Massari and Pawlik. Irrigation of the genitals, warm baths, good nourishment for improving the patient's constitution, and repeated careful examinations are the only preparatory measures yet to be taken.)

[It seems best to the editor to add here an abstract of Emmet's directions as to preparatory treatment, for his vast experience and his great success in operations for urinary fistulæ give his opinions especial force; he probably is regarded by Americans, if not by all others, as without a superior—possibly without a peer—in successfully operating upon the most difficult cases of these injuries.

Emmet remarks that "Unless the greatest care is given to cleanliness, a woman will become a great sufferer and a most loathsome object in a few weeks after receiving this injury." He then refers to excoriations and œdema of the external genitals, of the buttocks and of the thighs from the irritating urine, to the frequent ulcerations and occasional abscesses of the labia, to the abraded surfaces in the vagina covered with a sabulous and offensive phosphatic deposit. This deposit is, so far as possible, gently removed with a soft sponge, and the raw surfaces brushed over with a weak solution of nitrate of silver. Frequent warm sitz-baths are used, and the vagina is washed out several times a day with large quantities of warm water. In

connection with the latter, he mentions the fact that two women were admitted to the Hospital shortly after fistulæ had formed from injury in labor—usually patients do not come until several months after the lesion has occurred—and in each the fistula, though large enough to admit the finger into the bladder, healed with no treatment but the warm-water injections, thus rendering an operation unnecessary. After the sitz-baths or the injections, the parts must be thoroughly dried, and protected by anointing the outlet of the vagina and the neighboring surfaces with some simple ointment of a proper consistence. "The urine is almost always phosphatic and must be kept in an acid condition, or there will be no local improvement." For this purpose he generally uses the following mixture: "two drachms of benzoic acid and three drachms of borax to twelve ounces of water, of which a tablespoonful, further diluted, should be given three or four times a day. After the urine has become acid the dose must be reduced to the smallest quantity by which the acidity can be maintained, so as to avoid deranging the digestion. At the same time diluents must be employed, so as to render the urine less irritating. About every fifth day the excoriated surfaces yet unhealed should be protected by an application of nitrate of silver. It is often necessary to pursue the same general course for many weeks before the parts can be brought to a healthy condition." This state is not reached until not only the vaginal wall but also the hypertrophied and indurated edges of the fistula have attained a natural color and density. "This is the secret of success, but it is one that is rarely appreciated, and yet without it the most skillfully performed operation will most certainly fail."

"Upon now examining the fistula, if only slight and superficial bands of adhesion are found, they may be divided at the time of the operation, but when the tension is due to extensive sloughing, or when the posterior cul-de-sac has been destroyed, the parts can seldom be properly freed without more or less hemorrhage following, and it will be necessary to do one or more preparatory operations." Cicatrices are divided with blunt-ended scissors, two fingers of the left hand being placed in the rectum as a guide, and a sound held in the bladder by an assistant,

if necessary. After this, one of Sims's glass vaginal plugs introduced into the vagina and retained by a T bandage. "It is remarkable how much absorption of the cicatricial tissue takes place in a few weeks, when judicious pressure has been maintained by this instrument. Scissors are much to be preferred to the knife in dividing these bands." "As soon as suppuration begins the plug will become loosened, and it will then be safe to remove it. At once injections of warm water with a little old Castile soap added must be employed, and frequently if the discharge becomes profuse. After the parts have been properly healed, if necessary, the operation for enlarging the canal must be repeated until the object had in view has been attained."]

The patient may be placed either in Simon's or in Sims's position. In the former, the dorso-coccygeal, the patient lies upon her back, the pelvis being somewhat higher than the abdomen, and in the latter, upon her side. Anesthesia is not always necessary. Jobert and Simon exposed the fistula by dragging down the uterus, while Sims and Bozeman do not change its position, but operate in situ. All operators with a flat or guttered speculum draw back the posterior vaginal wall first, and then separate the lateral walls by retractors. If the patient is in the dorso-coccygeal or in the lateral position, and the anterior vaginal wall below the fistula bulges, it is lifted up by one of Simon's vagina supporters, or with a single or a double tenaculum it is drawn down so that the stretched fistula is plainly visible. If the upper margin of the fistula is high up near the uterus, each of the lips of the uterus is drawn down by a tenaculum, or a couple of strong silk sutures are passed through them, knotted and given to an assistant to hold. The drawing down is to be omitted if the uterus is fixed by cicatricial bands, or if preceding inflammatory symptoms render probable the existence of adhesions. Dislocation of the uterus is entirely unnecessary if the fistula is small and the vesico-vaginal wall readily movable. It is of especial importance that the extremities, the edges and the angles of the fistula should be found and exposed; a failure occurred in one of Simon's operations from incomplete closure. Various measures have been proposed to avoid this. The long tenaculum forceps of Simon and of Mathieu, however, or the

tenaculum forceps of Roser and Simon, or single and double tenacula will be sufficient, and more complicated apparatus may be dispensed with. For the same reason the various specula devised to lessen the number of assistants in these operations have not met general acceptance. If strong cicatricial bands prevent the exposure of the fistula, they must be incised or divided.

Having exposed the fistula, its margins are freshened. Different operators use different instruments. Simon preferred knives, rejecting scissors because of the bruising and the greater loss of tissue. Bozeman incised the lower border of the fistula with a knife, and then completed the denudation with the scissors.

[Most American operators, following the practice of Emmet, prefer scissors, and especially such as he uses. There are four pairs in the set, but if the operator be not ambidextrous he has no use for more than two pairs, those that can be used with the right hand. If he has these and two Sims's tenacula, he has all the instruments he needs in most operations for freshening the fistulous margins. If a doctor were to buy all the instruments that have been invented for the operative treatment of urinary fistulæ in the female, he would find himself encumbered with many useless articles].

In the denudation it is sought to secure a broad, smooth, vascular border, free from cicatricial tissue, and here the question arises as to whether artificial freshening is to be preferred, avoiding the mucous membrane of the bladder (the American method), or deep oblique, without regard to the mucous membrane of the bladder (after G. Simon). By the first method bleeding into the bladder is avoided. Hegar prefers the flat funnel-shaped freshening to the steep oblique when the margins of the wound contain cicatricial tissue, and claims that less tissue is thus sacrificed than when the steep oblique method outside the cicatrix is employed.

In order that the denudation may extend a uniform distance from the margins of the fistula, the portion of the vaginal mucous membrane to be excised should be outlined with the point of the scapel. At the same time it is to be determined whether the union can be most readily made transversely, longitudinally or

obliquely. Should the vesical mucous membrane prolapse through the fistula, it must be replaced and held back before the operation is begun. This may be done by introducing into the bladder a sponge having a thread attached, or by retaining the part with a sponge in a sponge holder in the hands of an assistant. A catheter as thick as the little finger may be introduced into the bladder and used to press the entire fistula toward the instruments of the operator, and to make it tense; this is best in small fistulæ. The lower margin of the fistula is now incised about 1–1.5 centimeters from the opening, and the borders are uniformly freshened, an assistant irrigating the wounded surface with a 3 to 5 per cent. solution of carbolic acid. Spirting arteries are caught by hemostatic forceps, twisted or at once tied. Most to be feared is the large vesico-uterine artery which, passing by the side of the cervix and of the vagina, is sometimes as large as a crow quill. Should it require to be tied, the ligature may be passed through the wound, as Simon has shown that primary union is thus not necessarily interfered with. Before suture the smaller divided arteries, compressed or tied, are cut off short and included in the suture. Those of medium size may be secured by sutures parallel to the wound.

There is no doubt that in the denudation a ureter may be divided when the fistula is not small and is situated at the side. This would be recognized by the escape of urine from a small opening into which a sound can with facility be pushed backward and upward for a considerable distance. Of course it must be endeavored to bring the opening of the ureter into the bladder by placing the suture below it. If the ureter be fixed in the border of the wound, it should be slit up toward the bladder, and the flat, funnel-shaped denudation extended about its opening to secure sufficient uniting tissue beneath it. The vesical mouths of the ureters, according to the statement of Simon, correspond to a point in the vagina about one centimeter externally to the outer border of the os uteri and about one-fourth of a centimeter in front of it, and Simon has operated upon a large number of fistulæ situated at or extending to those points, but has never observed a symptom that would certainly indicate closure of the ureter, nor frequently seen openings form at the place in ques-

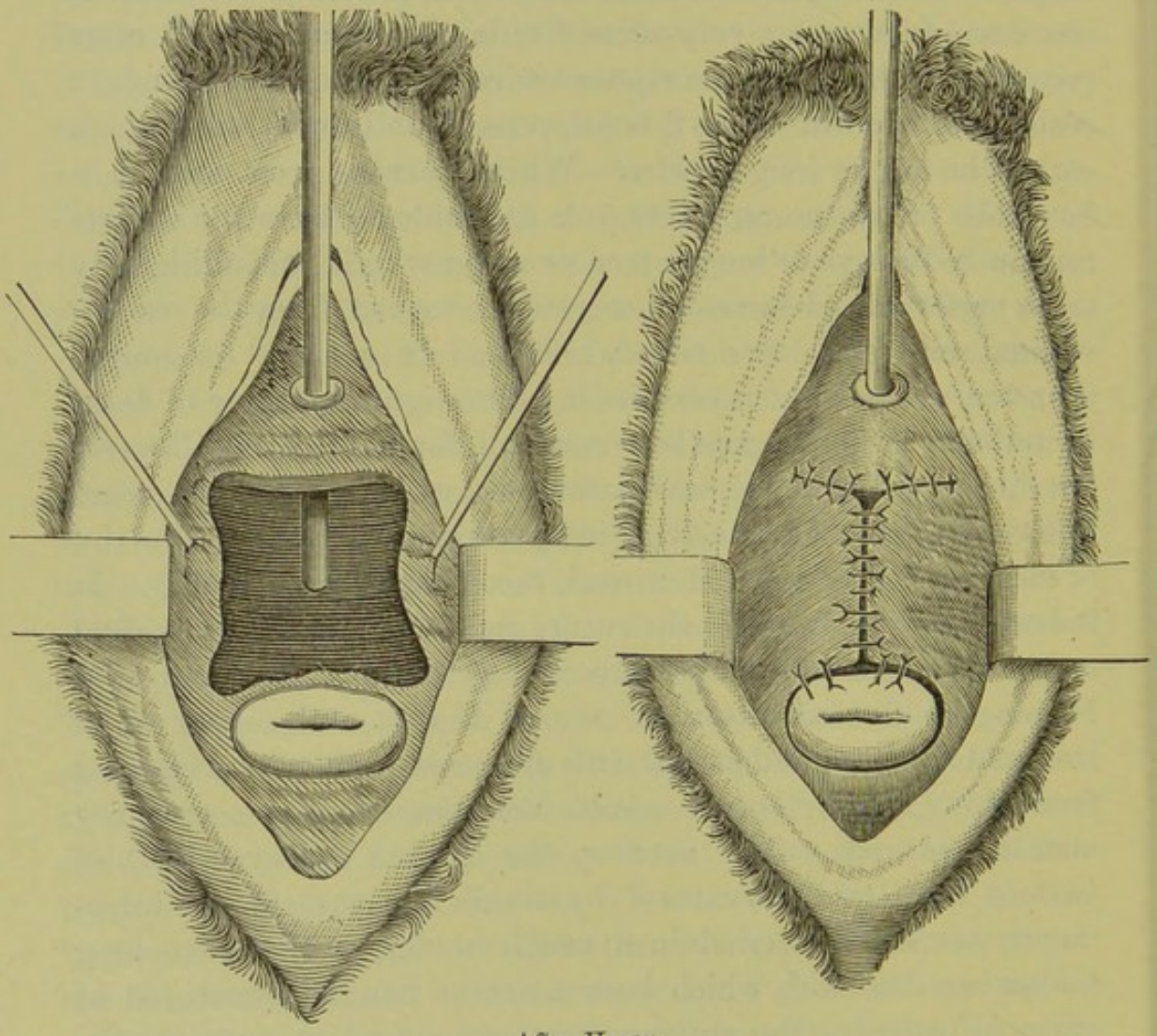
tion. The ureter in these cases was either not included by the suture or not occluded by it, or the suture cut through the ureter so quickly that any obstruction of urine did not long persist.

The border of the fistula having been completely prepared, the question arises what sort of suture to use. Each eminent operator naturally commends that which he has used, thus, Simon thin Chinese silk, Sims silver wire, as do also Bozeman and Hegar. I have used for suture silk, silver and iron wire, and in one case of long, not very tense fistula catgut, and in all cases recovery resulted. Simon rejected wire because a calculus might readily form on it. But this happens equally with silk, which cannot be left as long as wire. Where there is great tension, a large loss of substance, where it is desirable to have the sutures remain 8–10 days or longer, iron or silver wire is unconditionally to be preferred. I have but recently removed from the vesico-vaginal wall some iron wire which had been there for longer than ten weeks without occasioning the slightest degree of local irritation. A most excellent material for sutures is silkworm gut,* or fil de Florence, which for the last seven or eight years I have used almost exclusively in operations for fistulæ. Worthy of mention yet is seaweed thread, recommended by Müller. It is best, however, to select the suture according to the individual case; various kinds may be used together, as wire and silk. Pippingskjeld used alternate sutures of iron and copper or of iron and silver, placed at intervals of one centimeter, and claimed from this galvanic suture results not secured by the ordinary metallic sutures. The needles, the curved (Oehrnadeln) of various sizes and curvatures by which the sutures are introduced, are either carried in a needle-holder, or there are long hollow needles with which both margins can be punctured at once. Formerly, the sutures were introduced at varying distances from the margin of the wound, the more remote being called retention, the nearer uniting sutures, but now all are placed at equal distances, 4–5 millimeters from the margin. The

* A year since, while in Munich, I saw Professor Winckel close a fistula which was so large that sixteen sutures were used, all of which were of silkworm gut.—T. P.

stitches are inserted 3–4 millimeters apart; if the denuded surface is considerable in extent it is not necessary to include the mucous membrane of the bladder in the suture; Simon did so generally, but not always, while Sims and others avoided it. Before closing the sutures the surface must again be sponged and irrigated with cold water, so that no coagula or other foreign

Fig. 143. Fig 144.



After Hegar.

bodies remain between the surfaces to be united. In fastening the sutures union may follow in a transvere, a longitudinal or an oblique direction. Simon united the margins in the direction corresponding with the long diameter of the fistula. In triangular longitudinal fistula, with the base at the urethra and the apex at the mouth of the uterus, and in large quadrangular losses

of substance, he effected closure by making a T- and a $\overset{T}{\wedge}$-shaped lines of union. He regarded it as a disadvantage of Bozeman's method that, on account of the lateral stretching of the vagina, the fistula was always united in a transvere direction, and that other modes of plastic union, besides stretching the borders, had to be invoked.

In fistulæ deeply seated, and in such as cannot be well brought down, knotting the silk sutures is not always easy, and it may happen that the thread slips before the knot is tied. That is not possible in fastening wire sutures. Bozeman uses a plate of lead, and the wires are secured by perforated shot, a method too complicated, and giving no better results than simpler means.

When all the sutures have been fastened and their ends cut off short, the bladder is evacuated by the catheter, and then irrigated with a weak solution of salicylic acid; thus it can be ascertained if the union is so perfect that not a drop escapes into the vagina. The omission of this test may render necessary a repetition of the operation. The after-treatment has been greatly simplified by Simon. The patients may pass urine according to necessity, and many, if otherwise strong enough, get up and go about, and on the fourth to the fifth day—if silk sutures have been used, otherwise later—may go to the operating ward and mount the table to have the sutures removed. The catheter is used only if the patient cannot urinate. On the other hand, Bozeman pursues a much more active plan; an elastic catheter remains in the bladder, which is washed out several times a day, and large doses of opium are given. According to my experience, the very simple after-treatment is greatly to be preferred. Injections into the vagina are only necessary in case of offensive discharge. Easily digested food and daily evacuation of the bowels are requisite. Silk sutures, as has been stated, are removed on the fourth to the sixth day, those of wire after the eighth day. Abraded parts are touched with nitrate of silver. If any small openings remain, closure may be attempted by cauterization, but if this fails another operation may be done in 3–4 weeks.

This is the method which in the majority of cases of urethro-vaginal and vesico-vaginal fistulæ leads to the desired result.

Special directions, however, are now necessary for vesico-uterine and uretero-vaginal fistulæ.

In superficial vesico-utero-vaginal fistulæ the anterior lip of the uterus is denuded and sutured to the lower border of the fistula, consisting of vesico-vaginal, or even of urethro-vaginal wall; while in deep vesico-utero-vaginal fistula the posterior lip is made to fill the gap, and the woman is thereby made sterile. Hegar, however, has recently several times succeeded, after denuding even very slight remnants of the anterior cervical wall, in uniting the margins of the opening in a longitudinal direction.

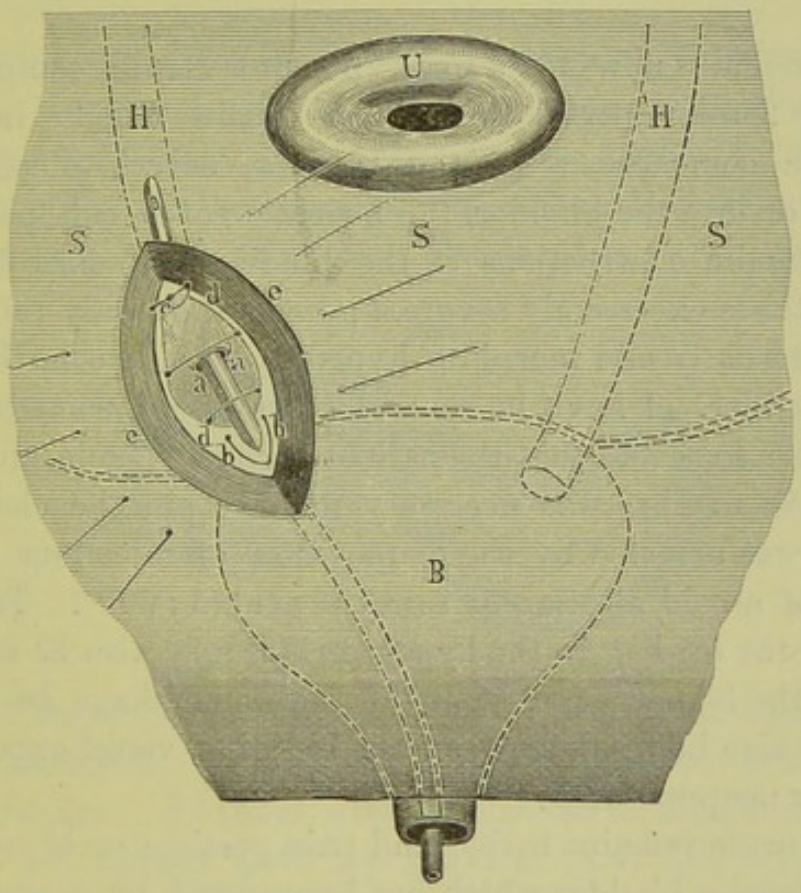
In vesico-uterine fistulæ, if after dilatation of the cervix cauterization does not close the opening in the bladder, the cervix may be split on each side, the anterior lip drawn down, and after excision of the borders of the fistula the opening closed with sutures. Should these means fail, the inner surfaces of the lips are freshened and united by sutures: hysterokleisis, an operation first performed by Jobert.

Simon's method of treatment of uretero-vaginal fistula was the following: An opening is made into the bladder where the ureter empties into the vagina; through this artificial fistula a sound from the bladder is introduced into the ureter; upon the sound the uretero-vaginal wall is slit up from the bladder a distance of 1–1½ centimeters; the margins of the slit are daily separated with a thick sound, until cicatrization has taken place Subsequently the vaginal fistula, which is at some distance from the new opening of the ureter, should be denuded and united in a longitudinal direction.

Bandl has quite recently operated upon uretero-vaginal fistulæ in the following manner: A catheter is introduced into the bladder and, through an artificial fistula made from the ureteral opening toward the bladder, into the ureter, and the original opening closed over the catheter. Like G. Simon, he entirely ignored the lower termination of the ureter; at the same time he has in this way obtained complete recovery in two patients who had several times been unsuccessfully operated upon. Schede, however, considers the procedure of Bandl questionable, on account of the subsequent cicatricial narrowing and inclusion of the ureters. He therefore first surrounded the artificial fistula

with vesical mucous membrane, to guard against subsequent narrowing, and in such a way that the mouth of the ureter constituted the most external and posterior portion of the artificial fistula. This double fistula was afterward so denuded that at its immediate circumference a strip of vaginal mucous membrane, 3–4 millimeters broad, remained intact. In this manner the margins of the fistula covered with intact mucous membrane

FIG. 145.



Operation for Uretero-vaginal Fistula, the Patient in the Knee-chest Position.—*After Bandl.*

SS, vaginal surface; B, bladder; U, vaginal portion; H right, 'H, left ureter opening at or into the vagina; bb, artificial opening, at a, into the bladder.

were turned into the bladder, and here formed a deep, half-canal entirely covered with mucous membrane, into the external extremity of which the ureter opened. Schede successfully relieved one patient by this method.

Finally, in uretero-uterine fistulæ, B. Credé and Zweifel have extirpated the corresponding kidney on account of the involuntary discharge of urine.

(In the treatment of uretero-vaginal fistulæ, I have omitted Winckel's description of the method proposed by Landau, a method which has nothing to commend it, that of Simon or that of Bandl being much preferable. So, too, there are omitted the methods of performing kolpokleisis, or obliteration of the closure of the vagina, in case the loss of substance of the vesico-vaginal wall is so great it is impossible directly to close the fistula. Winckel regards it best in such cases to make a recto-vaginal fistula, and then to close the urethra and vagina or the entire vulva.)

There remains now only a word upon unfavorable complications following fistula operations. These consist chiefly in violent spasmodic contractions of the bladder, severe bleeding per vaginam or into the bladder, the formation of calculi, peritonitis. The spasmodic contractions of the bladder may last 3–4 days, are sometimes excessively severe, and generally only relieved by opium internally and morphine hypodermatically over the region of the bladder. I have in several cases seen hemorrhage into the bladder so severe that the patient became anemic, and dilatation of the urethra was necessary to evacuate the clots. The bleeding was arrested by the employment of injections into the bladder of a cold solution of salicylic acid (1 : 600). The application of the ice-bag to the hypogastrium may also be employed to check the hemorrhage. Should the hemorrhage be vaginal, cold may also be tried, at worst the bleeding vessel exposed and ligated or acupunctured.

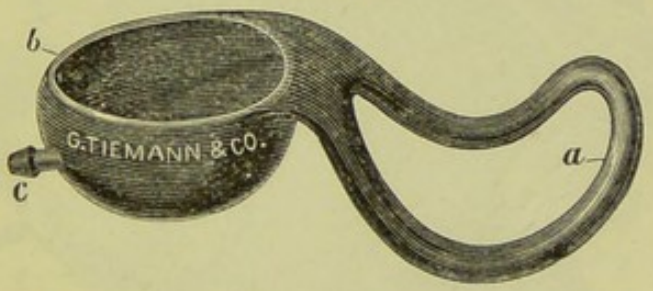
If the urine remains turbid and pain persists, or blood be discharged from a bladder which has been closed by operation, the urethra must be dilated, solid bodies found in the bladder crushed and extracted by the forceps, and for some time the bladder washed out. Peritonitis may occur after the operation, in consequence of exposure of the subserous connective tissue, of incision of the peritoneum or its inclusion in the sutures; but the results of suture of the peritoneum in ovariotomy teach that other unfavorable conditions, as infection or formation of an abscess in the vicinity of the peritoneum, must be added, else peritonitis does not follow such lesions; but should this arise it is to be treated by opium internally and the application of an ice-bag to the abdomen.

Should complete or partial incontinence of urine persist after successful closure of the bladder an endeavor must be made, as Hildebrandt did, to afford relief by cold vaginal douches or by tampons impregnated with salicylic acid or by the introduction of the pessaries recommended by Schatz. Patients who will not consent to an operation or who have been operated upon unsuccessfully may wear a urinal, which, however, is at times very troublesome and unpleasant. [We present below the urinal devised by Skene, which in some cases will prove quite useful.]

2. *Communications of the Bladder with Neighboring Abdominal Organs.*

Besides these urinary fistulæ which empty into the genital canal, there is a class of injuries of the bladder in which its cavity is placed in communication with neighboring organs. The abnormal openings in the bladder generally result from

FIG. 146.



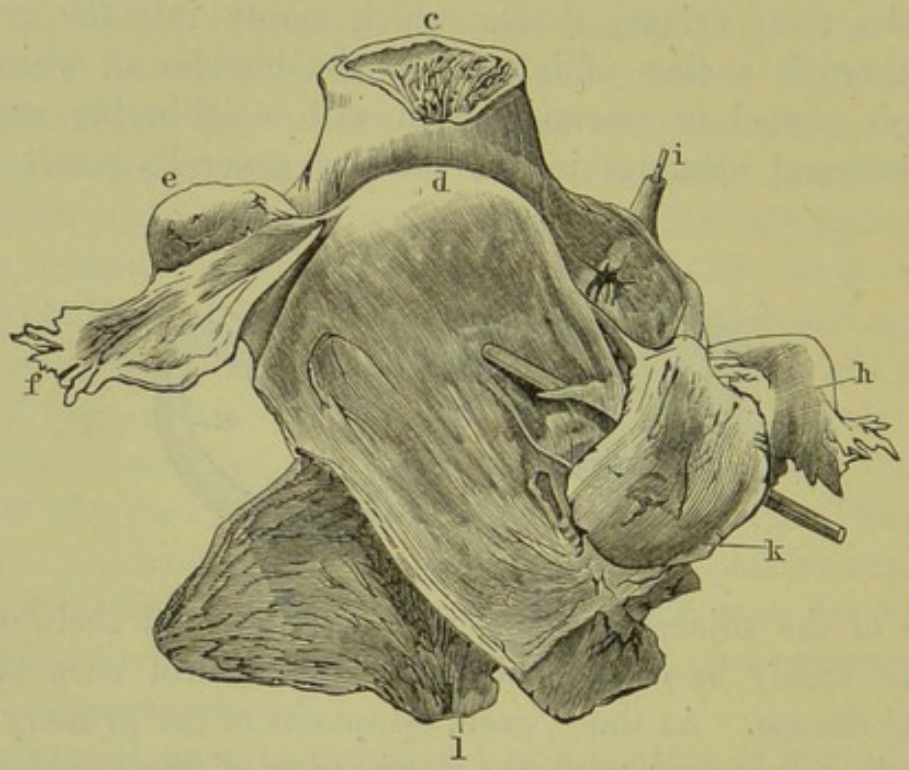
disease of the adjacent organs, as ulceration, and their origin may not rarely be considered a kind of natural cure of the original disease. At times, even, symptoms of the primary condition do not appear until the perforation of the bladder has been begun or completed, so that the disorders of the bladder constitute the first symptoms of the disease of the neighboring organ, and until the end remain the most important. The bladder may be in abnormal communication with an ovary, with the cavity of an ectopic gestation cyst, with the rectum, with the small and with the large intestine, even finally with the stomach and with the gall bladder.

Perforations of the bladder by ovarian cysts are not very rare. When only fluid passes from the cystoma into the bladder—pus, serum or colloid fluid—after evacuation with the urine the latter will remain abnormal so long as the communication persists. If

the pressure from the cyst is slight, the opening will close, and at most there will remain for a time dysuria and a catarrhal condition of the urine. Bennet's case is an example. The condition is different if the material which passes from the cyst into the bladder is firmer. Thus, hair, masses of fat, and teeth have been found. O'Brien, Civiale, Robert Lee, Humphrey, Blackman have removed from the bladder moderately large calculi of which the nuclei were teeth.

The perforation of an ectopic gestation cyst and the entrance

FIG. 147.



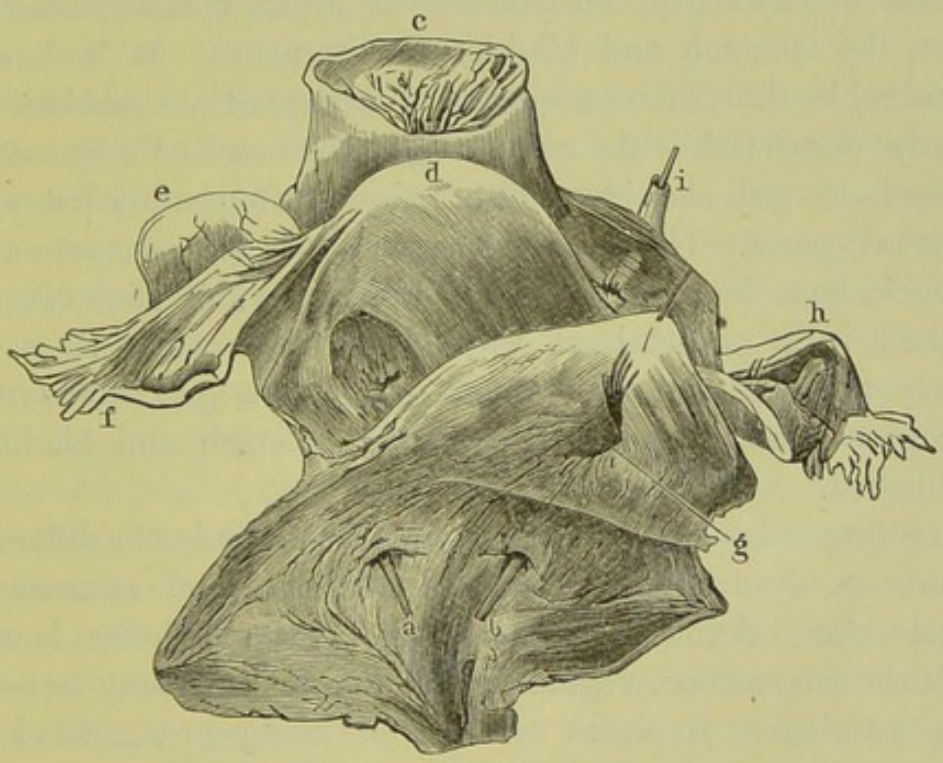
Dermoid Cystoma of the Left Ovary Adherent to the Posterior Wall of the Bladder. e, right ovary; d, uterus; i, left ureter; h, left, f, right tube.

of its contents into the bladder may occur as a result of inflammatory and suppurative processes in the interior of the sac and in adjacent parts. As soon as there is a communication between the bladder and a fœtal sac, the parts of the fœtus may thus pass out through the bladder. This way of removal is much rarer than through the rectum. Up to 1856, Giessler was able to collect only six cases of so-called secondary vesical pregnancy. The first case was observed by Ebersbach in 1714.

Abnormal communications between the bladder and the rectum

are very rare in females. The development of such a condition is usually owing to abscesses in the true pelvis or in its vicinity, which open into the bladder as well as into the rectum. Sometimes the site of the perforation and the connecting sinus are such that, while urine can enter the intestine, fæces cannot enter the bladder, so that a true urinary fistula, namely, a vesico-rectal fistula, exists. Von Eble's case is an example of this: Suppurating psoitis occurred in a girl twenty years old; 4–6

FIG. 147.



Bladder Opened.
a and b, sounds in the ureters; g, opening of the cystoma of the left ovary into the bladder.

weeks after the beginning of the disease, blood, pus and urine were passed by the rectum; no urine was passed in the natural way until, with the decrease of the discharge from the rectum, the urine again passed through the urethra. If, as in the case of Giessler, the communication between the rectum and bladder is extensive, the rectal contents may pass into the bladder, and the formation of calculi result. The patient of George Glen had pelvic inflammation following a difficult labor; fourteen months

after, intestinal gases and fæces passed out of the urethra, and she died a year later. At the autopsy, the walls of the bladder at the base were found thinned, and here there was an opening communicating with the rectum. An abscess, resulting from the puerperal inflammation, had perforated the rectum and the bladder, resulting in a recto-vesical fistula.

Slight adhesions may form between the bladder and portions of the intestines higher up, particularly the ileum and jejunum, and a fistula result. Thus, Van Geuns has described a colico-vesical fistula.

I am not aware of an instance of direct communication between the stomach and bladder in literature. It is, however, conceivable that, in consequence of pericystitis, a bladder enormously distended with urine might become adherent to the stomach or gall bladder, with subsequent perforation of the adherent parts. Gall stones, as well as the contents of the stomach, have been found in the bladder, which they may have reached in a roundabout way; thus, perforation of a right kidney adherent to the stomach or to the gall bladder may take place, and a canal between the stomach and bladder be established.

The diagnosis of these various vesical fistulæ is not difficult, if, as soon as dysuria occurs, careful chemical and microscopical examination of the urine removed by the catheter is made. With the microscope, vegetable and animal cells may be seen in large numbers. Remains of food—it being presupposed they have passed through the urethra—may often be recognized with the naked eye. To determine the situation and extent of vescio-intestinal fistulæ, dilatation of the urethra is absolutely necessary. The place of communication may probably be directly defined by the speculum. A long, elastic catheter is introduced by the side of the finger into the fistula, the appropriate urethral speculum passed over the catheter, and the margins of the fistula exposed by the use of short, sharp tenacula.*

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* The very ingenious use of inflation through the rectum with hydrogen gas by Dr. Noble, of Philadelphia, originally proposed and used by Dr. Senn, of Milwaukee, for the diagnosis of wounds of the intestines,

The prognosis of vesico-intestinal fistulæ is, as a rule, unfavorable. In spite of temporary amelioration and apparent improvement, in most cases patients slowly languish unto death. Direct therapeutics, however, as in the case of Dr. Heim-Vogtlin, may secure positive recovery; and in others, as in that of Dr. E. Martin, spontaneous recovery may occur. In vesico-ovarian fistulæ and in those originating from the opening of an extra-uterine gestation cyst into the bladder, the conditions are more favorable, as the fistula more readily closes when foreign bodies no longer pass through it. Moreover, in view of the result obtained by Czerny, operative treatment may be considered in these cases.

Heretofore the treatment of these lesions has been peculiarly unsuccessful. Only in the few cases in which the fistula was demonstrable in the upper part of the rectum or in the sigmoid flexure, was the fecal matter, by Amussat's colotomy, directed from the fistula, and thereby from the bladder, thus establishing a more tolerable condition. At the present time, after dilatation of the urethra, the vesical opening of the fistula may be sought by the finger, and through the speculum carefully cauterized with nitrate of silver or chromic acid. The application of the actual cautery, on account of the proximity of the peritoneum, could only be made very cautiously and very slightly.

Should this treatment fail, there remains yet vesico-vaginal section, as recommended by G. Simon, permitting inversion of the bladder, by means of which the fistula may be thoroughly cauterized, and after denuding its edges, even its closure by cat-gut sutures may be thought of. In these cases after the healing of the fistula the incision in the vesico-vaginal wall is again united.

In case of communications between the bladder and fœtal sacs or dermoid cysts, partly upon the size of the concretions, bones and calculi present in the bladder, and partly upon the size of the tumor and its prevailing tendeney to rupture will it depend

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deserves to be mentioned in this connection. Dr. Noble by this means satisfactorily made the diagnosis of a vesico-intestinal fistula, abdominal section confirming that diagnosis.—T. P.

whether dilatation of the urethra, extraction of the foreign bodies and cauterization of the cavity suffice, or whether abdominal and vesical section shall be made, and the ovarian tumor excised. Thus, in the case of Czerny, reported by Pincus, the dermoid cyst was removed by laparotomy, and the opening in the bladder closed by silk sutures; three drainage tubes were inserted in the lower angle of the wound, and although a large abscess of the abdominal wall formed and the drains discharged a sanious fluid, the patient completely recovered.

In general, in all abnormal communications between the bladder and neighboring organs the inner surface of the bladder should be disinfected by frequent irrigation with a tepid salicylated solution (1–1000), by means of Hegar's funnel, while mild diuretics are given internally, and, in case the intestine empties its contents into the bladder, the peristaltic action lessened by the moderate employment of opium and the entrance of ingesta into the bladder prevented by the simultaneous employment of astringents (decoction of cinchona, of colomba, or of rhatany). The favorable results attained by the more recent methods of intestinal suture render practicable the cure of ileo-vesical fistulæ by laparotomy, detachment of the intestine from the bladder wall and direct separate suture of the bladder and intestine, as in the previously mentioned case of Czerny; the operation for ileo-vesical fistula, however, is more difficult and more dangerous than ovariotomy with suture of a wound of the bladder.

3. *Rupture of the Female Bladder.*

A rupture of the bladder can ordinarily occur when the organ is more or less full, and a force from without or from the neighboring organs affects its walls. The greater the force the less need the distention be: a push, a blow, a fall upon the abdomen, an impact upon the feet from a height may cause rupture. The accident is rarer in women than in men; Graw, in 86 cases, found only eleven in women. Hawkins, in a woman who had received a blow upon the abdomen, found two rents in the bladder, the one 1.5 centimeters long, communicating with the abdominal cavity, and the other leading into the pelvic connective tissue. It is possible that the greater mobility of the bladder downward,

and the yielding character of the anterior vaginal wall and of the vulva furnish the female bladder greater protection from such rupture, while the narrow outlet of the male pelvis and the rigidity of the pelvic organs rather offer such strong counter-pressure that rupture is apt to occur. On the other hand, rupture of the female bladder has occurred in several cases in consequence of excessive dilatation associated with disease of the bladder wall, not rarely induced by retroversion and retroflexion of the uterus. This has been confirmed by autopsies.

Rupture of the bladder in labor has been spoken of, but no case of this kind is known to me.

In Von Doevren's case of rupture of the bladder, the entire abdominal cavity was filled with urine; in Lynn's case 9–10 pints of urine were found in the abdomen. At the place of rupture will be found exudations of lymph, softer or firmer in consistency, uniting the bladder with neighboring organs, and even encapsulating the urine from surrounding parts. That the seat of rupture is mostly upon the posterior wall near the fundus of the bladder is explained by the relative thinness of this part. The direction of the rupture may be oblique or transverse, the tear in the serous coat larger than in the mucous and muscular.

The severest manifestations of collapse follow, in the shortest time, the entrance of urine into the surrounding parts, severe pain in the hypogastric region, at times a feeling of tearing, of bursting, strong pressure of urine, without the power of voidance, a feeling of anxiety, abdominal distention, nausea, vomiting, and, with or without flow of urine into the abdominal cavity, peritonitis with clammy skin, urinous odor of the cutaneous transpiration and a small, very frequent pulse. The urine evacuated spontaneously or by the catheter is often bloody, sometimes, however, clear. If the rupture occurs in the anterior wall, urinary infiltration between it and the abdominal wall follows. In such a case peritonitis may be entirely absent; abscesses and spontaneous recovery may follow. As a rule, however, with increasing pains and peculiarly distressing urinary pressure, death occurs in a short time.

If peritonitis has already set in or other injuries have resulted as a consequence of the same violence, the diagnosis of rupture of the bladder may be very difficult. The severe urinary pressure, however, will warrant the introduction of the catheter and in any acute condition the bloody urine will suggest an injury of the bladder. A minute examination of the patient, a careful investigation of all the essential factors, especially of the condition of the internal genitals, must determine the nature of the lesion. A stinking condition of the urine would indicate disease of the bladder wall; further, the character of the urinary discharge has been an aid in diagnosis, in that, at times, after the introduction of the catheter, no urine flows until the instrument, passed through the rupture, conveys externally the urine emptied into the abdominal cavity; further, a full stream may alternate with dribbling and with intermittent emptying of the bladder. On the whole, only the picture of perforating peritonitis will be recognized, and not always can it be ascertained before the autopsy what organ has ruptured, especially not when the manifestations of sudden collapse have already been preceded by symptoms of local or general peritonitis. The question arises whether, if an acute rupture of the bladder be suspected, an attempt should be made with the catheter to find the rent, or after dilatation of the urethra to palpate it with the finger, not only for diagnosis, but especially for the institution of rational treatment. Many reasons may be adduced for and against this measure. On the one hand it may be objected that the rent again opened, the peritonitis is intensified through a renewed entrance of urine, that the patient, even without anesthesia during the dilatation, more quickly collapses, and with the employment of chloroform readily remains unconscious; further, that complete return of urine through the rent cannot be effected. On the other hand, it may be contended that the pernicious fluid can in great part be removed from the abdominal cavity by the catheter, that the placing of a drainage tubes through the rent in the abdominal cavity not only permits the discharge of the fluid from the peritoneal sac, but also of the urine accumulating in the bladder, and that all recent experience teaches how readily and how well such drainage tubes, with or without irrigation of

the peritoneal cavity with solutions of salicylic acid, are borne. Puncture of the abdominal wall would not completely drain the urine. I am therefore in favor, when rupture of the female bladder is suspected, of dilating the urethra and carefully palpating the inner surface of the bladder, which must, however, be done without the employment of anesthesia. The fatality is great. Of 97 cases of rupture of the bladder only 6 recovered, 50 per cent. died within 5 days, 30 per cent. in 5–10 days, and the remainder in 10–20 days.

If a patient with the threatening symptoms which have been described present fluctuating areas upon the abdominal wall, there should be no delay in emptying the bladder by the catheter, and then incising the parts at which the fluid can be felt, in order to afford it exit. The examination for urinary salts would make the diagnosis complete. Should sudden peritonitis or a sudden discharge into the peritoneum occur, after emptying the bladder, ice locally and opium internally should be employed, and an amelioration of the symptoms awaited. For the severe urinary pressure, irrigation of the bladder with narcotic solutions (infus. hyoscyami 5.0 : 200.0) is to be tried. At the same time, the condition and the quantity of the urine are to be observed, and when this continues foul and bloody, and the threatening manifestations have not lessened markedly in 1–2 days, the time has arrived for considering examination of the bladder with the finger. If a perforation be found and percussion reveal a large quantity of fluid in the abdomen, an elastic catheter is carefully passed through the rent, and, should a considerable quantity of fluid escape, in place of the catheter a drainage tube should be introduced, by the urethra and bladder, through the wound in the bladder into the peritoneal cavity, which may be left alone until the symptoms amend, or from time to time renewed, gradually substituting smaller ones, in case fluid still remains in the abdomen and the threatening symptoms continue. As soon as the opening becomes so small that there is difficulty in introducing the drainage tube, the attempt must be refrained from and the wound cauterized with nitrate of silver.

Puncture through the vagina for the evacuation of fluid in Douglas's cul-de-sac would only be required if the fluid were

encapsulated and threatened to suppurate. If free, that is, if displaceable through the vagina, an attempt should be made to disinfect it by injections through the drainage tube. As a matter of course, attention should be paid to the position of the uterus and to securing easy defecation. Then frequent injections of ether under the skin, which may be repeated, each time a syringeful (0.7 gram), every quarter, half, or hour, as long as the collapse is profound, will, on the one hand, aid in maintaining the strength of the patient, and, on the other, tend to lessen the sensibility to the proposed manipulations of the bladder.

CHAPTER VII.

NEOPLASMS IN THE WALLS OF THE FEMALE BLADDER.

The neoplasms which have been found in the walls of the female bladder are: polypi of the mucous membrane and polypoid hypertrophy, cysts of the mucous membrane, then papillary or villous tumors, further, fibrous tumors, fibromyomata and sarcomata, besides tubercle, and finally carcinomata.

(*a*) *Polypi and Polypoid Hypertrophy of the Mucous Membrane.*—The mucous membrane is thickened, soft, spongy, superficially rough, diffused or circumscribed, bleeds readily, is often covered with incrustations; there is serous, gelatinous infiltration, its capillaries abundantly developed, and at the surface there is a rich cell proliferation. The muscular and serous coats are also usually thickened, the first hypertrophic. Single mucous polypi of the bladder may be congenital; in the year 1875, at an autopsy upon a new-born child, I found two pedunculated polypi of this kind on the posterior wall of the bladder.

Polypi occurring singly may be as large as a hen's egg and even as large as a turkey's egg, and have occasionally been found together with uterine fibroids.

(*b*) *Cysts of the bladder wall* arise partly in the mucous membrane, besides those in the uterus. According to Fuenta, Paget has mentioned a case of dermoid cyst of the bladder. Not hav-

ing command of the original work,* I cannot state whether the cyst was really of the wall of the bladder, or whether, as is so common, a dermoid cyst of the ovary had perforated the bladder. Obscure, also, is the case described by von Campa, in which a serous cyst almost completely filled the bladder and from which were withdrawn 4–5 liters of a serous fluid, deficient in albumin, containing lactic acid. Roser has observed a case in which a large urachus cyst communicated with the interior of the bladder. Finally, the case of Wagstaffe is to be considered, in which, at the fundus of the bladder, there was a cyst, five centimeters in diameter, lined with pavement epithelium, and communicated with the left tube and with the rectum. The bladder was thereby greatly increased in size.

(*c*) *Papillomata of the bladder* occur as small and large pedunculated and flat sessile tumors, with granular, glandular, blackberry-like surfaces. Papillomata are chiefly found upon the posterior bladder wall in the vicinity of the trigonum Lieutaudii. The tumors are formed of proliferations of the papillæ; their matrix in part contains very large blood vessels and a very fine, loose and wavy connective tissue; the surface in a tumor which I extirpated consisted of stratified and proliferated pavement epithelium; in my case, too, a superficial epithelium was nowhere discernible, probably on account of the constant growth or perhaps on account of the fatty degeneration of the superficial cells. Klebs believes that, on account of the small quantity of stroma in the villi, it must be accepted that the increase in the blood vessels furnishes the basis of this neoplasm.

(*d*) Fibromata and fibromyomata of the bladder are extremely rare. Faye has described the only case of fibromyoma in a woman. The tumor, which had existed for some years, was as large as a man's head. Schatz removed a telangiectoid fibromyxoma from the posterior bladder wall.

(*e*) The only case of sarcoma of the female bladder until the year 1877, was published by Senfleben. Since that time we

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* Paget gives no description of the "cutaneous cyst" of the bladder mentioned, but merely refers to "specimen 1904, Museum of College of Surgeons."—T. P.

have come to know of several cases of primary and secondary vesical sarcoma. A case of primary fibro-sarcoma of the bladder has been described and operated upon by a female physician, Dr. Heim-Vögtlin; the patient was 56 years old, and died one year after the operation. Secondary sarcomata, extending from the vagina through the bladder wall occur rather often. Observations of this kind have been made by Ahlfeld, Bajardi, Bottini, Sönyer, Soltmann.

(*f*) Cancer is the most frequent neoplasm of the female bladder. It occurs partly as a diffuse scirrhous infiltration of the bladder in its entire extent, partly in the form of circumscribed nodules, partly finally as villous cancer. The last is the most frequent form of primary cancer of the bladder, is usually situated between the mouths of the ureters and the urethra, but also upon the anterior and upon the upper portion of the bladder wall. It forms very soft, fungous, polypoid projecting masses consisting of medullary tissue with numerous filaments and villi upon the surface, which likewise have dilated capillary vessels and an epithelial covering. It may therefore be readily confounded with polypoid fibroma of the bladder. Among seven cases of primary cancer of the bladder Heilborn found three of villous cancer, one of myocarcinoma, one of cauliflower cancroid, and one of cancroid. Förster has published two cases in which papilloma of the bladder was complicated with villous cancer.

In two-thirds of the cases of cancer of the bladder there are adhesions between the bladder and adjacent organs, especially the uterus and the intestine. Very often there are, besides, thromboses of the larger veins: the femoral, renal, the cava, the pulmonary artery. Embolism and metastatic abscesses may result from purulent, disintegrating thrombi of the neck of the bladder. Peritonitis also frequently occurs. Finally, the cancerous cachexia sometimes leads to amyloid degeneration of the kidneys, spleen, liver and intestines. In all the neoplasms of the bladder previously described almost the same symptoms gradually appear: first, as a rule, a certain pressure in the region of the bladder, then urinary disorders, at times only dysuria, at others strangury, again, even early, ischuria, sometimes also, as in the case of

Schatz, dribbling of urine. The pain is situated partly in the hypogastric, partly in the sacral region, in the loins, on the thighs, and in individual instances in the course of the urethra. If the pains have continued for some time hematuria usually appears; this may occur with all the neoplasms mentioned, and often attains a very considerable degree, so that even with benign tumors, papillomata, for example, exhausting hemorrhage may follow. The urine often undergoes decomposition, becomes offensive and ammoniacal. Alternating with the ischuria there sometimes occurs a sudden arrest of the flow of the urine, having its origin in the fact that parts of the growth or coagula have been forced into the urethra. As loose, floating parts in the decomposing urine may easily become incrusted, calculous concretions may be discharged. The long, severe pain, the great hemorrhages, the catarrh and hypersecretion of the vesical mucous membrane, the secondary hypertrophy of the bladder, the dilatation of the ureters and the secondary disease of the kidneys, which do not fail to appear in the course of these tumors, induce a cachectic appearance even in patients with benign papillomata or fibromata, and if timely aid be not rendered lead to a fatal issue by anemia, by peritonitis, or by uremia.

It is noteworthy, however, that these affections may last not only years, but decades. In our own case, for example, the duration of the disease was thirteen years, in Hutchinson's more than six years, and in Blich-Winge's nineteen years. The appetite and the digestion may long remain undisturbed. In some patients the pain exacerbates at the menstrual period, further upon movement, and particularly upon lying upon the back, then at night. In cancer of the bladder secondary nodules appear in the stomach, kidneys, lungs and liver.

The diagnosis of tumors of the bladder wall is not always easy, though now much simpler than formerly. When obstinate hematuria exists in a woman, it should never be omitted to dilate the urethra and palpate the inner surface of the bladder. The urine should first be carefully examined, especially its sediment, in which often with the naked eye broken fragments may be found, the microscopic examination of which will determine whether they come from a papilloma or a villous cancer. From

the catheter, the introduction of which may be so painful that the patient cries out, extremely rarely can the condition of the bladder wall be learned. From it may be learned only if the vesical wall bleeds readily upon contact, if it is very soft, if parts of it break off. If intact villi are found in the fragments, a villous fibroma is indicated ; cancer, on the other hand, is to be presumed if shreds of tissue more or less degenerated are found. According to Sperling, deposits of hematoidin crystals point to cancerous villi, and with them may be intermixed spheroidal rosettes of oxalate of lime. Smaller tumors cannot be accurately recognized from the vagina, and in the larger, on account of the sensitiveness and on account of the frequently lateral position, it cannot be precisely determined whether the tumor originates from the bladder wall, or between the bladder and the uterus, or at the side of the uterus, especially from the ovary. That parts from the ovary have perforated the bladder can only be demonstrated by the presence of hair or bones and especially of teeth. In all cases to accurately determine the situation, size, consistence, mobility, extension and possibility of operative removal of these neoplasms, it is necessary to make an examination with Simon's specula, and perhaps eventually with Rutenberg's illuminating apparatus. The latter is especially important if it be necessary to inspect tumors situated upon the anterior wall of the bladder. It can to-day be positively asserted that many a woman suffering with a benign neoplasm of the bladder wall has miserably died from exhausting hemorrhage who would have been saved if the beneficent method of Simon had been earlier known. If, after palpation and inspection of the tumor, the diagnosis in reference to its histological character is not positive, a small piece of the tumor may be removed by Simon's sharp spoon, Fig. 149, and a microscopic examination made. Ureteral catheterization should not be employed. Rectal examination may be employed in little girls; even in them the urethra may be dilated sufficiently to permit the introduction of the little finger, a subject to which we shall return in the description of the extraction of calculi.

Our knowledge of the causes of neoplasms of the bladder is very slight. Vesical cancer is most frequently secondary. It

occurs more frequently in women than in men. For all other neoplasms of the bladder, irritation from foreign bodies, especially fragments of stone, has been given as a cause. The various neoplasms of the bladder occur at all ages. As stated, they have been found congenitally, and they have been observed in patients between the ages of 2¾ and 64 years.

The prognosis for benign circumscribed neoplasms is good. Cancer of the bladder rarely lasts more than a year. Secondary cancer of the bladder, in 50 per cent. of cases, leads to vesico-

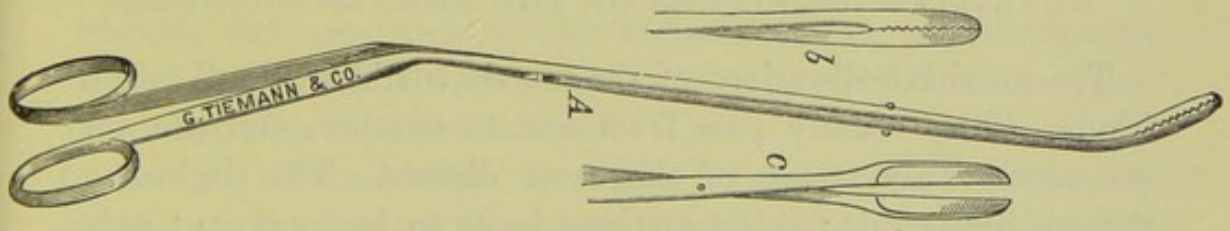
Fig. 149.



vaginal fistula. Death in cancer of the bladder seldom results from hemorrhage, but usually from uremia caused by hydronephrosis, or from septicemia in ichorous peri- or pyelonephritis, or from septic peritonitis after perforation of the bladder, or from numerous metastatic growths.

As soon as the presence of a neoplasm in the wall of the bladder and the possibility of its complete removal are recognized, the patient is to be anæsthetized, placed in the dorso-coccygeal

Fig. 150.



position, the tumor located by the left index finger introduced into the bladder, and seized with Simon's forceps (Fig. 150). The neoplasm is now twisted off, or, if hemorrhage is feared, the loop of a wire écraseur or, of a galvano-cautery is slipped over the forceps and around the pedicle, which is then cut off. If the tumor is too large to be removed in this way, the forceps and curette may be used to take it away in fragments. In flat, diffuse tumors, especially the carcinomatous, Simon's spoon may be used to scrape away as much of the villous surface as possible and to

remove all broken pieces. Severe hemorrhage is rare; it is to be treated by cold-water injections, or, as Braxton Hicks has done, by applying directly to the surface the solution of sesquichloride of iron. Further, after washing out and emptying the bladder, pressure may be made by tamponing the vagina, and an ice-bag applied over the region of the bladder.

In those cases in which the tumors and excrescences are situated so high on the sides of the bladder, or are so large that they cannot be readily reached through the dilated urethra, Simon's T-shaped incision of the vesico-vaginal wall should be made; after the removal of the growths with scissors and knife and cicatrization of the base, the opening may be closed.

When an operation is impossible, at the least by means of narcotic (hyoscyamus), astringent and styptic (liquor ferri sesquichlorati, decoc. quercus) and antiseptic (sol. acid. salicylic 1 : 500) solutions introduced by Hegar's funnel, the pains may be moderated, the offensive odor corrected, the hematuria lessened, and combined with warmth externally, and narcotics, hypodermatically and internally, make the frightful suffering more tolerable.

CHAPTER VIII.

NUTRITIVE DISORDERS OF THE FEMALE BLADDER.

The nutritive disorders of the female bladder are of various kinds. They readily pass from one to another, and are very frequently only stages of the same disease. The slightest of these is hyperemia; this sometimes leads to hemorrhage; existing for a longer time, hypersecretion is developed, catarrh of the bladder; decomposition of the urine occurring, croupous inflammation of the inner surface of the bladder results, or even through the access of recent injury, such as cannot always be avoided in catheterization: diphtheritic affections, which, involving the muscular coat and very soon also the serous, may give rise to so-called parenchymatous cystitis and pericystitis, in consequence of which, finally, abscesses, gangrene, necrosis of the wall of the bladder, may follow. In very many cases these

various stages will be found side by side in the same diseased organ, as, for example, is well pictured by von Cossy in his description of the diseases of the bladder in typhus, and also in the cases of gangrene of the bladder collected by von Krukenberg.

Studying these individual stages a little more closely, it is next found that hyperemia of the vesical mucous membrane may be acute and chronic; the mucous membrane is more or less pale red, its blood vessels—in the acute chiefly the smallest arteries—are distended with blood, its tissue is swollen. If the congestion exists for a longer time, is chronic, it leads to permanent dilatation of the smallest vessels, especially the veins, as well in the mucous membrane as in the entire bladder wall and adjacent parts. Persistent hyperemia may lead to—

Hemorrhage, rupture of the blood vessels of the vesical mucous membrane. If the tearing occur in the tissue beneath the epithelium, there appear only ecchymoses in the mucous membrane; should the blood be effused into the cavity of the bladder, it mixes with the urine and is discharged with it, or it coagulates, and the resulting clots are from time to time emptied through the urethra. Blood remaining in the bladder for a longer time disintegrates into a brown mass, resembling coffee grounds, suspended in the urine. At times a firm fibrin-clot forms the nucleus of a vesical calculus. More severe hemorrhages occur, especially in large varicosities of the neck and at the base of the bladder (see case two of Dr. Heim-Vögtlin), well-designated vesical hemorrhoids, and which develop especially in the pregnant and after repeated labors.

Catarrh of the bladder may also be acute and chronic. The changes in the mucous membrane affected by acute catarrh consist at first in great dilatation and fullness of the vessels; the surface, however, is yet intact; after a few days the epithelium is desquamated at many places, especially at the summit of the folds, probably in consequence of the abundant migration of colorless blood cells. The bladder is at the same time usually contracted, and the depressions between the folds of mucous membrane contain only somewhat opaque, whitish, purulent fluid. Frequently the acute passes over into the chronic form. The redness and swelling are no longer so diffuse, but more circumscribed, in

plaques; the yet swelled mucous membrane is often covered with a tenacious, mucous or muco-purulent or purely purulent secretion. Individual places, which have been the seat of ecchymoses, are slate-colored; the swelling of the mucous membrane increases with the continuance of the process, developing a villous, polypoid hyperplasia. The submucous and intermuscular connective tissue participates in this process, and changes in the muscular and serous coats occur. Under the influence of the abnormal secretion the urine, until now normal, undergoes alkaline decomposition, and furnishes a new irritant for the diseased wall. Incrustations of urinary salts occur, and more or less deep ulcerative processes develop, and irregular, excavated ulcers appear. The muscular fasciculi long resist this ulceration, become undermined by it, so that they may be visible as free strands in the breach of tissue, or, free at one end, floating as longitudinal masses in the contents of the bladder (Klebs). The muscular coat, with these processes, usually appears thickened; the wall is gradually perforated, yet direct fistulous openings to other organs rarely arise in this manner, but more often ulcerated cavities of irregular form, surrounded by callous tissue. The peritoneal covering is at the same time hyperemic, thickened by adhesions, thread-like and ribbon-shaped, between the bladder and neighboring organs. Perforation into the peritoneum may finally occur; further, urinary infiltration and suppuration with septicemia. The highest degree of inflammation of the bladder wall is designated gangrene; the bladder is dilated, relaxed, its muscular coat paralyzed, its contents a brownish, chocolate-colored fluid; urine with shreds of putrid mucous membrane, blood, pus, urinary sediment; the mucous membrane itself is softened, discolored, black, covered with loose shreds or incrusted with urinary salts; the submucous connective tissue and the muscular layer discolored, putrid, infiltrated with pus, the peritoneum injected and in places discolored, finally perforated, shreddy.

In all these diseases there is thus, as a rule, a participation of all the walls of the bladder, a mucous cystitis, a parenchymatous and a serous cystitis or pericystitis, and it is only very rarely that one wall only is affected, most rarely the muscular. The

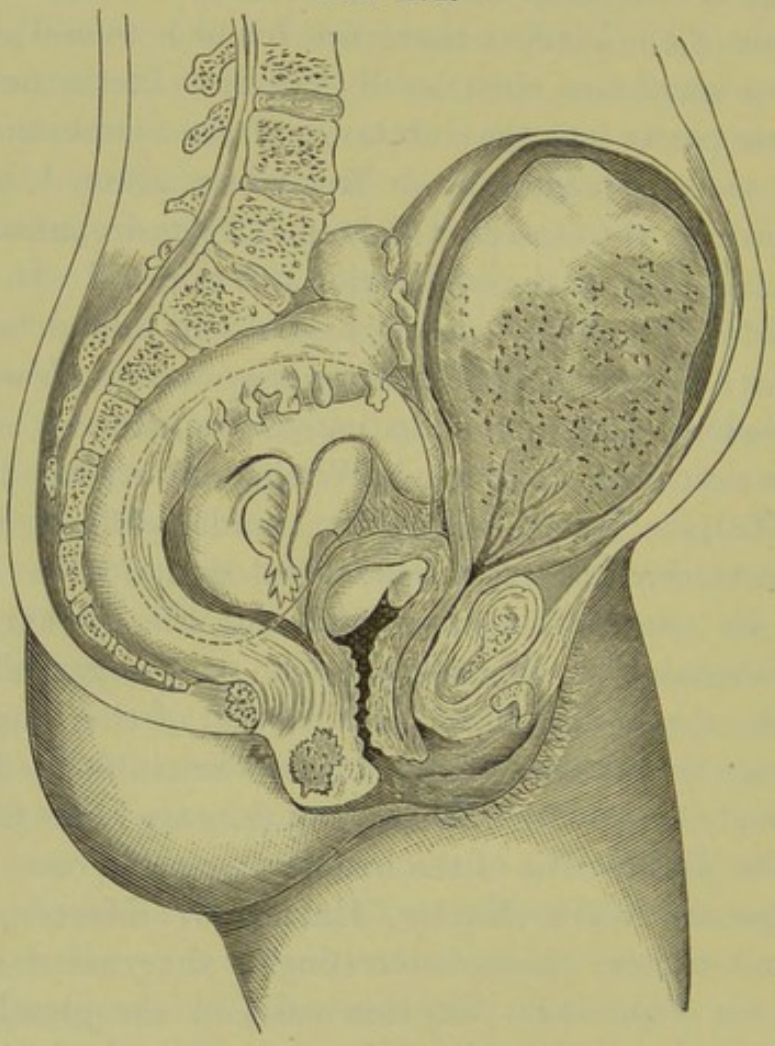
separation and especial designation of these diseases upon the dissecting table aim rather to indicate the point of origin and the principal seat of the affection than to present the individual forms as occurring strictly independently of one another.

As peculiar forms of cystitis which occur with especial frequency in the female are yet the croupous and diphtheritic. In croupous cystitis a fibrinous-cellular layer is deposited upon the surface of the inflamed mucous membrane, at times to such an extent that a complete cast of the bladder is discharged. In diphtheritis of the bladder there are found here and there upon the mucous membrane circumscribed dirty-yellow spots and lines, the exudate passes into the substance of the membrane, the surrounding mucous membrane is frequently affected by hemorrhagic injection, the muscular and serous coats are infiltrated, and with disintregation of the infiltration ulcers result. In croupous, as well as in diphtheritic cystitis, partial and total detachment of the mucous membrane of the bladder may occur. Cases of croup of the bladder, with desquamation of the mucous membrane, have been described by Kiwisch, Wittich and others. The earlier cases of Tulpius, Ansiaux, Baynham and Zeitfuchs are too indefinite to receive positive anatomical designation.

When by microscopic examination of the discharged membrane it is established that not only the most superficial layer of the mucous membrane, but also a portion of the muscular coat has come away, and the exfoliated tissues are infiltrated by small-celled, fattily-degenerated masses and delicate fibrin fibres, there can only be diphtheritis of the bladder, as in the cases of Haussmann, Spencer Wells, Barnes, Harley, W. Martyn, Luschka, Bauer and others. Most interesting is the case described by Schatz; see Fig. 151. In this case, in the greatly dilated, necrotic bladder, with walls 3–5 centimeters thick, which tore upon manipulation, and the inner surface of which was lined with urinary salts, there lay free a dark-gray sac, larger than a child's head, with walls 3–4 millimeters thick, necrotic and sandy, the necrotic vesical mucous membrane completely detached, in connection with the greater portion of the detached muscular wall, likewise necrotic; the sac was not completely detached in the neighborhood of the neck of the bladder, but here still ad-

hered to the mucous and the muscular coats, and had none but a ragged opening at the neck of the bladder. The sac was 15 centimeters long, 15 wide, and the lower opening was 8. Its walls had four layers: the most internal was composed of crystals of uric acid, elastic fibres, masses of fibrin and detritus, with scarcely any epithelium. Next came the submucous tissue, greatly hypertrophied, and containing many young cells and nuclei, then

FIG. 151.



a layer of muscular tissue 2 millimeters thick, with a greatly hypertrophied connective-tissue framework, infiltrated by cells, nuclei, fatty granules and small degenerated hemorrhages, and finally, in places above, a layer, 2 millimeters in thickness, which consisted of fibrin, detritus, fat granules, pus, infiltrated by bundles of fatty tissue and originated from more considerable hemorrhages with disintegration and secondary inflammation of

the wall of the bladder. The remaining bladder wall was composed of two layers, a necrotic, grayish-black inner surface, containing detritus, fat-granules, fibrin, pus, new spindle cells, uric acid and hematoidin crystals, and of a white, firm, not necrotic layer of strong connective tissue containing new cells. Schatz designated this case one of the striking examples of gangrene of the muscular and mucous coats of the bladder (manifestly originating from diphtheritis). The patient had retroflexion of the gravid uterus with incarceration, and died seven hours after the expulsion of a fœtus 17.5 centimeters long, and weighing 154 grams.

Tuberculosis of the bladder is extremely rare in women. * * * * * * * * * In 2505 autopsies of women I have found 4 cases of this kind. Tuberculosis of the urinary passages seldom lasts more than 1–2 years.

In contrast to these acute special forms of cystitis is the most interesting condition, recently described, chronic catarrhal cystitis with the production of epidermoid concretions. Rokitansky had already described, as a consequence of chronic catarrhal cystitis, a more or less extensive epidermic proliferation upon the mucous membrane of the bladder, leading to the formation of thick, laminated, white, shining deposits of epidermic cells, desquamating in large scales. The most instructive case of this form of disease of the bladder in woman has been described by Löwenson. Löwenson attributed the degeneration found in this case to a chronic inflammatory irritation, causing excessive epithelial proliferation with rapid degeneration and transformation of the epithelium into epidermic cells.

As the symptoms of hyperemia, of acute and of chronic catarrh of the bladder are well known, they will be only briefly referred to, confining ourselves to those of croupous and diphtheritic inflammation. These consist first in functional disorders, partly as dysuria, partly as strangury and tenesmus, not rarely as ischuria. Further, there is pain in the region of the bladder after urination, radiating to the region of the kidney. Then changes in the urine occur: the secretion becomes ammoniacal, often contains blood, pus, epithelial cells, urinary sediment, and often causes croupous inflammatory conditions of the parts over which it

passes in its evacuation. Thus, in the case of Bauer-Luschka, the vestibule was covered with a fibrous, softened, felt-like material, impregnated with offensive urine. For this reason also the entire urethra is swelled and becomes very sensitive. Not rarely, after a time, shreds and flakes appear in the urine, which plug the urethra, interrupt the stream of urine, and may even cause complete ischuria, until expelled by strong abdominal pressure or removed by artificial means. The shreds discharged in this way may attain considerable size, and were, leaving out the case of Schatz, above described and illustrated in Fig 151, in the case of Kiwisch twice as large as the palm of the hand, in that of Godson the size of the fist, in that of Haussmann 5 and 5.5 centimeters in diameter. See also Krukenberg's case.

In the ischuria caused by such detached fragments of the wall, it has repeatedly happened that the introduction of metallic and elastic catheters failed in the evacuation of the urine, evidently because the point of the instrument bored its way into the soft mass and its fenestra were in this manner plugged; thus, in the case of Bauer, in which for this reason cystotomy was done. Kiwisch also, failing in the case described by him, withdrew the catheter covered with blood and purulent fragments of exudation, the introduction of which required some force; so, too, Valenta.

From the great retention of urine—in the case of Kiwisch, for example, after the extraction of the mucous membrane cast, 3 pounds; in that of Schatz, with the male catheter, none; with the elastic, 9 pounds of urine were removed—symptoms of urinary stasis gradually arise: severe pressure, loss of appetite, nausea, feeling of suffocation and constipation alternating with diarrhœa. Not at all rarely peritonitis occurs. Whitehead, however, justly observes, and many cases confirm the fact, that commonly the constitutional manifestations are only slight in relation to the severity of the affection. At times, eclampsia has occurred in connection with severe chronic cystitis in pregnancy (case of Vinet). Frequently abortion follows; in Whitehead's patient the expulsion of the loosened part of the mucous membrane took place a few hours before labor. There are, however, cases, as one of Haussmann and another of Madurovicz demonstrate, in which, in spite of the detachment of a large portion of the

mucous membrane of the bladder and in spite of high fever, the condition was recovered from and without interruption of pregnancy. In the cases resulting unfavorably, death occurred either with uremic manifestations or from peritonitis and collapse. In patients suffering from severe constitutional diseases, as typhus, uterine diphtheria, variola, etc., the symptoms of the disease of the bladder may be easily obscured by those of the general condition. Löwenson's patient came to the Petersburg hospital only a few days before death, so that more positive symptoms of this remarkable form of chronic cystitis with epidermis formation could not be determined.

In all urinary troubles of which women complain, it is necessary to make a careful digital exploration of the internal genitals and examination with the speculum, as well as to inspect the orifice of the urethra, to search for new growths at this part, then to introduce the catheter and to palpate the posterior wall against it; then to examine the evacuated urine for albumin, bladder epithelium, cylindrical casts, blood and fatty bodies, for vibrions, crystals of phosphate of ammonia and magnesia, and for the presence of membranous shreds and their intimate character. Frequently, even before examination of the urine, the great sensitiveness of the bladder will indicate the existence of an inflammatory affection. To learn its exact situation and extent, and especially to distinguish it from a fissure of the neck of the bladder, to which Voillemier, Gueneau de Mussy and Spiegelberg have directed attention, the urethra must be dilated and the neck of the bladder especially examined by sight and touch. The dilatation serves also for the direct application of medicines, and perhaps for the extraction of exfoliated pieces of mucous membrane. Most important, however, is the microscopic examination of the extracted or spontaneously evacuated membranous fragments. This, and not the examination with the naked eye, will demonstrate whether the fragments belong to the mucous membrane of the bladder—pavement epithelium, fibrin fibres, mucous and pus corpuscles and unstriated muscular fibres must be looked for, whether they originate from perforating growths, as echinococcus sacs or ovarian cysts (containing hair, epidermic scales), or whether, as I once found

in a puerpera, and as also Prof. Franz Eilhard Schulze confirmed, they are membranes with straight tubules in which kidney structure can be recognized. As in many conditions of these affections, for example in diphtheria, the bladder wall may be very necrotic, so that distention of the bladder with air, to inspect its anterior wall with the speculum, must be abstained from. As a matter of course, the hypogastric region is to be examined by palpation, percussion and auscultation, to feel whether the bladder is much distended, whether its walls are tense or yielding, thick or thin, to learn whether friction sounds may be heard over it. In diphtheritic processes in the genitals of puerperæ, further in typhoid diseases, particularly, however, in the posterior inclination of the pregnant uterus, when a repeated introduction of the catheter is necessary, the condition of the urine must always be carefully observed, that the beginning of croupous or diphtheritic disease of the bladder be not overlooked.

In 2500 autopsies of females, inflammatory processes in the bladder were found in 68; thus, in 2.7 per cent. of all cases, and in 38.3 per cent. of patients in whom abnormalities of the bladder and urethra were found. The most important predisposition is furnished by pregnancy and the puerperal state. Two conditions especially favor disease of the bladder, retroflexion of the gravid uterus and the associated retention of urine and the ischuria of the first part of the puerperium. Besides these, constitutional conditions may be predisposing causes; thus, heart failure, typhus, variola, paraplegia, diseases of the spinal cord, advanced age. To these may be added diseases of the vagina and of the uterus, especially cancer of these organs; further perforating extrauterine gestation sacs.

Simple hyperemias, hemorrhages and catarrhal conditions permit a favorable prognosis. As the entire inner surface of the bladder can be easily irrigated and without special pain, it is generally possible, in uncomplicated cases, to effect a cure in 8–14 days. The case is different in croupous, diphtheritic and gangrenous processes; these are, independently of their efficient cause, of decidedly graver nature. Of eleven cases in recent literature, five, or 45 per cent., died (cases of Bauer, Schatz, Spencer Wells, Krukenberg and Schwarz), four recovered (cases

of Spencer Wells, Wardell, Haussmann, Kiwisch, Frankenhauser and Madurovicz). The earlier the cause of the disease is known, the better the prognosis; the longer the ammoniacal condition of the urine continues, the more doubtful. By energetic pursuance of the local treatment recovery may be seen in a few weeks, even in some of these cases, without extensive detachment of the inner surface of the bladder. High fever, great swelling of the urethra, of the anterior vaginal wall, acute œdema in the region of the bladder would be unfavorable symptoms, threatening perforation of the bladder. Adhesion of the bladder with neighboring organs may, even for a long time, exert an unfavorable influence, as retention of urine readily occurs and in catheterization air readily enters, and thus recurrence of the catarrh and inflammation follow. It is obvious that the prognosis also depends upon the character of the discharged fragments; that, for example, in simple croup, in which only epithelium and exudate are demonstrable, it is better than when portions of the muscular layer are also exfoliated or even gangrenous masses pass off, from which it may be concluded that the affection of the bladder wall is a profound one. The causes of the disease of the bladder affect the prognosis; these are various, according as croup or diphtheritis of the bladder occurs with a simple fistula or with carcinomatous destruction of the vesico-vaginal wall or with uterine diphtheritis in a puerpera or with a reducible retroflexion of the uterus. It is finally yet to be mentioned that from the adhesions of the bladder to the intestine a fatal ileus may later occur.

Treatment.—To avert hyperemia of the bladder in women predisposed the diet and drink should be carefully prescribed; the lower part of the abdomen and the feet should be kept warm; when there is discomfort in urination or increased frequency even if only from mechanical causes, caution should be recommended. The treatment of constipation will not be limited to the use of cool lavements, but mild cathartics, as magnesia, rhubarb, sulphur water, elder bark, calomel, may be administered, in order, by causing hyperemia, by moderate irritation of the intestinal mucous membrane, that the blood may be diverted from the bladder and to avoid too great pressure in defecation. It is, further, most important, in all cases in which the catheter-

ization is necessary, that not only should the catheter before its employment always be disinfected with corrosive sublimate, and if the introduction is frequent, be placed in a one-thousandth solution of corrosive sublimate, but also in emptying the bladder no air be permitted to enter. Though in Rutenberg's method the bladder is distended with air, yet this air escapes through the dilated urethra, and then an antiseptic injection is employed; in two cases, however, mild vesical catarrh followed the method. In maternities every puerpera requiring catheterization should have, as in the Dresden Institute, a new or chemically clean catheter; it would be well if this rule were observed in private practice. If, however, decided hyperemia or vesical catarrh has set in, according to my long and large experience with women and with little girls, the local treatment is the most important. I always therefore begin by washing out the bladder with warm water, eventually with mucilaginous decoctions, as flaxseed tea, or with lime water, frequently adding salicylic acid (1 : 1000), or use a 3 per cent. solution of boracic acid. The injection is made by a Hegar's funnel, not held too high, to which an elastic catheter is attached by means of a rubber tube; the fluid remains in the bladder a few minutes, and then, by lowering the funnel, is withdrawn. The quantity which can be injected depends upon the age of the person and the size of the bladder, and will vary between one-fourth, one-half and 1 liter, the bladder being irrigated 1 to 3 times daily. As soon as these injections are not sufficient, I use solutions of nitrate of silver, 1–2–3 : 500, or of tannin 0.5–1 : 100, and use these for weeks in a similar manner. On account of the uniform success from the employment of the means mentioned I have never had occasion to use other, especially balsamic injections, as variously recommended. Besides this local treatment, I direct only rest, according to sensibility, rest in bed, apply warm fomentations to the hypogastrium, give an unirritating liquid diet: milk, tea, egg yelk, bouillon, lean meat, and by means of rectal injections and the cathartics previously mentioned secure free evacuations of the bowels. I have never yet employed copaiba balsam in diseases of the female bladder, and believe that it can be well dispensed with. I have also not yet tried the potassic bromide, recently

recommended by Meinhard in cystic blennorrhœa. The potassic chlorate, however (5–175), in tablespoonful doses 4 to 6 times a day can be recommended.

Braxton Hicks, in the acute stage of inflammation of the female bladder, first washes out the organ with an acid solution.*

After catheterization, his directions are as follows: "With a syringe throw up through the catheter water slightly acidulated with nitric, hydrochloric or acetic acid (vinegar does very well); if nitric or hydrochloric acid, about two drops of the strong to the ounce of warm water. As soon as the patient complains of desire to urinate, allow the fluid to flow away again. More of this acidulated water may be used, till the bladder seems clear of the phosphates and mucus. About half a pint of acidulated water will generally suffice. Then inject also through the catheter about one grain of morphia dissolved in one ounce of water; quickly withdraw the catheter from the urethra, and instruct the patient to retain the injection as long as possible. It is a very rare instance if this single application do not produce very marked benefit."

After the subsidence of the acute symptoms, a solution of tannin or of 3–4 drops of the sesquichloride of iron in 25 grams of water is injected. In chronic catarrh of the bladder, Braxton Hicks likewise employs solutions of nitrate of silver, 1–60 to 1–40, and liquor ferri three times as strong as in the acute stage.

By the injection of common salt in solution (4 : 1000, increasing a gram a day), three times daily, the injection being retained 25 minutes, Lemaistre-Florian claims to have cured chronic cystitis in 21 days. It was formerly the practice in acute cystitis to employ local depletion by leeches and cups. Rapid dilatation of the urethra has recently been warmly recommended in various quarters as one of the most important aids in the speedy cure of cystitis, as by Banes, Parish, Teuke, Gardner and Davidson. In the treatment of cystitis it is of great importance that the patient should not be permitted to retain the urine for

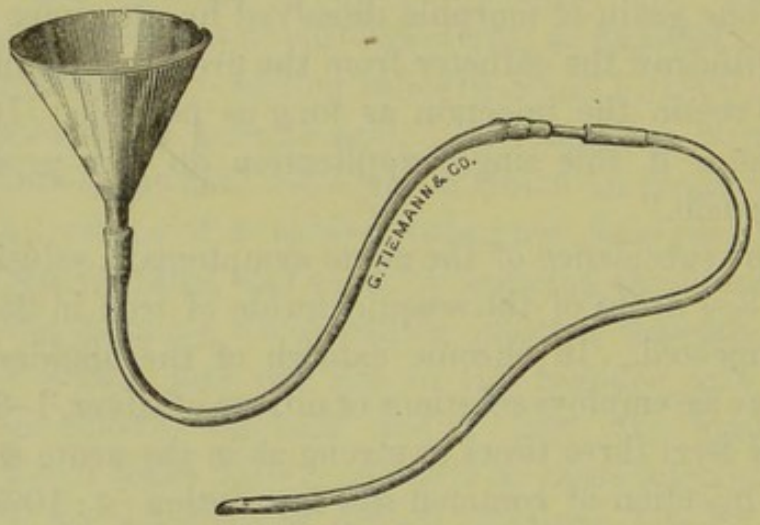
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* I have substituted in part for Prof. Winckel's account of Hicks's treatment the words of Hicks, as given in the *British Medical Journal*, July 11th, 1876.

a long time, but should evacuate it at as regular intervals as possible, and that the bladder be each time completely emptied, even if the catheter must be used.

[Fig. 152, taken from Skene's valuable work, shows the best instrument for washing out the bladder, and also for injecting it with solutions to modify the condition of its lining membrane. Essentially it is that referred to by Winckel as Hegar's funnel. While not so bold as to assert that the practitioner ought not to attempt to treat a case of cystitis in the female without this instrument, certainly the cure will be more rapid if he use it. In using it the funnel is filled, but held at a lower level than the tube. The catheter attached to the distal

FIG. 152.



end of the tube is now introduced into the urethra, and the funnel being elevated its contents pass into the bladder; again lowering the funnel the bladder is emptied.]

Fritsch recommended that a non-fenestrated rubber tube, 15 centimeters long and 0 6–0.7 centimeters thick, after disinfection in a 5 per cent. carbolic acid solution be introduced only so far that the contents of the bladder escape. The bladder is washed out through this tube 3–6 times daily with a 1 per cent. solution of carbolic acid. The tube may remain three days, but is then changed as a protection against the deposit of urinary salts. Schücking in 6 cases has recently employed permanent irrigation of the bladder from 1–3 days.

In order that the contents of the irrigator may always remain warm, a spirit lamp is kept under the irrigator. He used as an irrigating fluid a 1 per cent. solution of sodium sulphite with the addition of 5 per cent. of glycerin.

General warm baths are agreeable to the patients, and as drinks milk of almonds, Vichy, soda water, Biliner Brunnen.

The treatment of hemorrhage into the bladder has already been presented. If there are many coagula in the bladder, as may be recognized by the catheter, the urethra is to be dilated, and the clots not spontaneously expelled extracted by Simon's forceps or the so-called alligator forceps, the bladder irrigated with a very dilute solution of the sesquichloride of iron, proceeding then as already advised.

As soon as membranous discharges from the urethra are observed, the contents of the bladder should be examined with the catheter, the urethra dilated; should this confirm the presence of shreddy masses, these should be carefully extracted and lime water or solutions of carbolic acid, 1–1000, or solutions of salicylic acid or, in case of hemorrhage, liquor ferri sesquichlor., 1–800, injected. In all these conditions anodynes will often be required (hypodermatic injection of morphia above the mons veneris), and the forces of the patient must be maintained by quinine, wine, analeptics (ether hypodermatically), besides most nutritious, easily digested food.

Hypertrophy and Atrophy of the Bladder.

We add yet two sequelæ of acute and chronic nutritive disorders, which have already been mentioned with many of the abnormalities previously described, hypertrophy and atrophy of the female bladder.

Hypertrophy occurs with all long-continued dislocations of the bladder, for example, cystocele, further, especially wide neoplasms, as well of the urethra as of the bladder, with narrowing of the former by ulcers, then with compression of the urethra and of the need of the bladder, further, with inflammatory processes in the wall of the bladder. The thickening of the wall may involve all the layers or only the muscular, and the latter also in whole or in part. If only single portions of

the muscular coat are hypertrophic, the mucous membrane is at times pushed between the muscular fasciculi and the peritoneum lifted up, thus forming a diverticulum of the bladder; such diverticula are most frequent at the fundus.

The hypertrophy, as it is usually induced by obstruction to the evacuation of urine, gradually leads to dilatation of the bladder, which may attain considerable dimensions. In the case of mine so frequently cited, the bladder had a diameter of 23 and 26.5 centimeters, its walls were from 0.2 to 1.5 centimeters thick; in the case of Schatz, the bladder was more than 15 centimeters in length and in width.

If the bladder is considerably dilated, it may, after it has been emptied with the catheter, still be felt above the symphysis, usually as a firm, more rarely as a relaxed tumor, in which the catheter can be felt through the abdominal wall. Its limits may be defined by percussion, the irritability of its walls ascertained by the catheter, and the condition of its inner surface learned from the examination of the urine. Hypertrophy of the bladder extremely rarely occurs alone, but is most frequently complicated.

In the treatment of this abnormality, the cause must be sought for, especially obstructions to the evacuation of urine thoroughly removed. Should the latter be difficult, the evacuation should be regularly done with the catheter, aided by external compression. It is well for the patient to wear a good hypogastric bandage. Further, cold compresses, cold douches to the sacrum or cold injections into the vagina and cold sitz baths, thus cold sea baths are also good. Catarrh and dislocations should at the same time receive appropriate treatment. When there is great irritability of the neck of the bladder, the local application of narcotics, in the form of vaginal suppositories, and bougies and injections of narcotics into the bladder may be employed. Atrophy of the female bladder may be a consequence of enormous widening and dilatation; oftener, however, it is a consequence of paralytic condition of the muscular coat, which will be considered with neuroses of the bladder. Sometimes it is seen with hypertrophy of the muscular coat, as in one of our cases; and is found in old women in whom the walls of the

bladder may be as thin as paper. All three coats seem to participate equally in this atrophy of their elements, and I have now and then seen this thinning of the wall of the bladder in women sixty years of age, in whom the uterus showed senile atrophy, as a cause which occurs with relative readiness at this period of the vaginal cystocele, and which, of course, was only to be treated by mechanical means of retention by anterior colporrhaphy. (See page 129.) Should, under such circumstances, disturbances of urination yet appear after the use of means of retention, local irritants, cold bathing, catheterization, especially, however, the use of the induction current, are indicated.

CHAPTER IX.

FOREIGN BODIES IN THE FEMALE BLADDER.

Foreign bodies in the female bladder may be divided into three chief classes: those which enter from other parts of the body, those which originate in the bladder and those introduced from without.

A large number of foreign bodies which gradually find their way from the neighborhood of the bladder into its cavity have been mentioned (see page 715). In addition to these there are several cases of echinococcus cysts perforating the bladder.

Bodies from without may enter the bladder in four different ways: the patient may fall upon an object, which may thus be forced through the vagina or urethra into the bladder; in an attempt at catheterization the instrument may escape from the hand into the bladder; a pregnant woman, trying to effect abortion, may thrust the instrument used into the bladder; in masturbation the object employed may slip into the bladder. Among these various objects that thus become foreign bodies in the bladder are pins, hairpins, needles, needle-cases, crochet-needles, knitting-needles, lead-pencils, splinters of wood, straws, goose-quills, pipe-stems, iron wire. Gradual entrance of foreign bodies from the vagina, perforation by pessaries, has been mentioned in connection with vesico-vaginal fistulæ.

The symptoms are, frequent desire to urinate, hematuria, strangury; little by little the foreign body becomes more or less incrusted, causes vesical catarrh, ulcers, and not rarely perforation of the bladder wall. Spontaneous expulsion has occurred in a few instances.

The treatment has been greatly simplified by the knowledge of the dilatability of the female urethra, and besides Simon's specula and forceps, only an alligator forceps, at most, is needed. As soon as the presence of the foreign body is recognized with a metallic catheter, the patient is anesthetized, the urethra dilated according to directions, the foreign body sought with the finger, its lower extremity fixed, and with the forceps introduced by the side of the finger an attempt is made to seize and extract the foreign body. Should difficulty arise from the long axis of the object not corresponding with that of the urethra, a finger in the vagina may, by suitable pressure, effect the correspondence; or the forceps may be passed through the largest of Simon's specula, seizing the body at successive points and gradually bringing it in proper position. When it is difficult to seize the object, the bladder may be filled with tepid salicylated water and the attempt renewed. It has been advised that if the foreign body is barbed, like a crochet-needle, and has become fastened in the vesico-vaginal wall, it should be pushed through into the vagina. In some instances it has been necessary to break the object by the lithotrite, and then to extract its fragments.

If the object is partly within the bladder and partly in the vagina, and the portion within the bladder has become incrusted with salts, the original wound must be enlarged, and extraction then done. If cystotomy is necessary, the vaginal operation is generally preferable, the suprapubic, as a rule, being employed only in small girls. Denuce's statistics show that the recoveries after the former were 70 per cent., but after the latter only 17 per cent.

Vesical Calculus.—Stone in the female bladder is quite rare. In 10,000 women and girls examined by Winckel at Berlin, Rostock, Dresden and Munich he found but one case. According to Coulson there are twenty cases of vesical calculus in men to one

in women; according to Giraldès the affection is twenty-four times more frequent in boys than in girls.

The calculi may be of uric acid, phosphoric acid, oxalic acid and cystin, or combinations of these; the rarest are those of cystin, only three per cent. The stone is usually in the deepest part of the bladder, thus at the base behind the trigone; but it may occupy a diverticulum. If the stones are many and large a cystocele may result.

Vesical calculi vary in size from a grain of corn to a child's head. The number of calculi may be very great; Rosset found 11, Ruysch 45, and even greater numbers have been reported.

The symptoms depend upon the causes, the form and surface, the size and number of the calculi and upon various complications. While threatening symptoms of vesical irritation with manifestations of peritonitis for a long time precede the formation of calculi resulting from perforation of the bladder by ovarian cysts, extrauterine gestation sac, etc., there are calculi spontaneously developed in the bladder, which, especially if small, smooth and round, may be present for years without the patient suspecting it. In 1876 a patient entered the Dresden city hospital, and after death 185 calculi were found in the bladder, though no symptoms of stone were present during life.

Acutely developed, heavy, rough, dendritic calculi soon cause hyperemia of the mucous membrane, hypersecretion, catarrh, severe inflammation, and may lead to perforating abscess. Thus, vesico-vaginal fistulæ from vesical calculi are not rarely observed. Spontaneous expulsion through the urethra is more common than in males. Incontinence of urine and severe hematuria have been observed. A calculus may constitute a grave complication in pregnancy, in labor, and in the puerperium. Hugenberger has collected 23 cases of vesical calculus in women during the child-bearing period of life.* Though error may arise, the diagnosis ought not to be difficult if proper means are used. The finger in the vagina, the sound in the bladder and, if necessary, dilatation of the urethra, so that a finger can be introduced and directly touch the calculus, are the means to be employed.

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* Winckel details several cases in which this complication was present.

The treatment is direct removal of the calculus, and this may be accomplished by dilatation of the urethra, with subsequent extraction of the stone with the forceps without reduction of its size, by lithotripsy or litholapaxy, the stone being broken or crushed and the fragments removed, and by lithotomy. Dilatation is to be preferred when the stone is not so large that it cannot pass through the urethral canal stretched to the degree indicated by Simon. Lithotripsy or litholapaxy is indicated in women if the stone be large, its diameter more than 2.5 centimeters, and when incrustations have formed about a foreign body, such as a needle-case, wood, bone. Vesico-vaginal lithotomy is indicated when the stone is so hard that it cannot be crushed or broken, and is more than three centimeters in size in children. But the calculus may be so large that it cannot be brought through the small pelvis, or at least without some laceration of the soft parts, and this may even be the fact in the adult, as in the case of Josephi, in which an extrauterine gestation cyst had perforated the bladder. Suprapubic lithotomy, epicystotomy, *sectio alta*, is only indicated in women when, from the size and number of the calculi or from the narrowness of the soft parts, vaginal section does not suffice. Of four cases of hypogastric lithotomy in girls from 4–8 years old, two terminated fatally and two in recovery.

CHAPTER X.

NEUROSES OF THE FEMALE BLADDER.—CYSTOSPASM AND CYSTOPLEGIA.

Anomalies of the bladder without structural disease or abnormality of its contents, which thus have their seat in the nervous apparatus of the organ, are designated neuroses. They are spasm and paresis and paralysis of the bladder. In most of these cases there is also local structural disease, of which the nervous disorders are only a symptom; the existing structural affection, however, is not always to be recognized. There is no doubt that the more generally dilatation of the urethra is employed as a

means of examination, the more readily will cases of so-called primary neuroses of the bladder be recognized as purely secondary, as, for instance, various authors have recently described fissure of the neck of the bladder as a cause of cystospasm. There is, therefore, good reason to be cautious in the diagnosis of primary vesical neuroses, and to make it solely by exclusion.

Bladder Cramp: cystospasm, neuralgia of the bladder. Chiefly nervous, very excitable women are attacked with cystospasm: great emotional disturbance, onanism, excessive coition, colds, especially at the menstrual period, sitting on the damp cold ground, as well as getting the feet wet, may be mentioned as causes. If, besides, the indiscriminate imbibition of a variety of drinks, as of several kinds of beer, and of new, acid wines, be accepted as a predisposing cause, the anatomical condition may be due to a chemical action of the renal secretion on the sensory nerves of the mucous membrane of the bladder with consequent hyperemia.

The first and most important manifestation of cystospasm is pressure in the region of the bladder, especially at the neck, associated with varying spasmodic pain. If the bladder is full there is moderate tenderness; the pain is greatest at the beginning of micturition, which sometimes is vainly attempted, often anxiously avoided. The urine is at the same time pale, free from albumin, sugar, pus, blood, sand and foreign bodies, often passed in large quantities, often only in drops at short intervals. The passage of a metallic catheter through the urethra and into the neck of the bladder is at times excessively painful.

Only when, the urine being entirely normal, the urethra healthy, no anomaly of blood supply and texture of the walls of the bladder can be found by touch and sight, and when also, after dilatation of the urethra with specula, to which patients in obstinate cases readily submit, no local visible or palpable anomaly can be detected, only when, after illumination of the anterior wall of the bladder by Rutenberg's mirror, no disease is found, only then can primary spasm of the bladder be properly spoken of. No one of the symptoms described is alone pathognomonic. Even if the existence of vaginismus were demonstrated

a co-existing severe dysuria could only be regarded as reflex if it entirely disappeared soon after excision of the hymen.

In treatment, if possible, the causes should be removed: excision of the hymen in vaginismus, forbiddance of sexual intercourse, treatment of colds by warm general or foot-baths, forbiddance of the use of wine, beer, strong tea, and diminution of the irritability of the bladder by the use of milk of almonds (a wineglass three times a day). In the paroxysm itself opiates locally are most efficient; injection of morphia in the region of the bladder acts most speedily; medicated rectal injections of a cup of oatmeal mucilage with 15–25 drops of tincture of opium are also prompt in action; suppositories of cacao butter and morphia or extract of belladonna act somewhat more slowly. Internally, emulsion of almonds with tincture of opium or with extract of hyoscyamus is given, or opium with lupulin, or tincture of Indian hemp, 10–15 drops three times a day. Chloral hydrate is most efficient, either by enema or by the mouth.

If this treatment does not suffice in an individual attack to shorten its duration, the diet and the evacuations must be carefully regulated, the employment of warm baths, the use of carbonated waters directed; should these not relieve, mechanical treatment is to be applied: dilatation of the urethra (several successful cases from this treatment have been reported); the introduction into the vagina of broad, soft pessaries; to exert moderate pressure on the bladder in order to diminish the reflex excitability of the bladder and thus the cystospasm; and finally, the injection of morphia into the bladder, followed by cauterization similar to the procedure of Braxton Hicks. Debout recommended bromide of potassium internally, and also in rectal suppositories, containing also tincture of opium and extract of belladonna. Finally, the direct application of cocaine to the vesical mucous membrane should be considered.

Paresis and Paralysis of the Bladder.—Ischuria.—Incontinence.—Enuresis.

Physiologists are not in accord as to the functions of the two sphincters of the bladder, the internal sphincter, consisting of

unstriped muscular fibres, and the external sphincter, of striated fibres. Individual authors, as Budge and Hertzka, deny the activity of the external muscle as a sphincter of the bladder, viewing it only as a muscle for the expulsion of the urine, while Dittel and Kupetressow maintain that the transverse fibres of the neck of the bladder (the internal sphincter) as well as the transverse muscular fibres of the urethra act in producing closure of the bladder. From a clinical standpoint the latter view is the more admissible, particularly as the result of experience with fistulæ of the neck of the bladder which extend to within one and five-tenths centimeters from the orifice of the urethra, operation for which is followed by continence. However this may be, all authors are at present agreed that the evacuation of the urine follows in a reflex manner if the centres of the motor nerves of the bladder in the lower portion of the lumbar cord and throughout the whole cord to the pedunculus cerebri be irritated, either from the vesical mucous membrane by accumulation of urine or from the commencement of the urethra, if a drop of urine enter the urethra after the resistance of the involuntary internal sphincter is overcome by strong pressure, or also by the will, and that upon the other hand, the will is able, by contraction of the external sphincter or of the compressor urethræ (by Hertzka so called), to suppress this reflex manifestation, the evacuation of the urine.

Paresis and paralysis of the bladder may be caused by peripheral and by central disease. The former have already been spoken of and are chiefly mechanical in nature, as, for instance, the dislocation of the bladder resulting from pregnancy and labor, particularly, however, the bending of the urethra frequently occurring post-partum, which first leads to urinary retention, and with the continuance of this condition to exhaustion of the detrusor of the bladder, vesical paresis. A quite similar process, however, may arise from another source of pressure to which the muscular coat of the bladder may be exposed, to wit, an interstitial œdema which occurs with ulceration of the cervix, with parametritis and with peritonitis, impairing functional activity of the detrusor. The insufficiency of the detrusor thus resulting

occurs more particularly in the later days of the lying-in and often proves very obstinate.

Paralysis of the bladder may further occur from peripheral causes, not rarely in typhoid fever and also in dysentery, in which fatty degeneration of the muscular coat is the cause of the disturbance of function. The paralytic incontinence occurring in old women as a result of myopathic processes is an analogous condition, and in younger persons acute paralysis of the bladder has been observed after excessive distention in consequence of false modesty.

As central and general causes of paresis and paralysis of the bladder, have been given severe colds, a fall, concussion with acute meningitis and encephalitis, and with myelitis in the lower part of the cord, neuritis from extension of inflammation from the kidneys and bladder to the lumbar and pelvic connective tissue and thus to the lumbo-sacral plexus (Kussmaul), intoxication from excessive doses of opium, and finally endarteritis deformans of the pelvic arteries. Disorders of consciousness in diseases of the brain (apoplexy), sopor, delirium and high fever, paralyzing the detrusor, often remove the influence of the will, and overcoming the reflex contraction of the sphincters, the urine involuntarily streams forth. Paresis of the bladder first manifests itself by difficult evacuation of urine; the bladder can only be emptied with difficulty, or with the aid of great abdominal pressure, or not completely, only in small quantities, or finally not at all, retention of urine, ischuria, thus resulting. Enormous accumulations of urine may in this way take place in women. Leven removed 4000 grams, others as much as could be held in 16 beer bottles, Schatz 9 pounds, Hofmeier 4½ quarts. When the distention of the bladder reaches a certain degree the resistance of the sphincters is overcome, and there is dribbling of urine without any material diminution of the distention, ischuria paradoxica, a fact of no little importance, to be borne in mind by the practitioner lest he make an error in diagnosis.

An especial variety of paresis of the bladder is the incontinence of urine which mostly occurs in children, but also not rarely in growing girls, and which in some may persist even after

marriage: diuresis nocturna. This nocturnal incontinence of urine is found especially in scrofulous, cachectic, hysterical, delicate, pale individuals, at times in both mother and daughter. In many cases which first come under observation after a long continuance of the disorder, the condition is not a primary one, but a consequence of the frequent wettings and the resulting catarrhal conditions of the bladder, intestines, lungs and bronchi.

That the will is of great importance in governing the evacuation of the bladder is to be considered, and many authors explain the nocturnal incontinence of urine by the withdrawal during deep sleep of the influence of the will upon the sphincter of the bladder. Nocturnal incontinence of urine has been by some attributed to partial anesthesia of the sensory nerves of the bladder. Should the condition be long continued, paresis of the muscular fibres results and the incontinence may be manifested by day as well as by night. The diagnosis is made by a careful physical examination of the hypogastrium, by percussion of the region of the bladder, by palpation of the area of dullness, by exploration through the vagina, or in little girls through the rectum; it will thus be learned whether the bladder be filled, distended and its walls painful; the urethral orifice is to be examined, a catheter introduced, the character of the discharge noted, whether it flow in a strong stream or slowly and feebly, and the sensibility of the inner surface of the bladder tested with the catheter. Next, the urine must be examined, and it is to be determined whether the bladder remains contracted and how soon it again becomes filled. Large bladders after evacuation still occupy a large area. Infrequent evacuation of the urine in enuresis is a sign of impaired activity; the more frequent discharge also by day, of paralysis of the detrusor. In women during labor and the puerperal state, in those suffering from typhoid fever and from dysentery, distention of the bladder must be borne in mind—a matter unfortunately too often neglected. If no local cause of the weakness of the bladder can be discovered, then central ones must be sought, which, according to my experience with women, are much rarer than the former.

Many cases of paresis of the bladder in the female can be avoided at the right time by regularly repeated catheterization,

removing the obstruction, in overcoming which the detrusor is exhausted. This applies especially to the ischuria caused by retroversion of the gravid uterus, and that of the first as well as of the later days of the lying-in. In typhoid fever, dysentery, peritonitis, etc., the condition can be prevented by warm baths, by regularly reminding the patient to empty the bladder, by cold applications to the abdomen and by the introduction of the catheter if the patient does not completely empty the bladder. A timely, single, complete evacuation of the bladder with the catheter, at once followed by irrigation with a 1–1000 solution of salicylic acid, is often the best means of preventing obstinate ischuria.

On the other hand, if paresis or paralysis already exist, besides catheterization at regular intervals (about every four hours), above all means the application of the induced current is indicated, from which most authors, in ischuria as well as in paralytic incontinentia paradoxa, even in nocturnal incontinence, have obtained good results, often after a few applications. One pole, covered with rubber except at its end, is introduced into the bladder; the other is either placed over the symphysis, the sacrum or the perineum, or passed into the rectum. In children the poles are applied externally. The application is made daily for 3–5 minutes. If manifestations of hyperemia or catarrh of the bladder are present, this is to be treated as directed. At times irrigations with solution of salicylic acid (1–1000) by means of Hegar's funnel, repeated every 3 to 4 hours, will suffice to remove a paresis of the bladder. An invigorating diet should be used. In simple atonic conditions camphor and excitants, even the tincture of cantharides, 5–20 drops 1–3 times a day, may be employed; but recently the latter has been abandoned because it is often too irritating.

In recent cases of paralysis of the bladder from taking cold, or in consequence of long-continued retention from modesty, ergot has been of service. Of the fresh powder, 9–15 grains were given 4–5 times daily. According to Allier, ergot, in doses of 75 grains daily, in paralysis of the bladder in consequence of cerebral apoplexy and other lesions of the nerve centres, has proved most salutary. Strychnia has been used internally and externally in paralysis of the bladder.

In incurable paralysis of the sphincter of the bladder Rutenberg has proposed opening the bladder above the symphysis, keeping the fistula open, and then by operation closing the urethra.

In the treatment of nocturnal enuresis constitutional, moral, mechanical and specific means, in combination or separately, must be employed, in accordance with the excellent description given by Barclay; constitutional, for the improvement of the nutrition, little fluid food, and food not highly seasoned; in the evening little fluid is to be given and of medicines quinine and iron. Syrup of the iodide of iron, in doses of 1–2 grams, several times a day, for some months continuously, is especially recommended by Barclay, Brügelmann and others, and has been tested by the author. Brügelmann, with this remedy, completely cured a girl in fourteen days. Moral means are, in small children, sinapisms, chastisement after each wetting, regular wakening and admonition to urinate; in older children and those who are grown, the restraint of pleasures, balls, concerts, theatres and evening society, and waking 2–3 times each night.

Mechanical means are washing out the bladder to lessen existing torpor, and if the bladder is small, frequent mechanical dilatation with tepid water. In this way Braxton Hicks claims to have secured a speedy recovery in a girl in whom the disorder had continued after puberty. In a similar case, the same author, a relapse occurring after three months was relieved by injections of a solution of nitrate of silver, and later of a solution of morphia, restoring the capacity of the bladder.

As specific means, chloral hydrate and belladonna may be mentioned. I have used both for a long time, consecutively and in increasing doses (chloral hydrate, 15–22 grains nightly in girls 12–15 years old), without attaining the good and especially the lasting results claimed by Thomson, Bradbury and Leonardi. Belladonna may be given as tincture or extract; the latter may be employed as rectal suppositories. Campbell Black recommends narcotics with the chloride of iron in atony of the sphincter. 4–5 drops of tincture of opium given at bed-time to girls 10–14 years old often produce marked improvement.

Baths and cold douches to the back and sacrum, especially at

night, have sometimes been helpful when other treatment has failed. One of my patients, who was always better in the summer, was sent to the south in the winter. Therefore the warm baths of Gastein, brine baths, according to circumstances iron baths may have a salutary effect; however, sea baths are to be recommended.

[This subject is of such great practical importance that it has been thought well to add a few remarks in regard to treatment from Dr. Skene,* than whom no higher authority, in this country at least, can be quoted. He advises, in cases in which the vesical irritability is due to abnormality of the urine, such as lithiasis, oxaluria and acidity, correcting these conditions; if to ascarides, anal fissure and that class of rectal troubles, removing the cause, when the result will usually disappear also. The usual soothing and demulcent drinks should be used. "Oil of sandal wood has acted remarkably well in some of these cases. Bromide of sodium and tincture of nux vomica have been effectual in some."

"In the anesthetic variety, when the anesthesia is more or less marked, special or local and general stimulants should be employed. Narcotics are hurtful here, as they are useful in the hyperesthetic class. Strychnia by the mouth, in suppository or hypodermically often produces good results, as does also quinine, whether the presence of malaria is suspected or not."]

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* *Op. cit.*

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