The perineum : its anatomy, physiology, and methods of restoration after injury / by Henry O. Marcy.

The Perineum.

Marcy.

THE

PERINEUM;

ITS ANATOMY, PHYSIOLOGY, AND METHODS OF RESTORATION AFTER INJURY.

BY

HENRY O. MARCY, A.M., M.D., LL.D.,

OF BOSTON, U. S. A.,

Surgeon to the Private Hospital for Women, Cambridge; President of the Section of Gynecology, Ninth International Medical Congress; late President of the American Academy of Medicine; Member of the British Medical Association; Member of the Massachusetts Medical Society; Member of the Boston Gynecological Society; Corresponding Member of the Medico-Chirurgical Society of Bologna, Italy; late Surgeon U. S. A., etc.

REPRINTED FROM TRANSACTIONS OF

AMERICAN ASSOCIATION OF OBSTETRICIANS AND GYNECOLOGISTS,

SEPTEMBER, 1888.

PHILADELPHIA:

WM. J. DORNAN, PRINTER.

1889.

PREFACE.

This little work is offered to the profession as the result of some years of careful study and investigation upon a subject of importance alike to the physician and the surgeon.

If the author's labors help to elucidate a question upon which there is still great difference of opinion, and to settle upon a rational basis measures adapted to restore large numbers of semi-invalids to usefulness and health, his efforts will be amply rewarded.

HENRY O. MARCY.

116 Boylston St., Boston, 1889.

THE PERINEUM; ITS ANATOMY, PHYSIOLOGY, AND METHODS OF RESTORATION AFTER INJURY.

By HENRY O. MARCY, M.D.,
BOSTON.

It may occur to some present that I have exhausted, so far as my ability, the subject announced upon the programme. I have called the attention of the profession, upon several occasions, to the injuries of the perineum and the methods which appeared to me best suited to its repair. The importance of the subject, and the differences of opinion yet held by many of the leading authorities, both in Europe and America, seem sufficient to make the theme one of marked interest to the profession at the present time, and especially fitting to occupy the attention of this Association, whose members are devoted alike to those branches of the profession which include the causes of the injury, as well as the means best adapted for restoration.

I review my own publications upon the subject with more than ordinary satisfaction, since they may be considered as progressive phases in the study of a problem which has occupied more than an ordinary share of my attention for a number of years, and to what I now offer in addition, although, perhaps, not conclusive or final, I invite your consideration and earnest criticism.

All good surgery must be based upon a thorough knowledge of anatomy, and while this is essentially true in the consideration of every operative measure, as, for example, the resection of a bone, or the ligation of a vessel, it is especially to be emphasized where the avowed object of the operator is the restoration of the injured parts to their former normal condition. This is the problem confronting the obstetric or gynecic surgeon, when he undertakes to deal with lesions of the pelvic floor.

The surgical anatomy of the male perineum may be said to have been practically demonstrated, and the subject long since exhausted.

It is a *sine qua non* to the graduation of every medical student, and properly so, because of the importance of such knowledge in the practice of every-day life; but if this is necessary to the proper consideration of diseases of the male, how much greater the need of a familiar and accurate understanding of the pelvic organs, their relationship, and supports in the female! Here, in addition to the lower segment of the alimentary canal and its outlet, the position and retention of the bladder with its efferent passage, are placed the complex organs of reproduction, which necessitates a third and the largest of the openings through the pelvic floor. Not alone should this give additional interest and importance to the careful study of the female pelvis and its contents when in the exercise of the ordinary functions of life, but especially when we take into consideration the physiological changes occurring during pregnancy and parturition—conditions so important and which occupy so large a share of the attention of the profession, and demand from its members often the exercise of the highest skill and ability. If, happily, the recovery from parturition renders danger to life no longer imminent, yet every practitioner listens to the almost daily complaint of suffering dependent upon injury of the parts involved, and the reflexive nervous disturbances resulting therefrom.

To those whom I am now addressing, it seems almost superfluous to make reference to these complaints, since the cases are so very common in which injuries to the vulvar outlet have caused years of semi-invalidism, overlooked by the superficial observer. This happened since there was no visible prolapse, and the proof of the correctness of causation is found in the fact that a permanent cure follows the restoration of the parts.

The description of the anatomical structure of the pelvic floor, in most of the text-books, appears to me faulty, and, on this account, much confusion occurs, not only in the use of names applied to certain parts, but especially in involving the whole subject in unnecessary complexity.

The comparison between the component structures of the male and female pelvis shows a closer analogy than is at first apparent. The levator ani in the male is inseparably blended with the sphincter ani. (Plate I., Fig. 1.) The transversus perinei in a central tendinous line joins with the levatores and sphincter in front of the anus; and anteriorly, between this point and the accelerator

PLATE I.

FIG. 1.

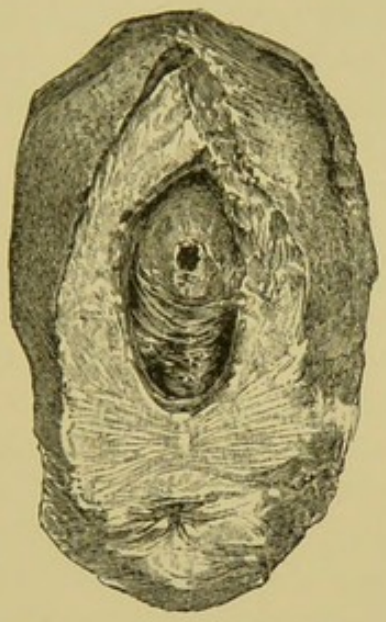


FIG. 2.

FIG. 1.—The perineal fascia removed, showing the transversi perinei muscles. They are seen to unite in a firm, central, tendinous raphé. Posteriorly are seen the mucous folds of the anus. (From photograph of a dissection for illustration of this paper.)

FIG. 2.—*u*. Urethra. *v*. Vagina. *r*. Rectum. *c*. Coccyx. *l*. Levator ani. The fibres may be traced descending from above the urethra, and uniting at coccyx to form a complete loop. The section is made just posterior to the transversus perinei. The perineal space between rectum and vagina is observed to be of considerable depth. (From photograph of a dissection made for illustration.)

urinæ and erector penis, there exists an irregular space, floored by the deep perineal fasciæ, called the triangular ligament of the urethra. This corresponds to the vaginal opening in the female. The accelerator urinæ or ejaculator muscle, separated in the median raphé, is not very unlike the sphincter vaginæ muscle. The erector penis and erector clitoridis are similar in position and functions. The transversi perinei are placed more obliquely in the male than in the female, and are often less well developed.

Since the dissections of William Hunter, undertaken to demonstrate the anatomy and the physiological function of the reproductive organs during pregnancy, the most valuable contribution to the proper understanding of the anatomy of the pelvic structures in the female are those of Dr. Henry Savage, of London. These studies, supplemented by the important teachings derived from frozen sections, greatly modify the previous views of the physiological relationship of the pelvic organs.

The depth of the perineum is less than usually described. The axis of the anus, cutting that of the vagina at nearly right angles, leaves in the external angle an irregular flattened portion of tissue rarely, when examined upon the living subject, more than one-half an inch in thickness. In the nulliparous woman this is clearly defined as a firm portion of the pelvic floor, and is composed of skin, fat, elastic and connective tissue, transverse muscles, sustaining fascia, and the anterior portion of the sphincter ani.

The vaginal side is usually slightly concave and the rectal side convex, owing to the interblending of the sphincter ani. If the finger be carried just within the perineum proper, and a little to one side, there can be felt the firm encircling band of the levator pubo-coccygeus, attached to each rami of the pubes above and descending to join with the posterior fibres of the sphincter ani and coccyx. In the perineum posteriorly this is firmly interblended upon either side with the transverse perineal muscles. These are under the control of volition, in considerable degree, and acting conjointly, serve to draw the vagina forward on to the pubes. (Plate I., Fig. 2.)

The parturient and fecal canals are supported in the pelvic basin in close apposition, and the functional relationship is often such that the one may encroach upon the other, in a way so as to occupy nearly all the space accorded to both. This is especially true in parturition, when the rectal space is reduced to a thin folded tube; and often,

in elderly women, the rectum becomes saccated, pushing forward the posterior vaginal wall, forming a considerable sized external tumor. The pelvic floor is so formed and blended about these openings, that it not only properly supports these tubes, but also materially aids them in their physiological function. In intimate relation to both are the bladder and uterus in their ever-varying functional activity, and each is surrounded by a delicate plexus of nerves and vessels.

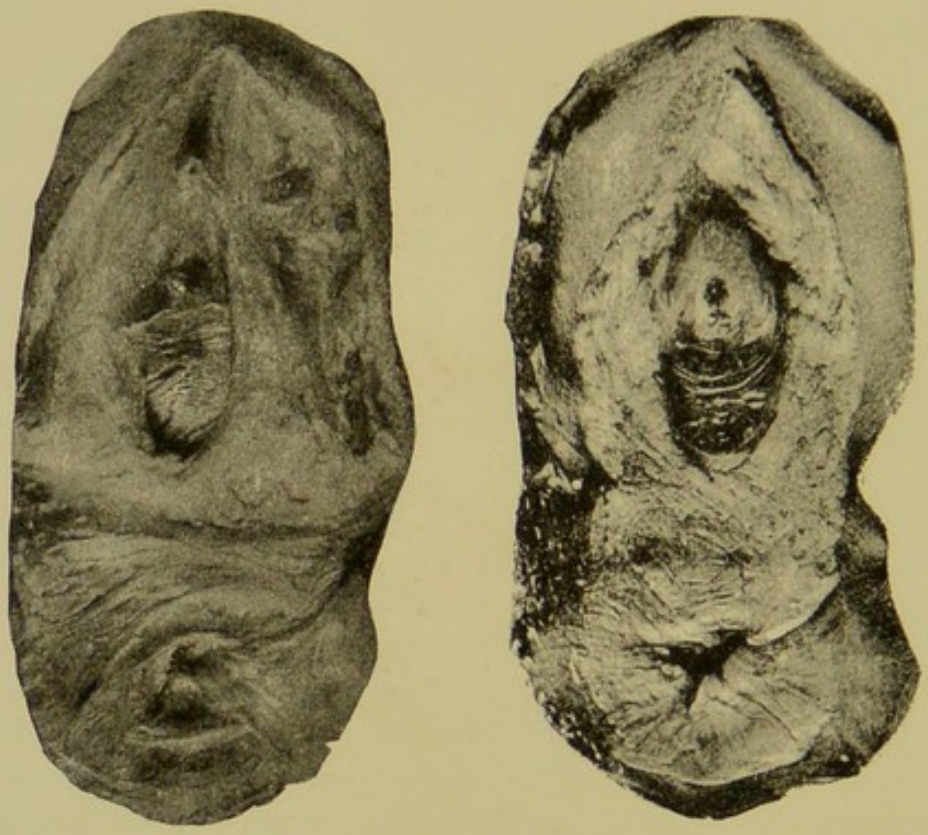
The sacral prominence throws a large proportion of the abdominal weight upon the symphysis pubis and the recti muscles, in the support of the body, and thus relieves the pelvic basin and takes off undue strain upon the pelvic floor. The rectum is rarely entirely empty, is circular in shape, serves the digestive apparatus, in a measure, as a constantly receiving reservoir, and, when not distended, may be felt from the vagina as a tube curving posteriorly. It is suspended and supported, slung—so to speak—by the levator ani muscles which hold the vagina in their encircling loops. On the contrary, the vagina, entirely unlike the early diagrams, is flattened antero-posteriorly upon itself, and in health its walls are, when at rest, ever in close apposition. The vagina joins with the vulva at right angles to its lateral opening, at the entrance of its passage through the pelvic floor. The vulvar organs are all intimately blended with, and go to form a part of, the perineum proper. On each side of the vaginal orifice are the erector clitoridis, the bulbo-cavernosus, and the transversus perinei muscles, and these with the levator ani make up, in large measure, the pelvic floor. The bulbi-vaginæ and Bartholinian glands are covered by these muscles with their erectile plexus of vessels, and abundant distribution of lymphatics and nerves.

The erector clitoridis and bulbo-cavernosus muscles, with the transversus perinei, join on each side to constitute the ovate muscular vaginal orifice, and, in their conjoined action, perform a very important physiological function in sexual congress, often underestimated or ignored. Their impaired function frequently underlies certain reflexive nervous conditions, distinctly pathological, which are easily overlooked, but are the cause of much suffering and unhappiness.

The much discussed, so-called perineal body has, in my opinion,

PLATE II.

FIG. 1. FIG. 2.

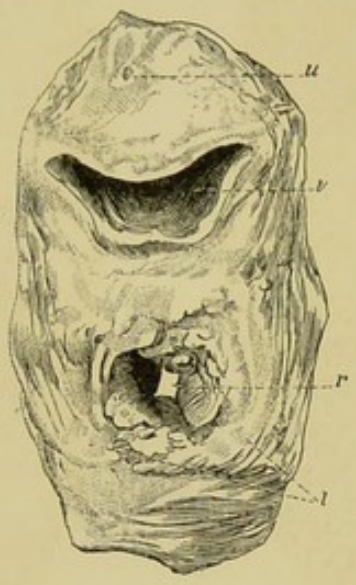


From photograph showing superficial fascia.

FIG. 1.—From photograph of dissections of the superficial fascia, made for illustration of this paper. The vaginal fascia blends behind the clitoris. Over the tranversus perinei it unites with the fascia encircling the anal folds.

FIG. 2.—The deep layer of the superficial fascia intimately connected with the transversus perinei.

PLATE III.



u. Urethra. *v*. Vagina. *r*. Rectum. *l*. Fibres of levator ani. The section is made at greater depth than Fig. 2, Plate II., about one-half inch posterior to the junction of the transversi. The fibres of the levator loop are well marked. (From photograph of a dissection for illustration.)

misled some of our prominent authors into false positions, and caused great confusion and misunderstanding among physicians.

I have been criticised, in emphasizing the muscular floor of the pelvis, that I under-estimate the importance of the variously distributed connective tissue and fascia. This is not by any means my intention. The superficial perineal fascia, in its deep layer in the male, as well as in the female, covers and encloses the transversus perinei muscles, forming strong ligamentous transverse bands, uniting in the perineum, designated by Savage as ischio-perineal ligaments. (Plate I.; Plate II., Figs. 1 and 2.)

The pubo-coccygei, acting in unison with the other muscles of the pelvic floor, draw forward and thus aid, not only in closing the rectum, but hold both it and the vagina in the anterior curve, so important to be retained for the preservation of normal function.

A horizontal section, made through the floor, just above the sphincter vaginæ and posterior to the junction of the transversus perinei, shows the deeper fibres of the pubo-coccygeus, united in a loop behind the lower border of the rectum, holding it from the fixed point at the pubes, as in a sling. This loop is connected with the transversus perinei, bulbo-cavernosus, erector clitoridis, sphincter vaginæ and sphincter ani muscles by strong layers of connective tissue, the importance of which, for union and support, cannot be readily over-estimated. (Plate I., Fig. 2.)

Upon the posterior wall of the vagina, in its lower third, longitudinal muscular fibres are found external to the circular layer, and these intimately blend with the pubo-coccygeus, giving a firm support to the vaginal outlet quite as the outer longitudinal fibres of the rectum unite with the deep layers of the sphincter ani. The physiological action of the muscles thus grouped serve to draw the rectum forward toward the pubic arch and approximate it in close relation to the urethra, and this explains, in large degree, why the circular fibres of the vagina, left free to act in other directions, are intra-folded laterally, making in cross-section an imperfect figure H, first pointed out by Freund, in 1873. This intra-folding of the vagina, at right angles to the axis of the vulvar outlet, is very important in its relationship of support to the uterus and its appendages. (Plate III.)

One of America's most distinguished gynecologists, Dr. Emmet, takes exception to the possibility of the perineum and vagina serv-

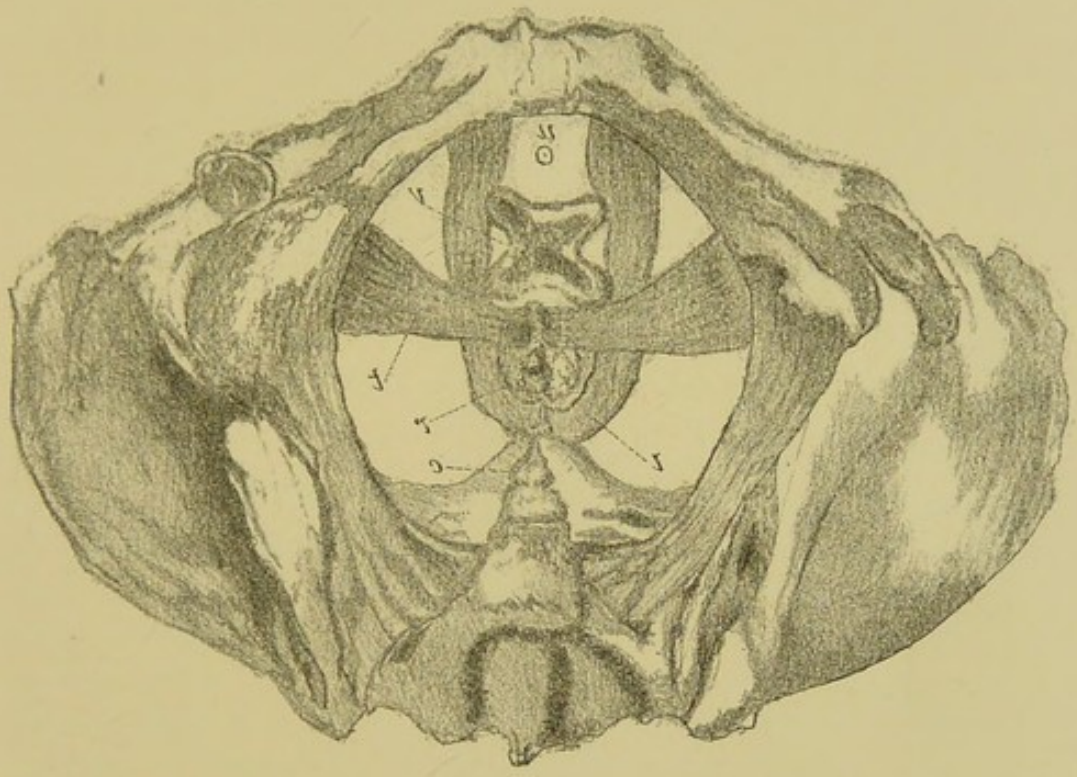
ing as a uterine support and that "it would be as rational to assume that a man's pantaloons were supported by the legs, resting on the instep or foot."

When we remember that the promontory of the sacrum is so placed in its relation to the pelvic basin, that the superincumbent abdominal weight is thereby deflected upon the symphysis pubis and recti muscles, we the better understand the protection given in a normal condition to the organs of the pelvis and their comparative state of rest, independent of the position of the body.

The vaginal axis is normally about parallel to the conjugate of the brim. The anal axis is nearly at right angles with the vagina and on a line with that of the uterus. The urethra, vagina, and rectum are disposed in curves corresponding to the sacral line. Architecturally considered, these are the lines and disposition of supports adapted to give the least outlay of power to retain the organs in position. This is the more to be emphasized, since the physiological function demands mobility of the organs in conjunction, and also each independent of the other. Viewed from this standpoint, a still further analysis of the vagina, as a column of elastic support to the uterus, is of interest and importance. (Plate IV.)

We have already observed that the circular loop of the muscular fibres of the pubo-coccygeus, posterior to the anus, carries the rectum forward on to the vagina and changes the vertical vulvar outlet into an antero-posterior closure of the vaginal canal, and that this again is thrown into two lateral folds. The longitudinal muscular fibres external to the vaginal muscle, and which extend, both in front and behind the vagina, along the distal third, are the chief causes in producing this intra-folding, constituting in large part the so-called columnæ rugarum. The letter H-shape, thus given to the vaginal column in section, is well known in the arts as the form adapted to the resistance of vertical weight. This elastic column, retained in its shape and position by its basic vulvar and perineal support, in its upper border is blended with the cervical tissues. The union thus made with the uterus is at nearly right angles to the vagina, and serves to hold the lower segment of the uterus backward, retaining that organ, like a ship at anchor, swung on its lateral supports, with freedom of mobility at its moorings. This vaginal support to the uterus is so effective, in the normal condition, that the cervix uteri is rarely displaced without there first ensues a

PLATE IV.



The outlet of the pelvis with its ligamentous attachments, showing the relations of the levator loop and transversi perinei muscles (diagrammatic). *u.* Urethra. *v.* Vagina. *r.* Rectum. *c.* Coccyx. *l.* Levators. *t.* Transversi perinei.

change in the vagina. Although there are exceptions, of which the scope of this paper will not permit the discussion, the general consensus of medical opinion is that the changes which occur in the vagina usually commence with those lesions of the outlet and contiguous tissues dependent upon parturition.

A weakness in the base of support, the change of muscular action which causes a drawing upward and backward of the posterior vaginal wall, with an eversion of the vulvar outlet, produces a change in the axis of the vagina, bringing it and the uterus toward a common plane, and then the cervix, instead of being held at right angles, becomes a wedge in line with the vaginal outlet, separating its walls. This change in the position of the uterus causes the weight of the abdominal contents, deflected toward the pubis, no longer to fall upon the organ posteriorly, but vertically, and little by little, following the sacral curve in its descent, prolapsus, with varying degrees of retroversion, ensues.

The injuries of the retro-vaginal pelvic fascia, occasionally occurring in delivery, have been somewhat recently deservedly emphasized by Freund, Emmet, Baldy, Hadra, and others. The latter author considers that many of the ill results following delivery are due to injuries of the vaginal fornix and the upper portion of the parturient canal, and are consequently often overlooked.[1] "The impacted head, in its further progress, tears loose the upper portion of the anterior vaginal wall from the bladder and from the anterior surface of the cervix, turning it into a loose pouch which the bladder will have to follow on account of gravity." This, he believes, is the more common cause of cystocele. Hadra has devised certain plastic operations (resections of the upper portion of the vaginal canal) to remedy these injuries.

In a similar manner, the vagina posteriorly is caught in a fold and protrudes, as a ring, before the advancing head, and in the eversion thus produced it has been assumed, rather than demonstrated, that the posterior folds of the pelvic fascia are sundered, and that the result of the injury may be prolapse with rectocele and deep lateral sulci. Such injuries very probably occur and enter into the sum total of possible damage, but to differentiate and emphasize them as independent of the various muscles which it is

[1] Hadra: The Medical Register, vol. i. p. 611.

their office to hold in proper relation and support; moreover, to base important surgical operations upon their assumed restoration, is misleading and unscientific. In a sense, muscle and fascia are equally important, since the one fails in its function without the support of the other.

If the anatomy and physiology of the pelvic floor have been correctly described and interpreted above, there takes place, in normal parturition, a retraction or drawing upward of the bladder before the descending head, rendered possible by its loose suspensory ligament, until the occiput passes below and is allowed to escape anteriorly to the symphysis. The perineal muscles relax and descend in a more or less encircling loop, the pressure upon which is not lessened until the occiput escapes. This is not the place to enlarge upon the physiology of parturition, but the above view, especially emphasized by Drs. Simpson and Hart, of Edinburgh, is important in its practical bearing upon the so-called support of the perineum in delivery, wrongly taught in many of the standard text-books. I believe injuries to the perineum are often caused by the earnest but misdirected efforts of the accoucheur, in the attempt to preserve the tissues intact.

I have carefully reviewed our present knowledge of the anatomy and physiology of the pelvic floor, since all attempt at a restoration must, in a large measure, depend upon our understanding what we mean to restore. It should be taught, as cardinal, that the obstetrician has not completed his duty to his patient until he has carefully examined, in a good light, the vaginal outlet. There is still considerable difference of opinion whether an attempt at immediate repair is advisable. This has been questioned, since the bruised and raggedly torn tissues seem unsuited for primary union, and the lochial discharges liable to infect the wound.

Antiseptic midwifery, however, has abundantly demonstrated the error of such conclusions. When the parts are maintained aseptic, the union rarely fails; and if, by any reason, this should not take place, the patient is none the less fitted for subsequent operation. The torn tissues are very vascular, extraordinarily developed in preparation for the parturient act, and paralyzed, in a measure, by the extreme tension to which they have been subjected. All this favors a rapid plastic repair. There can be little doubt, the time is not far distant when the patient will rightfully demand of the

practitioner as rigid care in this respect as in any other part of her supervision.

The primary operation is comparatively simple and often will not require an anesthetic. A solution of cocaine is frequently of service. Under irrigation with sublimate solution, the vaginal vault temporarily lightly tamponed to retain the uterine flow, with one or two fingers in the rectum, I unite the parts with a deep continuous buried tendon suture. The torn muscles are not retracted and lie easily in apposition. The deep sutures are limited to the perineum, and should be so placed as to be covered by the superficial vaginal line of union, and are four or five in number, taken with the double continuous stitch hereafter described. More recently, I have further modified the operation in the superficial layer by commencing at the upper angle of the wound, closing it with a tendon suture applied as a blind stitch. This is best effected by a straight Hagedorn needle, lightly but accurately piercing the connective tissue, beneath the mucous membrane, from side to side. The sewing is continuous in the same way over the fourchette posteriorly to the limit of the division of the skin. Thus the divided edges are brought evenly into apposition without the vestige of a stitch in sight. The parts, carefully dried, are dusted with iodoform and covered with iodoform collodion. The tampon is replaced by a light packing of iodoform wool, and, if the operation is done aseptically, the repair goes on as in a subcutaneous wound.

If the rupture extends through into the rectum, the lower bowel having been well washed with sublimate, care being exercised not to allow its retention, and tamponed with iodoform wool, the rectal mucous membrane is closed with great care, the stitches being taken continuously as above described. The sewing is carried to the anal opening and the suture left uncut. When drawn sufficiently tense it becomes a buried suture, and the rectal mucous membrane lies in close apposition. The operation is then continued as in incomplete rupture, the deep double suture (the Marcy stitch) also carefully inclosing the divided sphincter. When the edges of the two anterior sides of the triangle have been coapted by the buried suture, the end is joined to the rectal suture in front of the anus. Although I have usually retained the united parts at rest without strain for some days, by means of a lateral support, as a sort of splint, with

parallel pins applied in halves and joined like a safety-pin (previously elsewhere described[1]), in a number of instances I have omitted this support and complete union followed without pain or even edema of the parts.

The operation is to be commended for its simplicity in application, the comfort of the patient, as well as assurance of result. A word of caution may be required that the sutures are not drawn too taut, since retention in easy apposition is to be sought, and constriction of tissue avoided, as even in an aseptic wound injury must otherwise result.

Operations undertaken for the restoration of the perineum, a considerable period having elapsed since the injury, are quite different from primary operations. Here almost always certain secondary changes of adjacent organs have supervened, and, on this account, the patient seeks the aid of the surgeon. Thus, new and often difficult factors enter into the problem, and these generally vary to such a degree that each case must be carefully studied as a personal equation.

Perineal lacerations usually commence at the posterior commissure, and may extend even through the recto-vaginal septum. They vary in all degrees, but, for convenience, are divided usually into complete and incomplete ruptures, the former including an opening into the rectum, involving the sphincter ani. Lack of symmetry is usual and results from a lateral deflection of the rupture, the posterior columna rugarum usually remaining as a much thickened projection, often overlapping the side of the lesion.

The pelvic floor, viewed from within, presents a series of inclined planes sloping toward the anus, the general function of which, beside furnishing a strong elastic support, is best described by the name given to the larger group of muscles by the earlier anatomists —levatores ani.

There is a large class of injuries to the pelvic floor incident to childbirth, usually overlooked or under-estimated, because the external orifice shows no material damage. These concealed injuries are due frequently to a submucous tear of the transversi, a rending of the pubo-coccygeus from its posterior perineal attachment, and may be continuous through the vagina up the lateral sulci, leaving the columna rugarum free upon one or both sides. (Plate IV.) It

[1] American Medical Association Journal, October 27, 1883.

PLATE V.

FIG. 1.

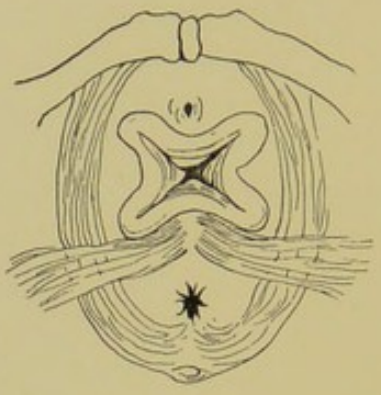


FIG. 2.

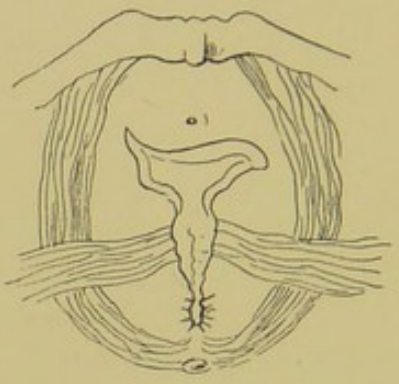


FIG. 1.—Diagram showing the relation of the uninjured muscular attachments of the levator and tranversus.

FIG. 2.—Showing a central lesion, the transversi slightly separated, the levator loop weakened in its support causing a relaxation of the posterior wall of the vagina. If complete, loss of septum.

FIG. 3.

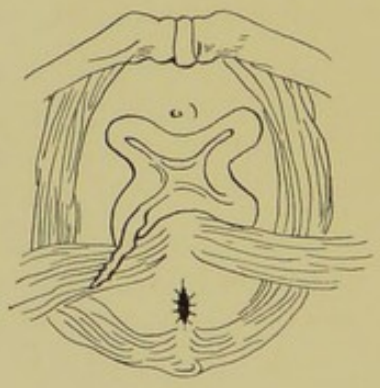
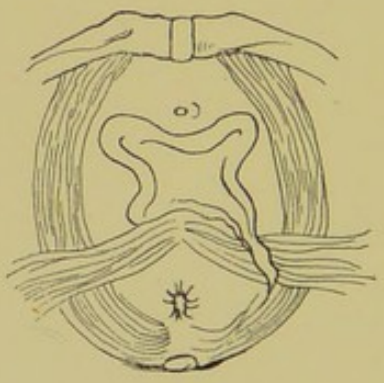


FIG. 4.



Figs. 3 and 4 showing lateral rents separating the transversi, with more or less injury to the levator loop.

is exceptional that the injury is symmetrical, usually extending higher upon one side than the other, and it may even reach into the posterior fornix. These inside lacerations usually begin from above, before the advancing head, and generally do not involve the rectal tube, since this is merely compressed laterally, and comes into tension by the strain upon its anterior and lateral attachments which are the site of actual injury. On the contrary, lacerations of the sphincter are usually produced by the over-tension on the median line posteriorly causing a rupture in the raphé, which extends backward into the rectum. (Plate V.)

There is a series of severe injuries where the vagina shows no evidence of lesion, and, although these are generally ascribed to over-strain or distention at labor, followed by relaxation and weakening of support, a deep post-vaginal injury to the muscular groups can usually be demonstrated. The finger no longer feels the firm ridge of the transversi muscles closing the vulva posteriorly. The pubo-coccygeus is felt as a large open loop, passing obliquely backward into the pelvis, changing, in a marked degree, the plane of the pelvic floor. A careful study of the differences between these and the normal conditions renders this injury readily recognizable. A perineum may seem to be deep, because of the loose relaxed condition of the parts, but the transversi uninjured are tense, and therefore may appear shallow. When the upper portions of the levator loop are uninjured they may, in a measure, retain the pelvic organs in position, but, by the increased strain and tension, produce much suffering. Often, on this account, operative measures may be required.

In deeper ruptures, accompanied by rectocele, the posterior vaginal wall, on the contrary, is much thinned and the mucous rugæ disappear. Carefully examined, cicatrices usually extend much beyond the ununited parts, showing that a limited repair took place after the injury. Often bridges of cicatricial tissue make an imperfect repair of what, otherwise, would be a complete rupture; the radiating folds of the anus are retained only posteriorly. The rectal mucous membrane everts anteriorly in a thick, soft fold, sometimes appearing as a small tumor. When the injury is severe, the transverse muscles of the perineum are separated at their union in the median line, and contracting toward their origin, draw apart the injured surfaces, and the levator loop no longer presses the

rectum forward upon the vagina, but, loosened from its central support, is changed in its plane of action, and causes eversion of the posterior portion of the vagina. (Plate V., Fig. 2.)

A careful review of the surgical procedures adapted to repair the injuries of the pelvic floor, leads us beyond the limits of this occasion, but forms a chapter of exceptional interest. The time involved, the thought expended, the ingenuity and fertility of resource, to meet and group the different factors, as they appear to the varying consideration of special students, generally writers of much eminence in the surgical domain, all teach the importance and difficulty of the problem.

Celsus clearly recognized the injuries incident to parturition, advised rest in bed and tying of the legs, but gave no suggestion of surgical repair.

Ambrose Paré pointed out the applicability of sutures, and his pupil Guillemeau restored the parts, applied the interrupted suture, and effected a cure. At the close of the last century Saucerotte and Noël each succeeded in a single case, using the twisted suture.

Dieffenbach, surgeon to the Charity Hospital in Berlin, in 1829, gave much attention to the injuries incident to labor, and his method of repair finds recognition in the text-books of to-day.[1] "After a most deliberate and careful investigation, Dieffenbach concluded that suture alone would not supply any certain mode of remedying perineal lacerations; and, among others, he laid down the following rules of practice: 1. That prior to the operation the bowels should be well cleared by purgatives and enemata. 2. That despite the swollen state of the torn parts, the presence of discharges, and the debility of the patient after delivery, the operation should be performed as immediately as possible after the accident, since those evils would be more than counterbalanced by those consequent on delay, as suppuration, sloughing, and loss of substance, and the yet later results, displacement of the uterus and associated organs. 3. That no rupture, however slight, should be left to nature, for the healing would be superficial, and the vulva enlarged, proportionably to the extent of laceration, by the retraction of the labia toward the anus, the support of the pelvic viscera being also thereby diminished. 4. That three to five sutures are necessary, according

[1] Baker Brown: Diseases of Women. First edition, 1854, p. 13.

to the severity of the accident; the insertion of the sutures commencing at the anus, and, where the sphincter is torn, the first being applied at its angle. 5. That where the perineum is lax, either the twisted or interrupted suture may be used, and, when the vagina is implicated, its fissure should be first brought together; also, that where the perineum is tense and rigid, an elliptical incision should be made on either side the median line, and equidistant from it. 6. That in those cases where there has been considerable loss of substance, the transplantation of an adjoining piece of integument may be resorted to—*i. e.*, a plastic operation may be attempted. 7. That in cases of old standing, the edges of the fissure require to be pared before being brought into apposition by sutures. 8. That after the operation the bowels should be bound by the administration of opium, in doses of one-third of a grain twice a day, and that the urine should be regularly withdrawn by the catheter." Lateral incision to relieve tension and confining the bowels by opium are the most noteworthy of his directions.

Chelius, on the contrary, advocated keeping the bowels loose during the process of repair. This seems to have been the common practice, until Baker Brown revived, in this respect, the teaching of Dieffenbach. The next most important contribution that has come to my notice is that of Langenbeck, described in a memoir published in 1852, by M. Verhaeghe, of Ostend:

"Operation[1] immediately after the accident is advocated, but the description given of the proceeding applies to old cases, since in recent lacerations it is only necessary to bring into apposition the divided tissues to restore the perineum. The operation may be divided into several stages, viz.: 1. Vivisection of the free border or spur (éperon) of the recto-vaginal septum. 2. The undoubling (dédoublement) of the septum and the formation of a flap destined to form, in the new perineum, the anterior side of the triangular space formed by the two canals, vaginal and rectum, with the perineum as the base. 3. The vivisection of the two lips of the laceration. 4. The insertion of the sutures. 5. The two semilunar incisions advised by Dieffenbach." "In order to pare the free edge of the septum, two fingers of the left hand are introduced into the rectum so as to stretch the parts transversely; then by means of scissors a

[1] Baker Brown: Diseases of Women, 1854, pp. 23, 24.

very thin lamina is removed from the entire thickness of the spur. This done, the two fingers in the rectum keeping up tension of the septum, a nearly semicircular incision is made on the anterior surface of the latter, and two or three lines from its inferior border. The upper lip of this incision is next to be seized by forceps, and separated by careful dissection from the deep layer for the space in length of six lines, and in the entire breadth of the septum. Thus two laminæ are formed, one anterior or vaginal, the other posterior or rectal; the latter destined to continue *in situ* to close the rectum, the former to be drawn forward and fixed by its angles at the anterior part of the new perineum on each side. It will thus form an inclined plane, directed from behind forward, as a sort of valve, which will act with reference to the new perineum as the epiglottis does to the glottis; that is to say, it will prevent the fluids of the vagina coming in contact with the newly united parts.

"The vivisection of the two sides of the laceration is the next object. To do this a quadrilateral space, rather elongated antero-posteriorly, is to be circumscribed by the scalpel, from the vulva toward the anus, avoiding the mucous membrane of the vagina above and the skin below. In front the incision must not pass beyond, nor yet stop short of the point where the posterior commissure of the vulva naturally exists; behind, it should connect itself with the corresponding side of the pared edges of the spur; no portion not pared should exist between them. In general, this quadrilateral space should be an inch and a half long, by three-quarters of an inch wide.

"This space having been accurately pared, and bleeding having ceased, next comes the introduction of the sutures. The suture intended to close the rectum is the first introduced, by a curved needle carrying a double thread. The needle should pierce the skin to the left of the anterior margin of the anus, and from four to five lines from the edge of the wound, so that it may come out on the denuded border of the spur of the septum, at the distance of about two lines to the left of the central line; it is then to be plunged into the same border, at an equal distance from the median line, and to be brought out at a point corresponding to that at which it was first inserted on the opposite side. By drawing this thread, the opposite pared edges are found to approach in the median line and thus close the rectum. This ligature thus drawn, being entrusted

to an assistant, the other sutures are to be introduced. The posterior suture is the first inserted, and about four lines should be left between any two. The needles should penetrate the flesh from four to six lines from the margin of the wound, and emerge at a corresponding point on the opposite side, being kept clear from wounding the mucous membrane of the vagina.

"The next step is to fix the lamina derived from the septum. For this object small curved needles with a single thread suffice. This flap being fixed, its purpose becomes evident. It acts as a vaulted roof to the essential parts of the operation, obliging all the original secretions to flow toward the vulva without infiltrating in the interstices of the united fissure. In other words, it reconstitutes the anterior wall of the triangular space seen in the normal perineum. The sutures of the perineum are now drawn tight. Lastly, the incisions of Dieffenbach may be made, as they serve materially to obviate dragging on the united parts by movements."

I have made transcript of this method in detail, since there are two features in the dissection and apposition usually attributed to more recent surgeons. In previous publications upon this subject, I have given credit to Dr. Jenks, of Detroit, as the originator of the method of flap dissection which I used in my earlier operations; the purpose, I supposed, having been that of Langenbeck's operation, viz., to protect the wound from the vaginal secretions. It will be seen by quotations later from Dr. Jenks' own article, that he does not claim this as a part of his method, since he removes the flap entire after dissection. The other feature to be emphasized is the lateral splitting of the edges of the parts to be coapted—"undoubling." This method is attributed by Drs. Hart and Barbour[1] to Prof. A. B. Simpson, by Zweifel[2] to Lawson Tait, and which I published in 1883 as a device of my own, unaware of its use previously.

Baker Brown published his method in 1854, advocating the dissection of Dieffenbach, the use of deep quilled sutures, and the bilateral division of the sphincter ani. This latter measure he thinks of the first importance in severe cases. The diet is kept very light, the knees close together, the urine drawn by catheter, opium is used freely, and the deep suture removed usually about the fourth day.

[1] Manual of Gynecology, Hart and Barbour, p. 517.
[2] Cyclopedia of Obstetrics and Gynecology, vol. xii.

In the further development of the operation, Simon's modification of Dieffenbach's comes into consideration. He carried the denudation up the vaginal vault—posterior colporrhaphy—over the region of the perineal cicatrix, in the shape of a triangle. This was first closed, and then the operation continued as by Dieffenbach. In complete ruptures, he applied sutures in three directions, crossing in the perineal space. The perineal sutures were removed the third day; the vaginal and rectal later, often remaining ten or twelve. All sutures used were of silk.

Little by little, in modification of the above method, the dissections were extended more and more up, and laterally into the posterior folds of the vagina, notably, by Hildebrandt and Hegar. Kaltenbach and Hegar adopted, in complete ruptures, the closure by stitches, taken in three directions from the perineal centre as the point of departure, the vaginal sutures being the deep ones, the others superficial. Kaltenbach carried the denudation even into the vaginal cul-de-sac.

One of the most important contributions to the surgery of the early part of this generation is conceded as American, and due, in large measure, to her favorite son, sometimes called the Founder of Gynecology, Marion Sims. The history of surgery teaches the use of metallic sutures, in the cure of hernia, two centuries ago. Mettauer, of Virginia, first used and commended metallic sutures (lead) in 1830. Iron and silver wire followed, and came into general use for many purposes after the demonstration of the cure of vesico-vaginal fistula. In the Woman's Hospital, in New York, Sims, Emmet, and Thomas, with able assistants, many of whom have since become famous, worked out the problem of their adaptation to the plastic repair of the vaginal tract. The great value of the wire suture was found in its non-irritating qualities. This, in wounds usually septic, was a great advance. They could remain for a much longer period, but, in an aseptic wound, they offer no advantage over silk or other material, and are often troublesome to remove.

To Dr. Emmet is due the introduction of the method which is the one most generally practised in America. The two points most important that he presents, are the denudation and the introduction of the first stitch (wire) through the sphincter ani. He states: "that if we examine carefully an old complete laceration, upon each side, there will be found a little depression or pit, which I

attribute to the contraction of a portion of the sphincter ani." This marks its point of laceration, and should be very carefully refreshed. In contraction the fibres are so separated that, in the way too often sutured, the inner constricting bands are not inclosed, and thus retract with, at best, a weak union. The stitch should be deep enough to include all the fibres. This is an important point, and should always be kept in mind. In perineoplasty for rectocele, as well as restoration of the perineum proper, Dr. Emmet modifies the dissection of the mucous membrane, so as to include the deep lateral sulci. These are united in an irregular V-shape. In 1883, Dr. Emmet published his new operation for so-called laceration of the perineum. Since I have elsewhere criticised[1] this operation, I extract from the articles of Drs. Jenks and Coe.[2] Dr. Jenks writes: "In this paper, he holds that the loss of support following the laceration produced by childbirth is not due to the injury of the perineal body. In fact, he denies the existence of any such body, and claims that the injury is due rather to the detachment of perineal muscles and the perineal fascia. The description of this operation by the author is by no means lucid, but it substantially consists in a semilunar form of denudation, wholly within the vagina, of such extent that when the edges are brought together by means of sutures, the 'slack' in the posterior wall is entirely taken up or made to disappear, and yet the ostium vaginæ is in no way denuded or directly interfered with. The advantages claimed are, great diminution in the discomfort following immediately after the operation, and the perfect juxtaposition of the anterior and posterior vaginal walls, as in the non-parous woman."

Dr. Coe[3] states, "Although Dr. Emmet was not the first to affirm the insignificance of the perineal body as a support, he has deduced the practical lesson that laceration of the perineum alone impairs but little the integrity of the uterine support, whereas, overstretching or tearing of the fascia or muscles (levatores ani) of the floor at their attachment to the vagina, as the result of parturition, at once disturbs the delicate adjustment of the pelvic organs. This theory, so correct logically, has, unfortunately, not yet received confirmation through careful dissections. Assuming that the injury in such

[1] The Physician and Surgeon, May, 1887.

[2] American System of Gynecology, vol. i. p. 55. [3] Ibid., vol. i. p. 234.

cases involves the deeper tissues, and that it is not repaired by closing the perineum alone, it remains to inquire if the new operation proposed by Dr. Emmet does fulfil the indications. Granting that the tissues of the pelvic floor are lacerated, does the operator reunite the torn ends by passing his sutures blindly through the posterior vaginal wall, or is the operation simply a modified posterior colporrhaphy, the ultimate result of which is simply to narrow the vagina by the removal of redundant tissue?"

Dr. Dudley also seems to appreciate that Dr. Emmet may fail in the closure of the deeper layers of the sundered structures, and has added several deep perineal sutures after the method of Simon.

Dr. Wylie has modified Dr. Emmet's operation.[1] "Commencing from below, a strip of mucous membrane as wide as can be conveniently cut is snipped off, following the line of junction of the skin and mucous membrane from the level of the inferior caruncle on one side, to the same level on the other. We then denude all the posterior surface of the vagina up to this level, till we reach the beginning of the sulci running on either side of the rectocele. The part of the operation requiring the greatest judgment has now come. Our object is to unite the vaginal walls above the sulcus on one side with the corresponding portion of the vaginal wall on the other side, so obliterating the sulci and forcing back the rectocele. If we carry denudation too high, we shall find it difficult to bring the two sides together without undue tension. If we are too timid, our support will be insufficient, and the operation will be but a partial success. The proper level having been determined, we continue the denudation upward till we reach the points in the vagina which we marked out as the limits of tension from the apex of the rectocele. This will usually be about one and a half inches from the orifice. In denuding this portion of the vagina we still work from side to side, carrying the strip of mucous membrane down into the sulcus, and up to the level we have marked on the other side. In doing this we should not cut very deeply and preserve as much as possible of the muscular substance of the wall of the vagina over the rectocele, but afterward we should go over the work in the sulci, removing all tissue till we come to the fibrous external sheaths of the vagina. In this way, we hope to preserve a firm muscular

[1] The Medical Register, vol. ii. p. 196.

coat over the rectocele. When we are through, the denuded surface will be nearly square, or if the rectocele be very large, parallelogram, the greatest length being transverse to the axis of the vagina. All bleeding should be controlled perfectly by pressure and torsion, but if necessary catgut ligatures may be used, and the parts washed thoroughly with some efficient antiseptic."

This method of posterior colporrhaphy is important chiefly in that Dr. Wylie cuts away, by a second paring of the parts, laterally the vaginal muscle. He also emphasizes the stretching of the sphincter ani, in order to relieve tension and discomfort from rectal distention. He uses the interrupted suture, tightening from below upward, being careful that the needle is buried when it passes under the angle of the sulcus.

In Germany the first notice I find of the use of *animal sutures* in perineorrhaphy is by Bröse, in recent lacerations, in 1883.[1] He commended catgut treated with a corrosive sublimate solution and preserved in absolute alcohol, rejecting that prepared after Lister's method.[2] Schroeder used, in perineorrhaphy, with much satisfaction, catgut soaked eight days in a 1 to 1000 sublimate solution and then preserved in juniper oil. Doléris[3] published his experience and advised knotting the thread from time to time. He states, "the catgut is absorbed in seven or eight days." Last year, when here at the International Medical Congress, he informed me his experience continued satisfactory.

Dr. Martin, of Berlin, reported[4] twelve cases in which he used the continued catgut suture with good results; since this time he has continued its use. When the wound surface is very large he coapts in layers, as did Schroeder, and thus buries one line of the sutures. He commends this practice as very satisfactory. He refers to Werth, as having published, in 1879, the advocacy of the use of catgut as a deep suture. Dr. Martin's method of denudation is a modification of Freund's operation. Both leave the columna rugarum and resect in a lateral direction, as thought sufficient to restore the normal vaginal lumen.

Bischoff's method is interesting in that he revives the flap opera-

[1] Centralblatt für Gynäkologie, 1883.
[2] Ibid., July 15, 1885.
[3] Archives de Tocologie, Feb. 1885.
[4] Deutsche med. Wochenschrift, No. 2, 1886.

tion of Langenbeck, but reattaches it laterally. He, like Langenbeck, limits the dissection to the removal of the mucous membrane.

Lawson Tait, in complete ruptures, has recently also modified the Langenbeck operation. He removes no tissue and operates with scissors. His sutures are inserted in the axis of the wound and surround and bring together large surfaces. The suture should not appear in the rectum, and only the knot should show in the vagina. Two stitches are always sufficient, are of silk, and generally are removed the tenth or twelfth day.

Heppner devised a suture for securing equable pressure. It is a figure of 8 in shape and possesses certain advantages.

Hadra, of Texas, has recently contributed a series of interesting articles[1] upon the lesions and restoration of the pelvic floor. After a careful review of the operative measures commended by various authors, he criticises most of the methods, as in certain respects defective. First, that operations for posterior colporrhaphy are made upon the denuded vaginal muscle and are not resections of the vagina, as in anterior colporrhaphy, now generally recommended. His query is pertinent, since if for the anterior portion of the vaginal tract resection is best, why not for the posterior? Again, he places much emphasis upon the vaginal vault or fornix and he has devised some ingenious resections as modified posterior colporrhaphies.

Although this review is necessarily brief and imperfect, many excellent suggestions and changes in operative procedures by distinguished men having been omitted, I have endeavored to sketch the outlines of thought which lead up to the present accepted modes of surgical repair. We have seen, with one or two exceptions, that the tissue removed is limited to the mucous membrane, whether the operation is upon the perineum proper, or a posterior colporrhaphy. In operations for incomplete ruptures, more or less complicated with rectocele and prolapse, the method, with the exception of Wylie's, consists of an intra-folding of the muscular wall of the vagina in varying pattern.

The groupings of the muscles sundered at the perineal raphé and more or less widely separated are, in attempt, included by deep sutures, taken in every manner of direction, while every material used in surgery for sutures finds its advocates.

[1] Medical Register, 1887.

In the earlier part of this paper, I endeavored to show the anatomical relation of the parts when normal; the more exact conditions of the structures as usually found after injury, and their perverted physiological action, producing various degrees of suffering. We found that the changes in the vaginal structures were generally not due to a primary injury of this muscle, or its mucous covering, but to the secondary forces brought to bear upon it, called into action by the modified relations of the muscles of the pelvic floor; the transversi perinei no longer supporting and holding in place the other groups, but, on the contrary, retracting toward their origin and thus everting the vulvar opening; the levatores ani, not able to act as a suspensory band, pulling forward and closing the vaginal canal, but, on the contrary, freed from their central moorings, drawing the anus upward and backward. These, of course, are accompanied by changes in vascularity and innervation, by weakening of the various layers of the pelvic fascia, by absorption of the fat and elastic tissue, by defective action of the bulbo-cavernosus, erector clitoridis, and sphincter vaginæ muscles, by consequent imperfect circulation in the erectile tissues, and perverted glandular secretion. The ultimate effects are a bladder weakened in support, a distorted rectum, a displaced uterus, each factor adding to the other, until the sum total of discomfort renders life often a grievous burden.

In June, 1883, at the meeting of the American Medical Association, I read a paper upon the restoration of the perineum by a new method, which was published in the *Journal* of the Association the following October. In this, I advocated the dissection of the portion to be restored by a flap, the lower border of which only is separated. This dissection I made after the manner of Dr. Jenks, of Detroit, with two modifications which seemed to me essential; first, making the dissection as deep as possible, without its being retro-vaginal, and then retaining it *entire*, instead of dissecting it away as recommended by Dr. Jenks. He says,[1] "I use neither tenaculum nor tissue-forceps, but with the parts tense, snip a hole in the mucous membrane in the median line, close to the integument, and then inserting the scissors with a cutting motion into the small hole made, I continue to dissect the mucous membrane away

[1] American Journal of Obstetrics, 1879.

from adjacent tissues without removing the scissors, first going up the septum as far as desired, and then laterally, first on one side and then on the other, without removing the scissors or once bringing their points from beneath the mucous membrane. Then, with blunt-pointed scissors, I cut away the dissected flap."

This anterior flap I utilized by coapting its inverted Λ-shaped freshened surface, and united the lower sides of the triangle, the perineum proper, by lateral supporting pins[1] (Plate VI., Fig. 1). "This is effected by means of a double pin, the halves of which are nearly alike. The pin is made of German silver wire, gauge No. 20 or 22, since this material does not irritate the tissues and possesses stiffness and elasticity, qualities which are essential. The end is bent in a small loop and turned one-fourth of an inch therefrom at a right angle, and the shaft is two to two and a half inches in length, sharpened like the point of the needle of a subcutaneous syringe. The one half is introduced from the vagina, *within* outward, quite deep into the tissues laterally, the direction being determined by the finger placed in the rectum, to which the pin should be parallel. The other half of the pin, similarly constructed, is introduced from *without* inward upon the opposite side in the same manner, the point of which is caught in the loop of the first part and adjusted without. Thus a kind of 'safety pin' is constructed, and, when fitted to retain properly the enclosed portions, the loops are clamped down by compression forceps and the ends cut square. This is found to hold sufficiently firm; but at first, fearing it might not be secure, I also clamped a perforated shot upon the wire. The shot renders the end of the pin less liable to cause irritation. If properly adjusted, the elasticity of the wire compensates for the collateral edema, and does not impair the circulation in the inclosed parts, while complete approximation is obtained, and no force is exercised in the direction of the long axis of the triangle. Two to four pins are required as the case may demand (Plate VI., Fig. 2). The subsequent treatment consists, in most instances, of a daily washing out of the rectum by means of a large double rubber tube with a considerable quantity, usually from three to four quarts—of water as hot as comfortable to bear. Upon the eighth or tenth day, as thought wise, each pin is gently pushed upward and

[1] American Medical Association Journal, Oct. 27, 1883.

PLATE VI.

FIG. 1.

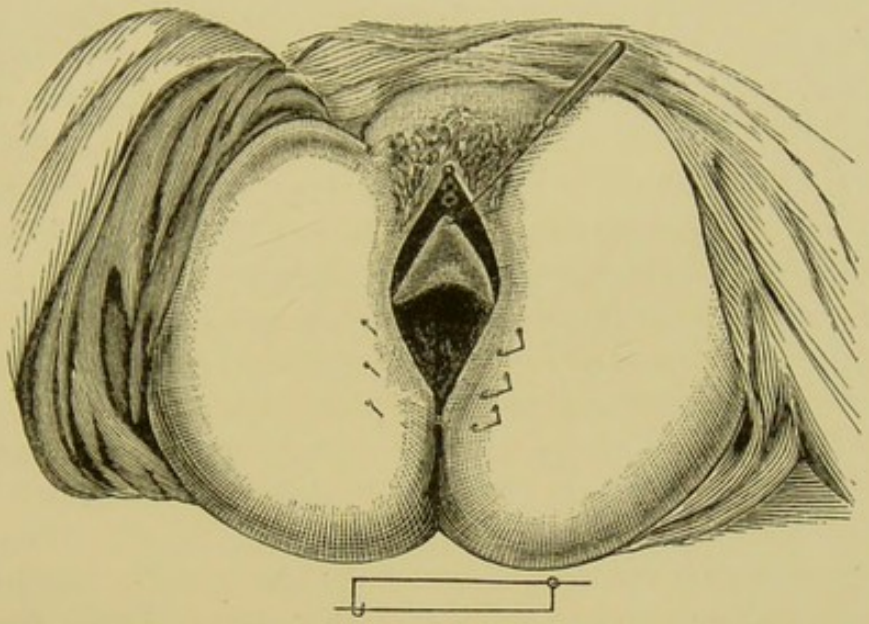


FIG. 1.—Represents the separation and uplifting of the posterior vaginal wall. The pins are already inserted ready for coaptation and fixation by clamping.

FIG. 2.

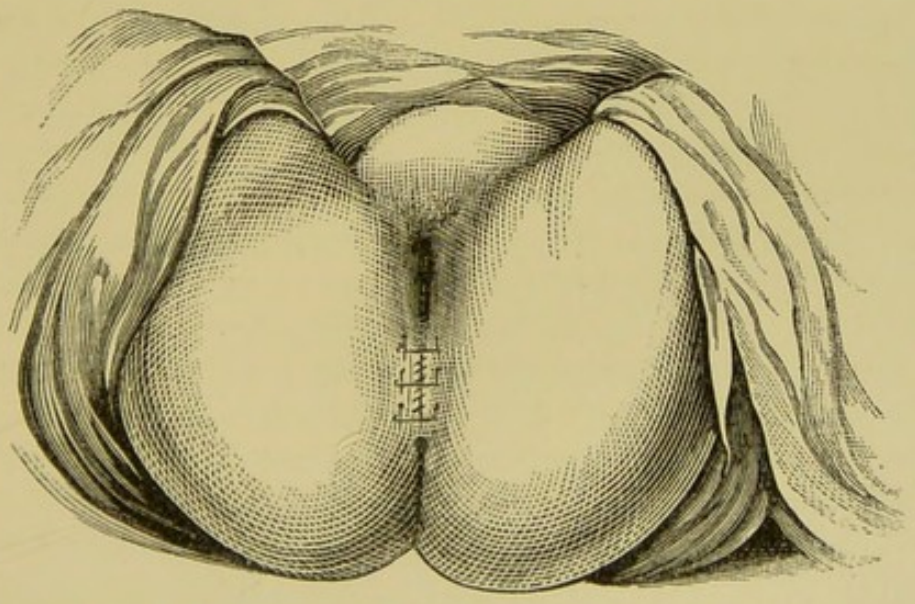


FIG. 2 shows the operation completed, and the careful adjustment of the edges by a fine continuous animal suture.

the vaginal end exposed. Each side is then cut off near its juncture and withdrawn."

The object of this support is to do away with the distortion and puckering of tissue inherent to the deep wire suture, and prevent all strain upon the enclosed freshened surfaces. In this paper I also emphasize the fact that, in cases of complete rupture, I divide the refreshened sides of the rent *laterally*, and close with a *continuous animal* suture, so as to make the double V, or diamond ◊ shape of the parts to be coapted, as in incomplete rupture.

At the Eighth International Medical Congress, held in August, 1884, at Copenhagen, I contributed a paper still further setting forth the views I then held, and, with slight modifications, advocated the above described method, using *tendon* from the tail of the kangaroo instead of catgut. In May, 1887,[1] I published a further contribution to the study of perineal injuries and the restoration of the pelvic floor. In this article I advocate a modification in the dissection, in that I carefully find and separate the posterior third of the vagina, not its mucous membrane, from the more or less deformed perineal structures. "My dissection is to separate the vaginal muscle from its pathological relations, and is continued so as to reach the lateral sulci, and, in its closure, not only is intended to, but does overcome the patulous condition of the introitus vaginæ in cases of great relaxation. . . . . A curved needle, threaded with tendon or catgut, is introduced into the bottom of the wound, and then it is carried carefully, in deep suture, from opposite sides of the *lateral sulci*, behind the vagina. The posterior vaginal space being thus approximated, the same suture is continued deeply into the *retracted* ends of the transversus perinei, and tied without extending externally. This, of course, is intended to remain as a buried suture, and subsequent success is dependent upon its aseptic condition. More recently, I have threaded each end of the tendon, and introduced the needles from opposite sides, thus making a double stitch. . . . In a number of hospital cases well selected, the patients under careful supervision, I have omitted the pins, trusting to the deep buried suturing. At present, I do not feel safe in commending this practice generally, but if trustworthy, it will be a manifest gain to both patient and surgeon."

[1] The Physician and Surgeon, vol. ix. Nos. 5 and 8.

In June, 1887, at the meeting of the American Medical Association, Dr. E. W. Cushing, of Boston, in a paper contributed to the Obstetrical Section, reported *my method* of operation, and gave the result of our experiences in associated work. In this paper, he claims nothing original, refers approvingly to my methods, but states that the use of catgut, as a continuous suture in repair of the perineum, is due to Schroeder. In a very recent publication he writes: "At the meeting of the American Medical Association, in 1887, I reported my method of operating for ruptured perineum, by joining Schroeder's system of buried catgut sutures in layers, to Dr. Jenks's method of splitting the flap, followed by a cure in every case."

As we have seen above, in my paper read before the Obstetrical Section of the American Medical Association, in 1883, and again at the Copenhagen Congress, in 1884, I distinctly mention the use of the continuous animal suture in perineorrhaphy. In the *Annals of Surgery*, December, 1881, in an editorial upon "Animal Ligatures," I discuss the advantages arising from their use as sutures and the changes which ensue, when antiseptically buried in the tissues. I there advocate the use of the tendon from the kangaroo as a *buried suture*, taken as a double and also as an over-and-over continuous stitch. I first used, in 1871,[1] the buried animal suture in hernia, and soon after, published the results of a series of physiological, experimental studies upon animals, undertaken to demonstrate the advantages of the buried suture.

A résumé of these studies may be found in the *New England Monthly Medical Journal*, June, 1883, in a paper upon "The Animal Ligature." "For the same reason, in the use of the deep suture, we have sewed the catgut or tendon with the over-and-over stitch, or the ends from opposite directions through the same opening, after the manner of the shoemaker. The continuous suture has a double advantage. It reduces the number of knots to one or two, which is a considerable gain where a number of stitches are required, and the collateral swelling is equalized by distributing the pressure of the suture throughout its entire length. This insures a uniformity of circulation in the enclosed portion, and thereby lessens the devitalization of the tissues, causing a more sure and

[1] Boston Medical and Surgical Journal, Nov. 1871, p. 315.

rapid process of repair to ensue. This method of suturing is especially to be recommended in the closure of large hernial openings, the ligature of the stump of a uterine tumor, or a large ovarian pedicle." From that time until the present, I have applied the buried animal suture for the coaptation of nearly all wounded surfaces.

According to Martin, catgut was first used in Germany as a deep suture by Werth, in 1879. Doléris adopted its use in perineorrhaphy in 1885, and soon after Schroeder recommended it for perineoplasty.

Results, rather than the origin of methods, are the facts sought for by the profession. German surgeons may never have heard of my labors, but as the records stand, I am clearly entitled to priority in the use of the buried continuous animal suture. The manner of applying the suture, called the shoemaker's stitch, quite unlike any other, I demonstrated at the International Congress, in London, in 1881, and, so far as I know, its originality has never been questioned.

A brief résumé of my operation will close a paper already too lengthy. In incomplete ruptures, with more or less prolapse, the transversus perinei muscle can no longer be felt as a band in front of the rectum, and the pubo-coccygeus has lost its tonicity. The restoration of these, with the various attachments of the sundered groups, is the object sought.

The patient, etherized, is placed on a table, in a good light. The limbs are flexed, and both thighs are carried closely to the abdominal wall. This position is retained by the aid of assistants or the Clover crutch, which has been simplified by Dr. Kelly, of Philadelphia. Under the hips is placed an inflated rubber irrigating pan, with a large efferent tube, to conduct the fluids into a receptacle under the table. These inflated rubber receptacles are a great convenience, preventing all soiling of patient and surgeon, and were first made for me, nearly ten years ago, by the Davidson Rubber Co., of Boston. Somewhat recently, with a slight modification, they have been introduced to the profession as the "Kelly pad." The irrigation, with a 1 to 2000 mercuric bichloride solution is under the charge of an assistant, and the entire operation is conducted with due antiseptic care.

The sphincter having been stretched and the bowel thoroughly

emptied, two fingers in the rectum, the posterior third of the vagina is separated, with knife or scissors, from its vulvar attachments. The recto-vaginal space is easy found, without much loss of blood, and the dissection of the vagina from the rectum is carried into the lateral sulci as far as may be judged sufficient. The *separated flap is lifted* and held by an assistant; then I introduce a large curved needle, the eye near the point, armed with tendon, deeply from side to side; the opposite end is threaded, and the needle withdrawn, carrying the tendon with it.

The suturing is continued in this way, until the required number of stitches are taken (Plates VII., VIII.). In rectocele, with prolapse and large deep sulci, the deeply buried double stitch is taken on either side, to join the separated fibres of the levator loop with the retracted transverse perineal muscles, and then these are united laterally (Plate IX.).

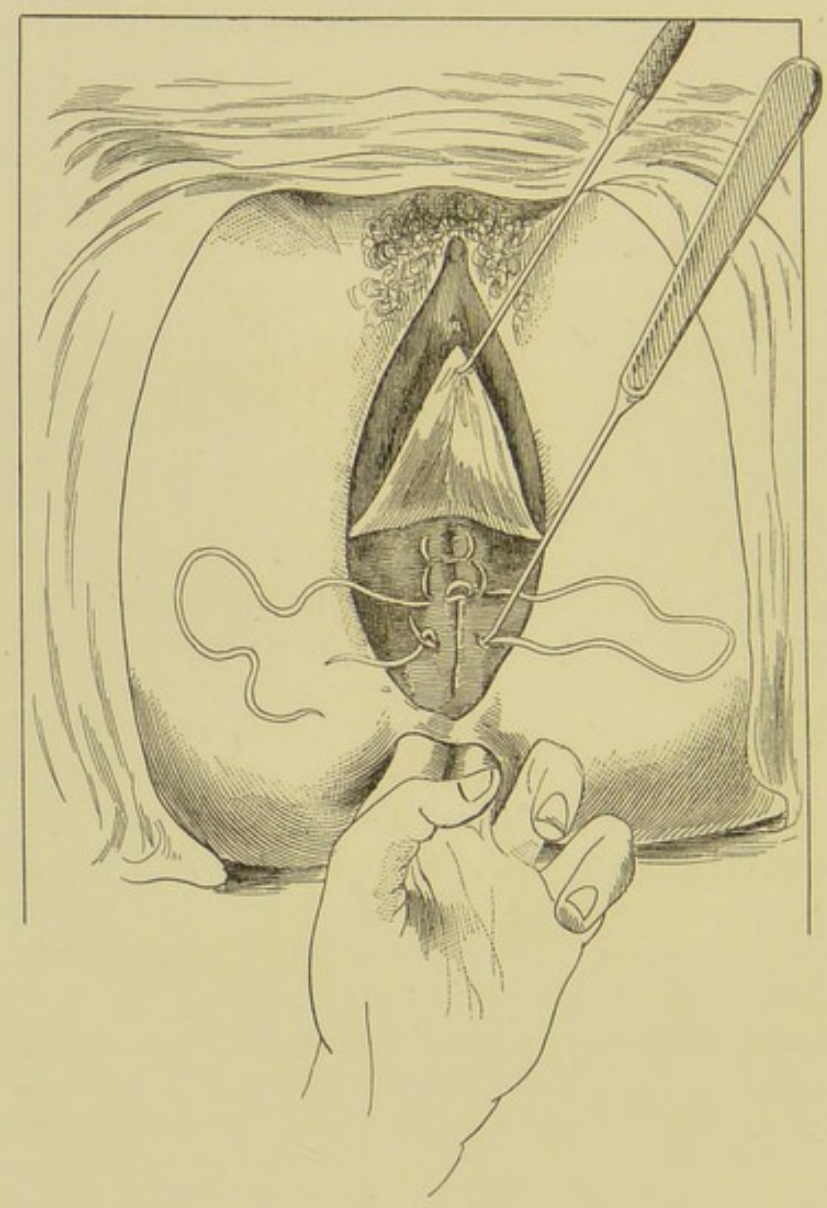
Usually, four or five stitches are required to unite the posterior vaginal fascia, and then the separated ends of the perineal muscles are included by deep sutures. Any other needle and stitch may be used, but I prefer the one above mentioned.

In prolapse, where there is great redundancy of the posterior vaginal wall, a portion may be required to be removed, otherwise the edges of the inverted sides are united vertically. I use the buried suture, as described above, in recent cases, and seal with iodoform collodion.

In complete ruptures, after a careful refreshing of the sundered edges, I split laterally with a sharp knife, between the rectum and vagina, quite sufficiently to permit a free separation of the flaps. Over the sphincter, it is usually necessary to carry the dissection in a posterior direction in order to reach the retracted ends of the sphincter muscle. The lateral dissection must also be sufficiently deep to reach the separated ends of the transversus perinei muscles. To effect this, the posterior third of the torn vagina is usually detached.

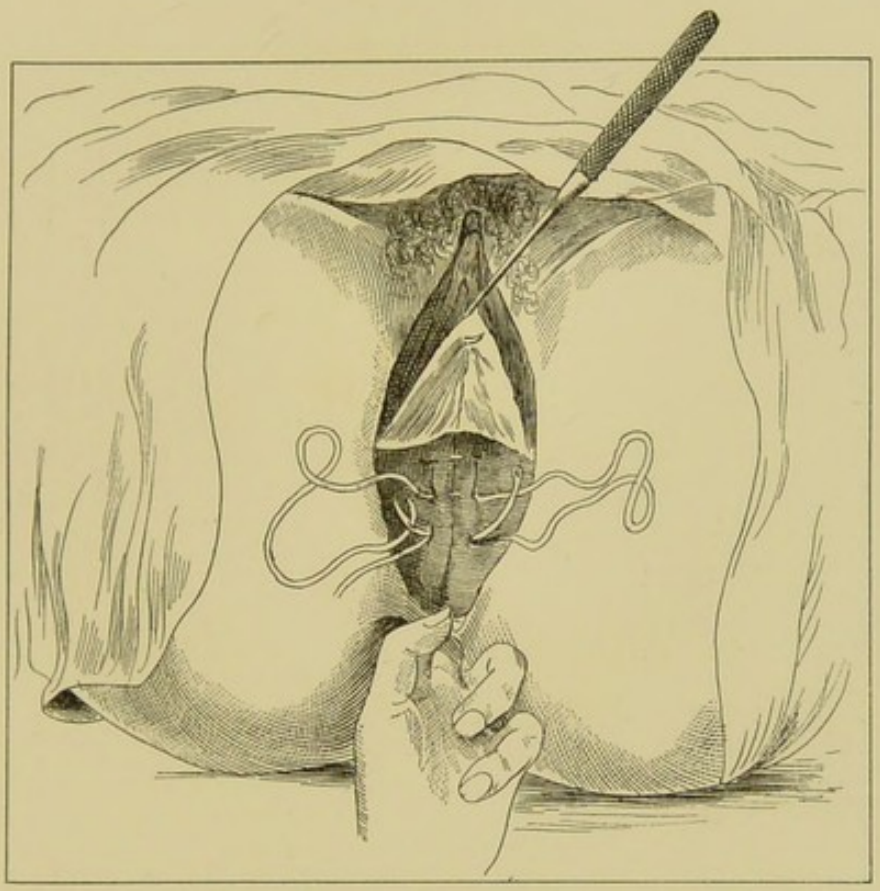
If the ends of the retracted perineal muscles seem tense when united, I use the lateral supports, applying one or two pins as heretofore described. These serve simply to retain at rest the coapted parts, and lie parallel to the anus outside of the sutures. If the operation is aseptic, the after-treatment is simply rest in bed, and the cure is complete. The operation should be conducted with the

PLATE VII.



Represents the uniting of the widely separated transversi muscles by the double, continuous, buried, animal suture. The posterior vaginal wall is lifted and held by an assistant.

PLATE VIII.



Showing the operation conducted as in Plate VII., except a Hagedorn needle with eye added near the point, is substituted to serve for the more expensive needle, especially constructed for sewing with the Marcy stitch. The needle is rethreaded, with the opposite end ready for withdrawal.

PLATE IX.

FIG. 1.

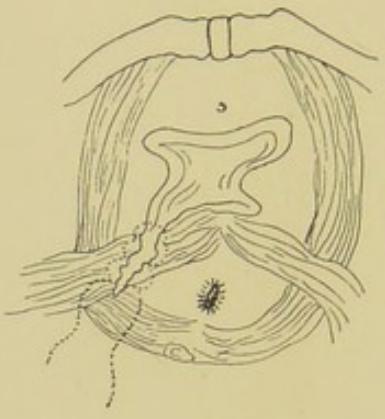
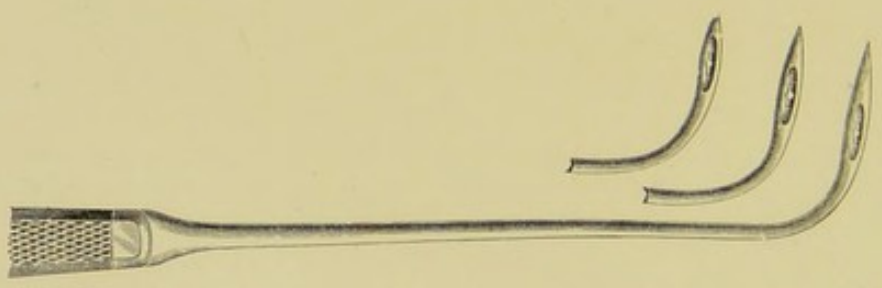


Diagram showing the union of the deep lateral sulci by the buried continuous double animal suture.

FIG. 2.



Needle specially designed for the use of the double continuous buried animal suture. The eye is made large for ease of threading, and the lateral slots hold the suture from slipping.

PLATE X.

A new depressor or speculum.

On page 31 of the *Transactions* reference is made to the exhibition of the above instrument. It is introduced here, since it has been devised as the result of the studies upon which the principles underlying the methods advised for the restoration of the perineum are based. Its simplicity offers little need for explanation. The vaginal portion is constructed so as to cause a minimum of pressure upon the vulvar outlet. It is irregularly broadened within, so as to secure a firm hold without slipping upon the levator loop, and this allows of depression without overstrain of the external tissues, and permits the foreshortening of the instrument to the minimum, scarcely more than one inch in length. When the uterus is of normal mobility the cervix may be easily brought to the vulva. The anterior vaginal wall and the uterus are, by its use, rendered much more accessible. The handle is made hollow for the escape of the irrigation fluid, and roughened for a secure hold.

strictest care, since it is difficult to operate upon this portion of the body without contamination of the parts involved. The sutures should be applied under irrigation, and the parts about the vulva covered with towels wet in a sublimate solution. Of all surgical procedures, few can be more dangerous than the deep implantation of infection carried by a septic buried suture.

My method differs from others in the following particulars:

1. The dissection of the posterior third of the vagina, not its mucous membrane, from its vulvar attachment, carried, as deemed necessary, into the recto-vaginal space, and the retention of this flap.

2. In rectocele with prolapse, the closure of the deep layers of the post-vaginal fascia by a continuous buried animal suture, taken either in single or double stitch.

3. In lifting forward the vagina from its vulvar attachment, the retracted transverse perineal muscles, with their connections, can be reached and closed also by a deep buried suture, making in this way a true restoration of the pelvic floor.

4. Coapting all superficial surfaces by a buried animal suture, applied in a blind continuous stitch from side to side, covering the same, when dry, with iodoform collodion.

5. The application of lateral supports, pins external to the sutures as a splint, to hold the parts in complete apposition without strain.

6. In complete ruptures, the lateral dissection, the joining of the rectal and vaginal edges with buried sutures, and then finishing the operation as in incomplete ruptures.