
Chapter 4

RELAXATION AND FISTULAE

of the Pelvic Floor, Perineum, External Genitals, and Vagina

Points in Anatomy

The term "pelvic floor" is applied to that group of structures which closes in the pelvic outlet and supports the organs above it. The principal supporting structures are the levator ani muscles and associated fasciae. They are indicated diagrammatically in Fig. 373. The levator ani muscles, arising from each side of the pelvis and joining in the median line, form a sling which holds up the vagina and rectum and at the same time holds their lower ends forward under the pubic arch.

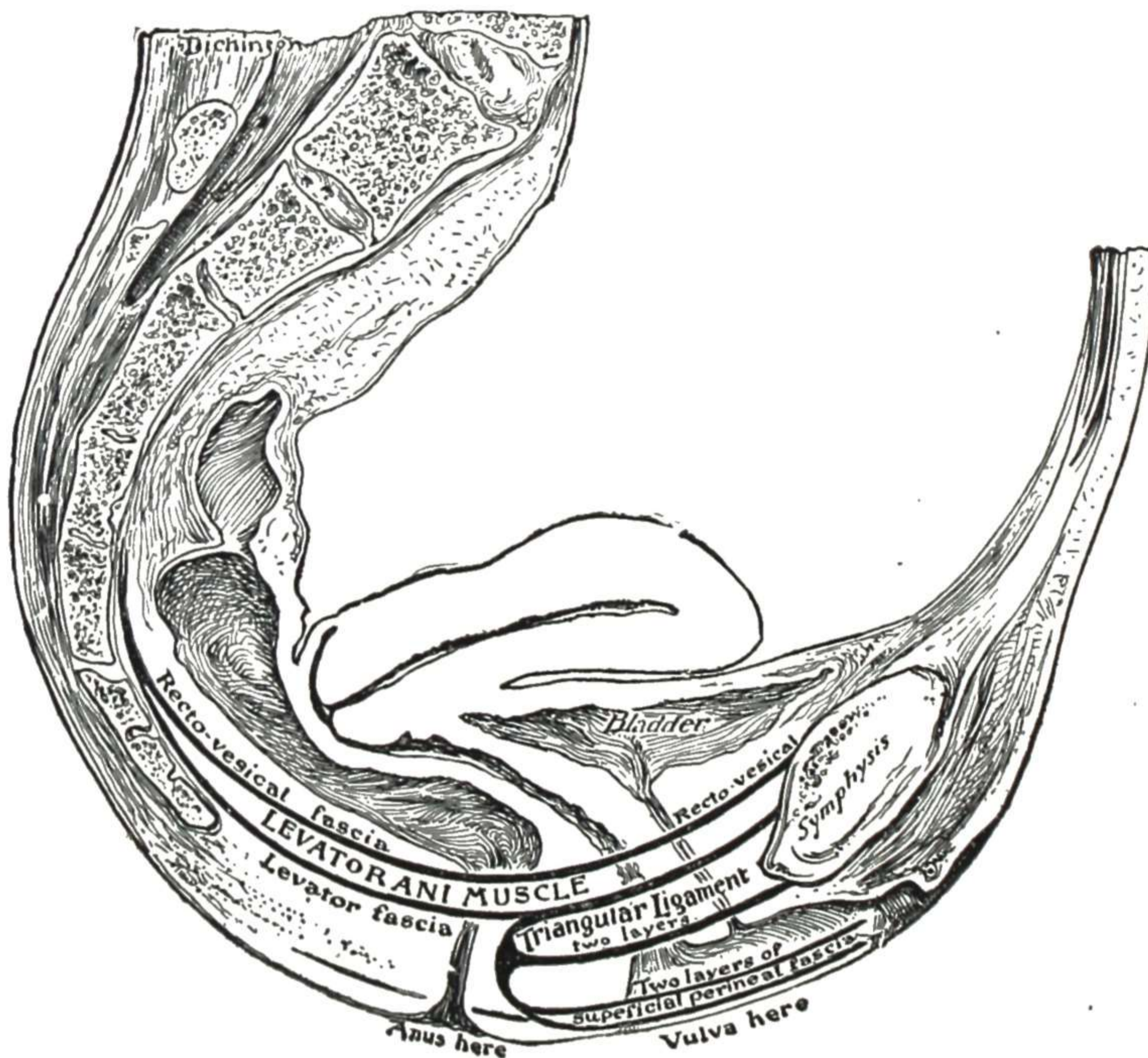


Fig. 373.—A diagrammatic representation of an anteroposterior section of the pelvis, showing the various fascial layers of the pelvic floor. (From Dickinson: American Textbook of Obstetrics.)

Each levator ani muscle arises in front from the posterior surface of the pubic bone, behind from the spine of the ischium, and between these points from the "white line" that marks the division of the pelvic fascia. The anterior portion of the muscle passes downward and toward the median line and unites with a corresponding portion of the muscle of the opposite side. Some

of the fibers unite with the lower part of the vagina, some with the lower part of the rectum, some between the vagina and rectum, and many of them back of the rectum. The most posterior fibers of the muscle unite with the coccyx. Lying back of the posterior part of the levator ani muscle is the coccygeus muscle. The action of the levator muscles, in conjunction with the fascia above and below them, is to hold forward the lower end of the rectum and vagina

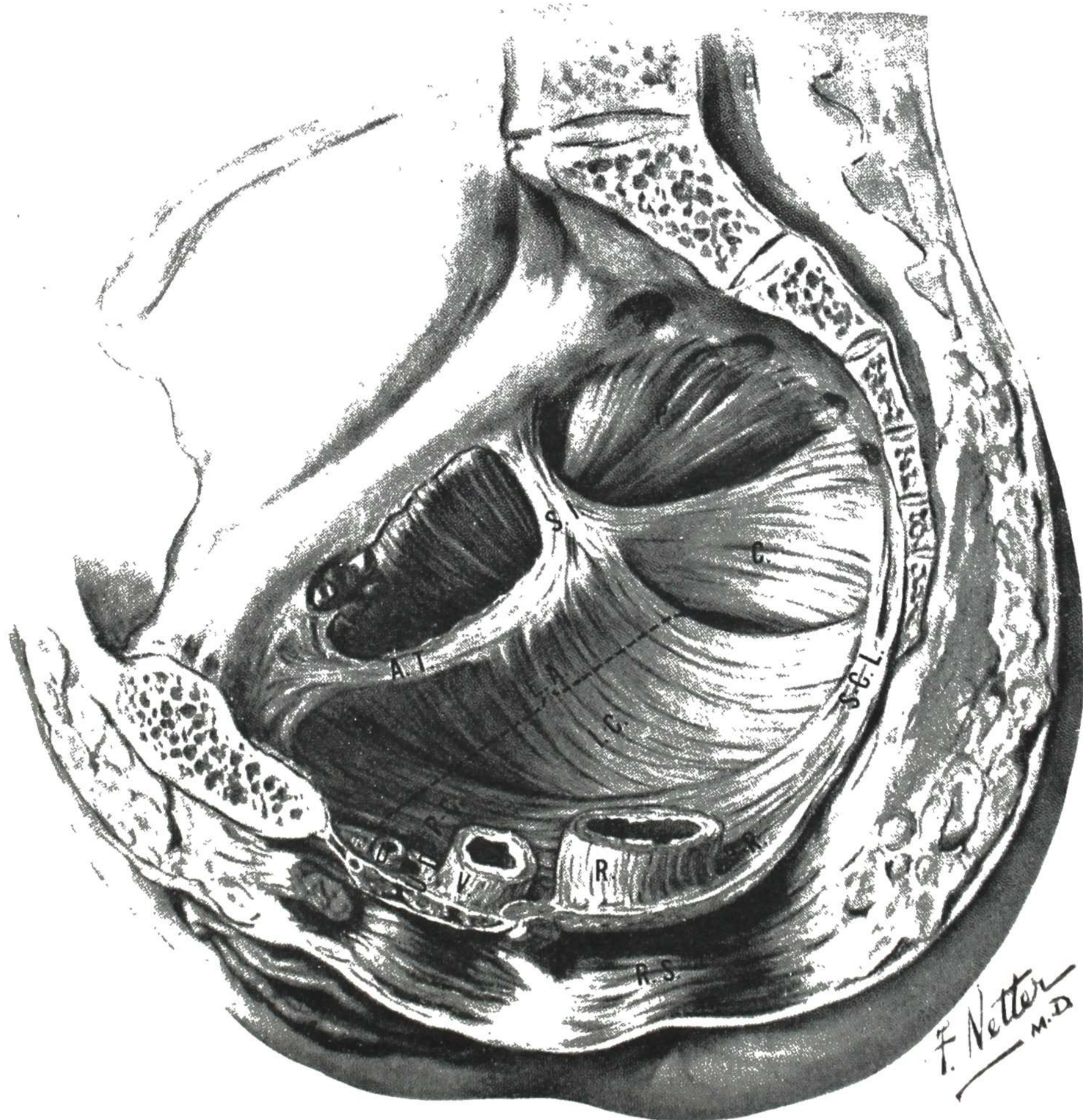


Fig. 374.—E.A., Levator Ani; I.C., Iliococcygeus; P.C., Pubococcygeus; P.R., Puborectalis; A.T., Arcus Tendineus; O.I., Obturator Internus; S.I., Spine of the Ischium; U., Urethra; V., Vagina; R., Rectum; S.C.L., Sacrococcygeal Ligament; U.D., Urogenital Diaphragm; P., Pyriformis; C., Coccygeus; R.S., Rectal Sphincter. (Courtesy F. Netter and Wyeth Laboratories.)

close to the symphysis pubis, and at the same time to form a sling which closes the pelvic outlet and supports the organs above (Figs. 374 to 380). Waldeyer has given this the very appropriate designation of “diaphragm of the pelvis.”

When the muscles and fasciae are torn, the effect is twofold:

1. The sling is lengthened and does not furnish the support it previously did.

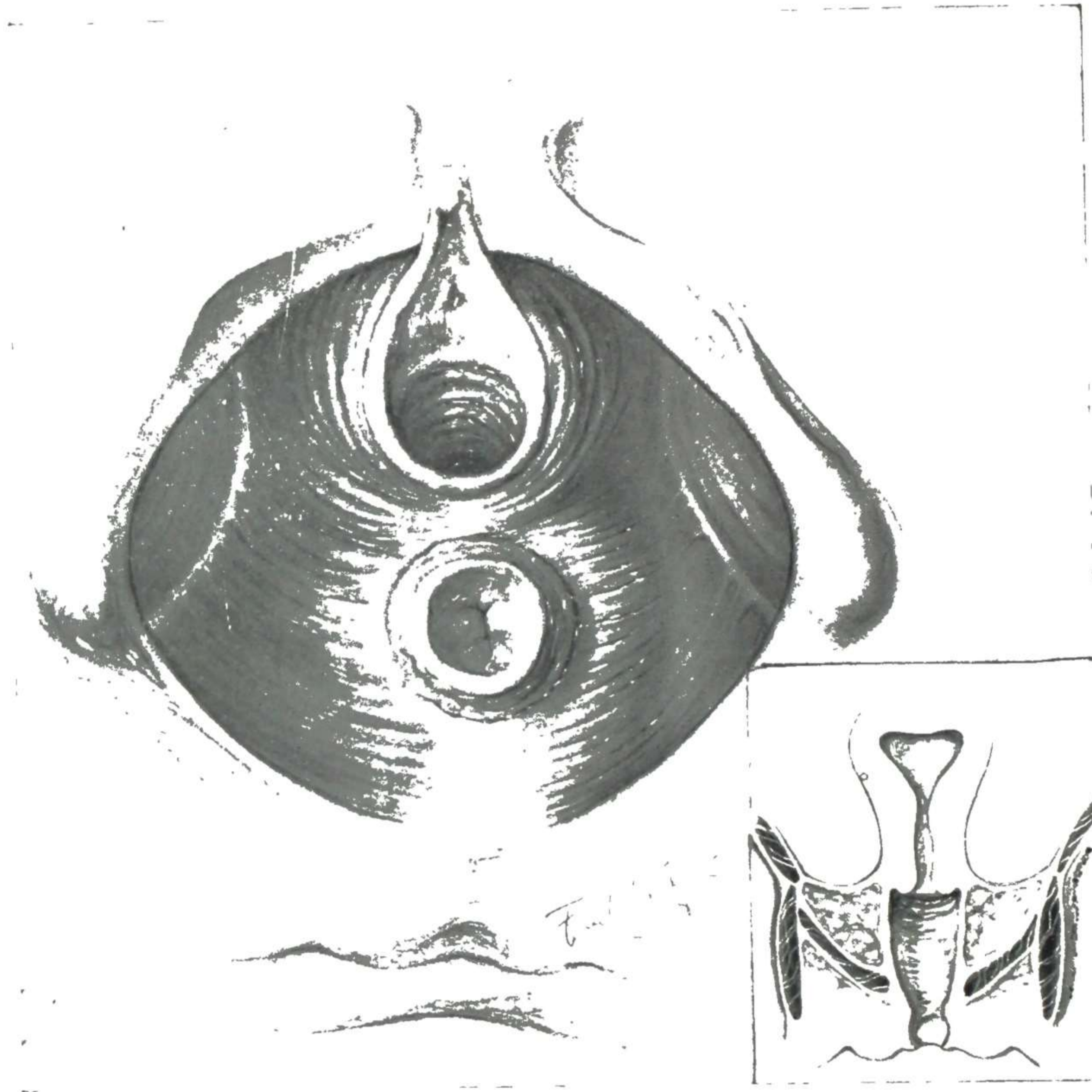


Fig. 375.—The relationship of the levator ani muscle to the rectum and vagina as seen from below. Inset, The same relationship as seen in a frontal section. (Modified from original by Tom Jones in *Camp Anatomical Studies*.)

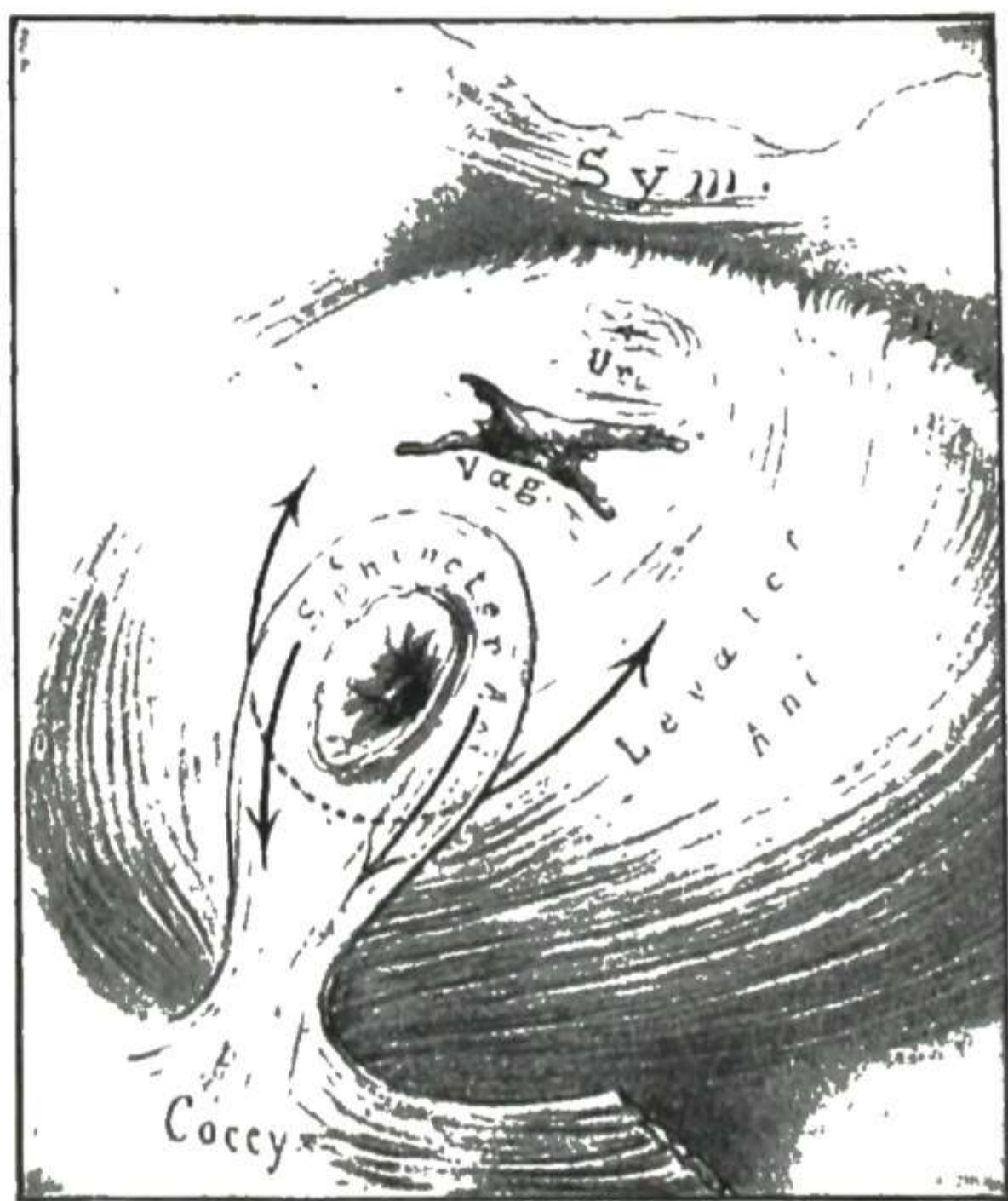


Fig. 376.

Fig. 376.—Actions of the pelvic sling. It tends to draw the vaginal opening and the anus forward under the pubic arch at the same time that it supports them. (From Kelly: *Operative Gynecology*.)

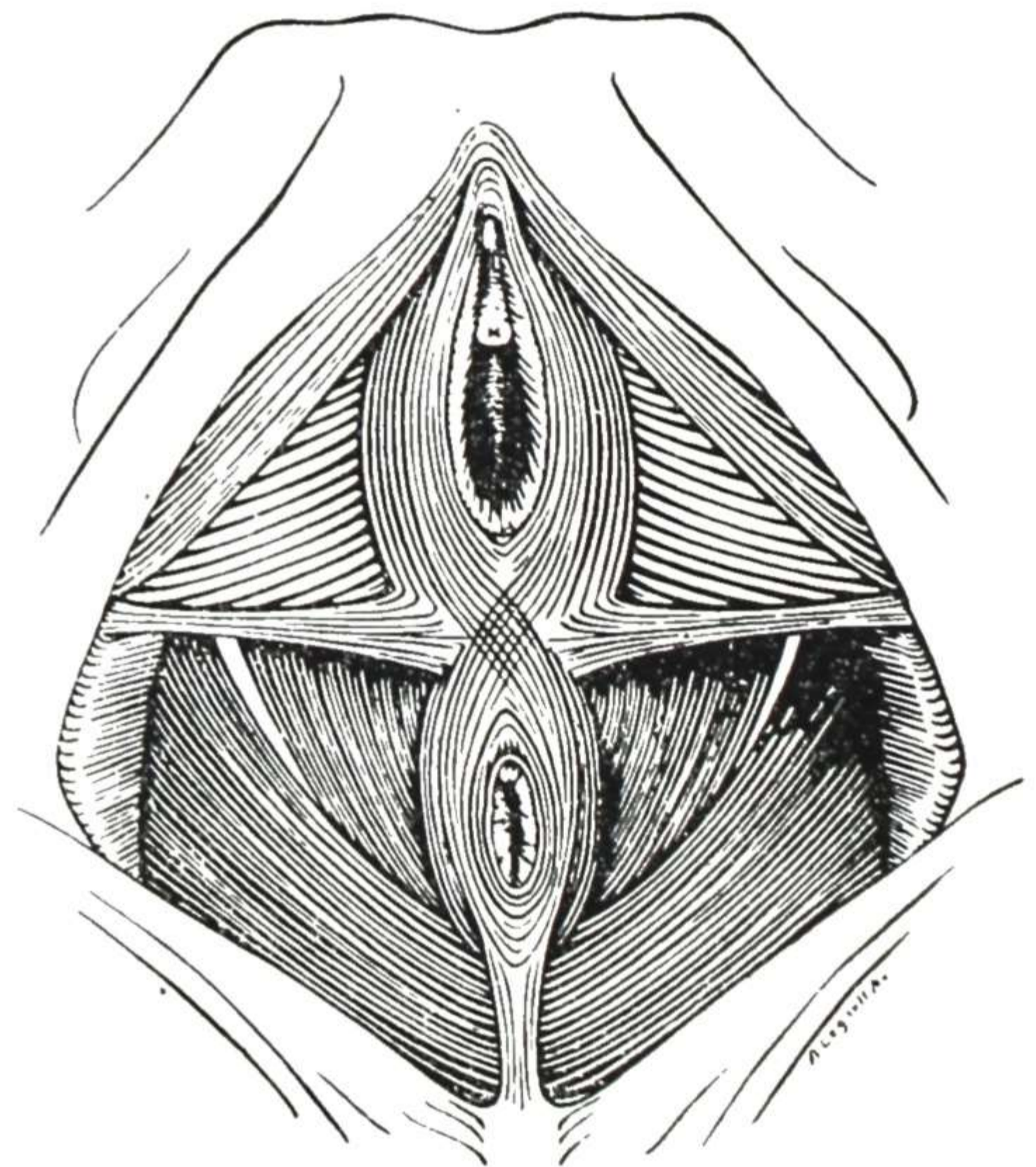


Fig. 377.

Fig. 377.—Schematic representation of the sphincteric muscular group of the pelvic floor. (From Power: *Surg., Gynec. & Obst.*, September, 1946.)

2. The vaginal and rectal openings (the weak places in the pelvic floor) are allowed to sink backward into the line of pressure, so that the weight from above, which formerly fell on the muscle and fascia, now falls on the openings.

The perineum is defined anatomically as the space at the pelvic outlet, its boundaries being formed by the bony and ligamentous margins. The soft structures closing this outlet are referred to collectively as the pelvic floor, the most important factor in pelvic floor support being the fibromuscular sling or diaphragm formed by the levator ani muscles and the fasciae immediately above and below them. (Fig. 374.)

Several of the superficial muscles of the region meet at about the center of the perineal space, as shown in Fig. 378, and form there a rather firm body of tissue which lies between the lower end of the vagina and the rectum (Fig. 379). This is the perineal body, and the cross section in Fig. 380 indicates its structure. For convenience, the anatomical term "perineal body" is usually shortened to "perineum" in gynecological conversation and writings. Keeping in mind this gynecologic restriction when the term "perineum" is used should prevent any confusion with the strict anatomical definition as the entire space at the outlet of the bony pelvis.

Clinical and anatomical study have shown that the perineal body is not a large factor in pelvic support, the important supporting structures lying deeper, as above mentioned. Hence the expression "repair of perineum" is not a satisfactory descriptive term for repair of the supporting structures of the pelvic floor.



Fig. 378.

Fig. 379.

Fig. 380.

Figs. 378, 379, and 380.—Showing the perineal body, as seen on dissection and on cross section and with component parts labeled.

RELAXATION OF THE PELVIC FLOOR

For this common gynecologic condition, so frequently requiring operation, the authors prefer the term "relaxation" rather than "laceration," for the following reasons:

a. It is the presence or absence of relaxation that determines the necessity for treatment. Even though there is immediate repair and perfect healing of the laceration, there may, through subinvolution and lack of tone, be persisting relaxation requiring operation. Again, with an unrepaired laceration, the contraction of scar tissue and regaining of tone may be sufficient to give good support, and there is no relaxation—hence, no cause for operation. The essential lesion, then, considered from the therapeutic standpoint, is the relaxation.

b. The term "laceration" as commonly used, and as interpreted by the patient, often works an injustice to the physician who took care of the patient during confinement. In a considerable proportion of cases the patient comes to the gynecologist with her mind poisoned against her former physician because some other physician has told her, bluntly and without qualification, that her present trouble is due to having been "torn in labor."

The average patient interprets this as conclusive evidence of faulty care. In fact, she not infrequently begins her story with the statement that her trouble is due to neglect in confinement—this she knows because of having been informed that she was suffering from “a laceration.”

Now, as a matter of fact, this wholesale condemnation is not warranted. Of course, in some cases the relaxation, for which the patient seeks relief, is really due to the fact that an extensive tear was not repaired at all or was repaired in a faulty manner. In a considerable proportion of the cases, however, the relaxation is due to entirely different causes. There may have been no open laceration, the overstretching having been accomplished by submucous lacerations (many or few) which could not even be located, much less repaired. Again, if pelvic floor involution is imperfect, as it often is in atonic patients, marked relaxation may result without there having been any definite lacerations, either open or submucous. This form of relaxation is especially likely to occur if the patient has repeated pregnancies at short intervals. Again, in certain cases, laceration or division of tissue must necessarily accompany delivery of the child. The wounds may fail to heal satisfactorily in spite of the utmost care. Again, a pelvic floor which is good two months after labor may be found greatly relaxed later, owing to displacement of the uterus or to heavy lifting (as of a heavy child) or to persistent straining or coughing associated with an atonic condition of the tissues. These facts are well known to every physician who has made a real study of the anatomy of the pelvis and of the physiology and pathology of parturition.

In view of the above facts, it is incumbent upon us to employ some term, for the condition under consideration, which does not in itself carry condemnation to the mind of the patient. “Relaxation” is such a term. It simply designates clearly the condition demanding relief, leaving open the question as to which one of the above-mentioned causes may have been present in that particular case.

Etiology

The usual cause of relaxation of the pelvic floor and perineum is **childbirth**. As the child’s head passes through the pelvic outlet, the structures are greatly stretched and there is frequently more or less laceration (Figs. 381 to 383).

Subinvolution is a large factor. The markedly enlarged uterus and vagina and pelvic floor accompanying pregnancy and parturition must undergo the normal process of involution. If this process is not completed there remains an atonic relaxed condition. While subinvolution of the uterus is often mentioned, subinvolution of the vagina and pelvic floor is seldom thought of, though it is no doubt an important factor in many cases of relaxed floor.

An allied factor is the general atonic condition of many patients, which tends to retard normal involution and restoration of local tone after childbirth. Also, after repair, an atonic condition may permit restretching of the healed tissues.

Prophylaxis.—In a fresh laceration of the pelvic floor or perineum in labor, the rule is to repair the injury at once. Even though the tear is not deep enough to damage the pelvic floor, it should be repaired, for every laceration closed lessens to that extent the chance of infection. For the same reason, tears of the anterior vaginal wall or of the vulva should be repaired at once. The details of this immediate repair belong to obstetric work, and need not be considered here.

To prevent subinvolution, certain steps in addition to surgical repair are employed in postpartum care; namely, knee-chest posture (to keep the heavy uterus forward and improve the circulation about it), special exercises to

improve local muscular tone, and a general tonic regimen with frequent periods of recumbent rest to relieve the pressure and strain on the involuting structures. The knee-chest posture and special exercises must not be employed too soon after labor.

On inspection, it is found that, instead of a normal vaginal opening, the vaginal outlet is relaxed—that is, it is open and without tone or resistance (Fig. 381). The two index fingers introduced into the opening may be carried to the sides of the pubic arch with but little resistance. If now the patient be directed to bear down or strain, as in defecation, the sinking and protrusion of the parts become more marked and the relaxation of the floor is more apparent.

The relaxation is progressive, and leads to various complicating conditions. The cervix sinks into the pelvis and comes forward and the fundus uteri frequently goes backward into **retrodisplacement**. Also, the whole uterus lies too low in the pelvis, constituting **prolapse** of the uterus.

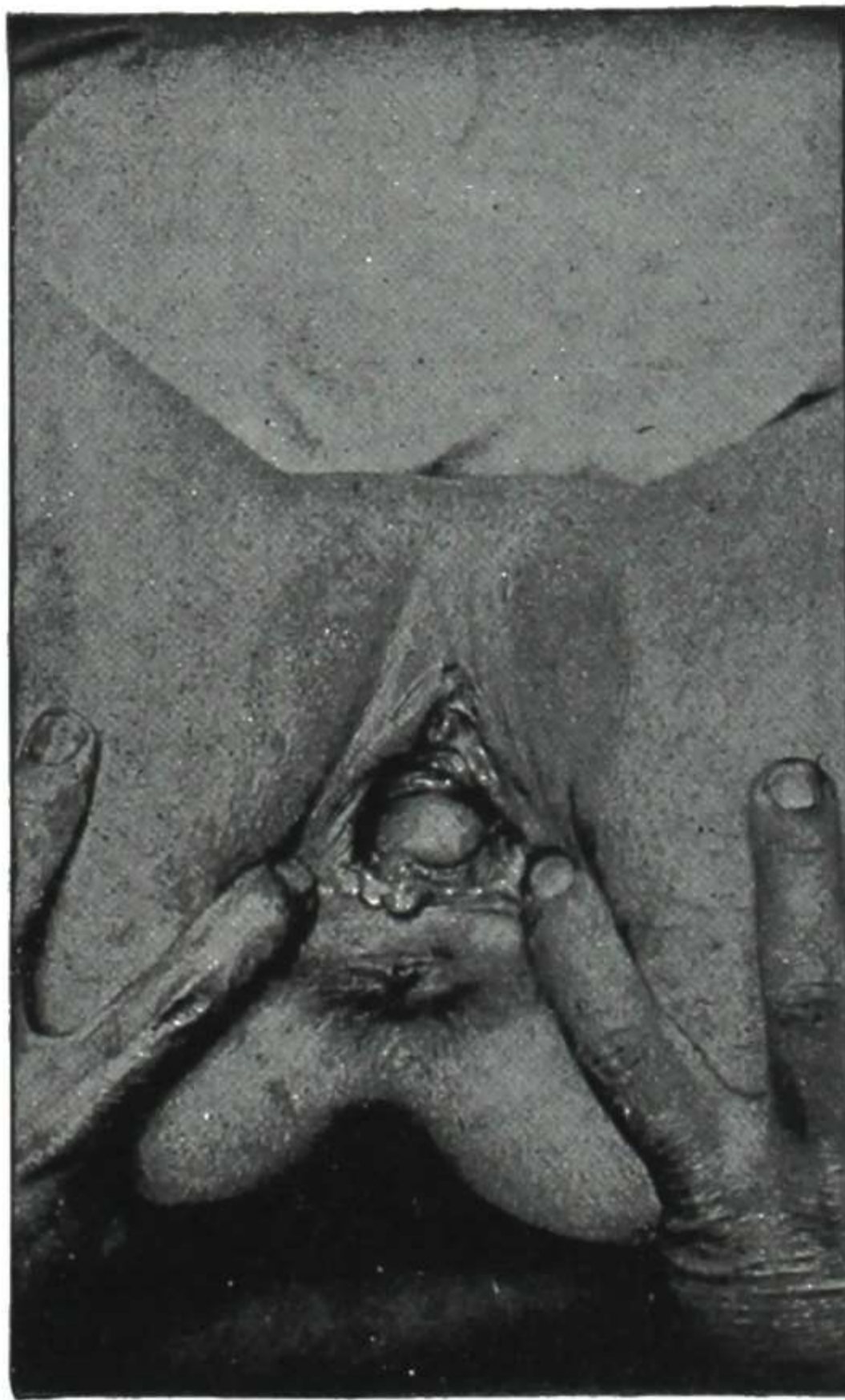


Fig. 381.—An old laceration of the pelvic floor. (From Baldy: American Textbook of Gynecology).

As the damaged pelvic floor and other supports of the uterus gradually stretch more, the uterus may sink so low that the cervix appears at the vaginal opening. As the uterus sinks lower the vaginal opening enlarges and the vaginal walls roll outward, forming an anterior or posterior **colpocele** (Figs. 382 and 383).

With the prolapsed posterior vaginal wall, sometimes the anterior wall of the rectum is found, forming a **rectocele** (Figs. 384 to 386). An appearance resembling rectocele may be produced by prolapse of a thickened vaginal wall. There is areolar hyperplasia and often considerable venous dilatation, giving quite a large projecting mass, but without displacement of the anterior rectal wall. Whether or not rectocele is really present is easily ascertained by

rectal examination, to determine if the anterior rectal wall is pouched forward with the vaginal wall (Fig. 384). In some cases of rectocele a large pouch is formed and interferes much with emptying the rectum, it being necessary for the patient to push back the protruding rectocele to secure satisfactory bowel movement. Rectocele is sometimes found in combination with a cul-de-sac hernia; the method of differential diagnosis is shown in Figs. 384 to 386.

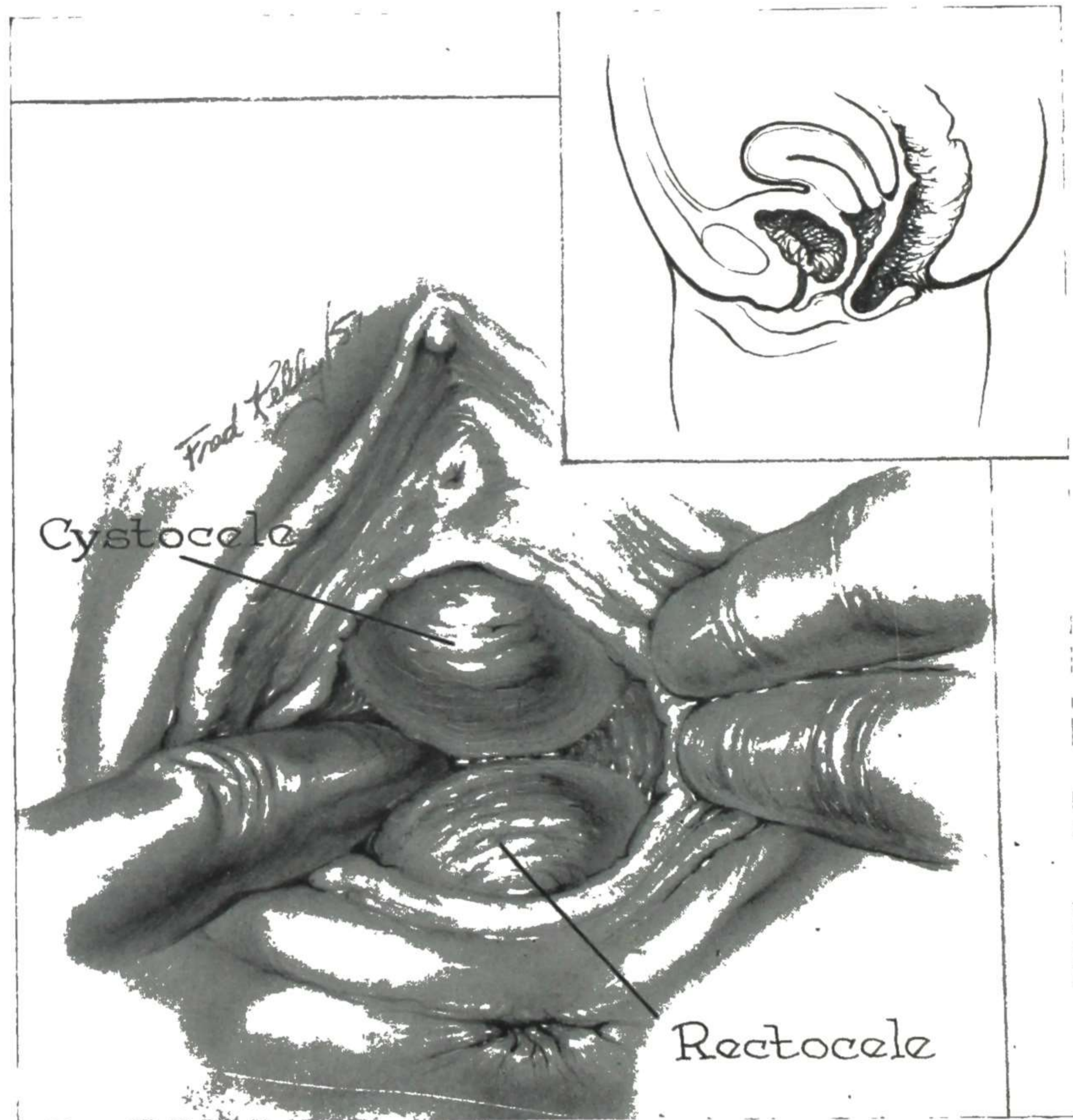


Fig. 382.

Fig. 383.

Fig. 382.—Cystocele and rectocele resulting from unrepaired tears in the muscles of the pelvic floor and those under the bladder, usually following childbirth.

Fig. 383.—Inset showing sagittal section in cystocele and rectocele.

If the base of the bladder follows the prolapsing anterior vaginal wall, the condition is known as **cystocele** (Fig. 382). Sometimes a supposed cystocele is found to be only vaginal wall. In marked cystocele, a large pouch is formed at the floor of the bladder, in which residual urine remains and decomposes, causing much bladder irritation. It is sometimes necessary for the patient to push back the protruding cystocele before a satisfactory evacuation of the bladder can be secured. Straining at defecation or urination greatly aggravates the cystocele. In some cases both rectocele and cystocele are present (Figs. 382 and 383).

The patient complains of dragging weight on the pelvis, of a feeling of weakness at the vaginal outlet, as though the parts were coming down and out, and usually of backache across the sacral region. The symptoms come principally when the patient has been on her feet some time.

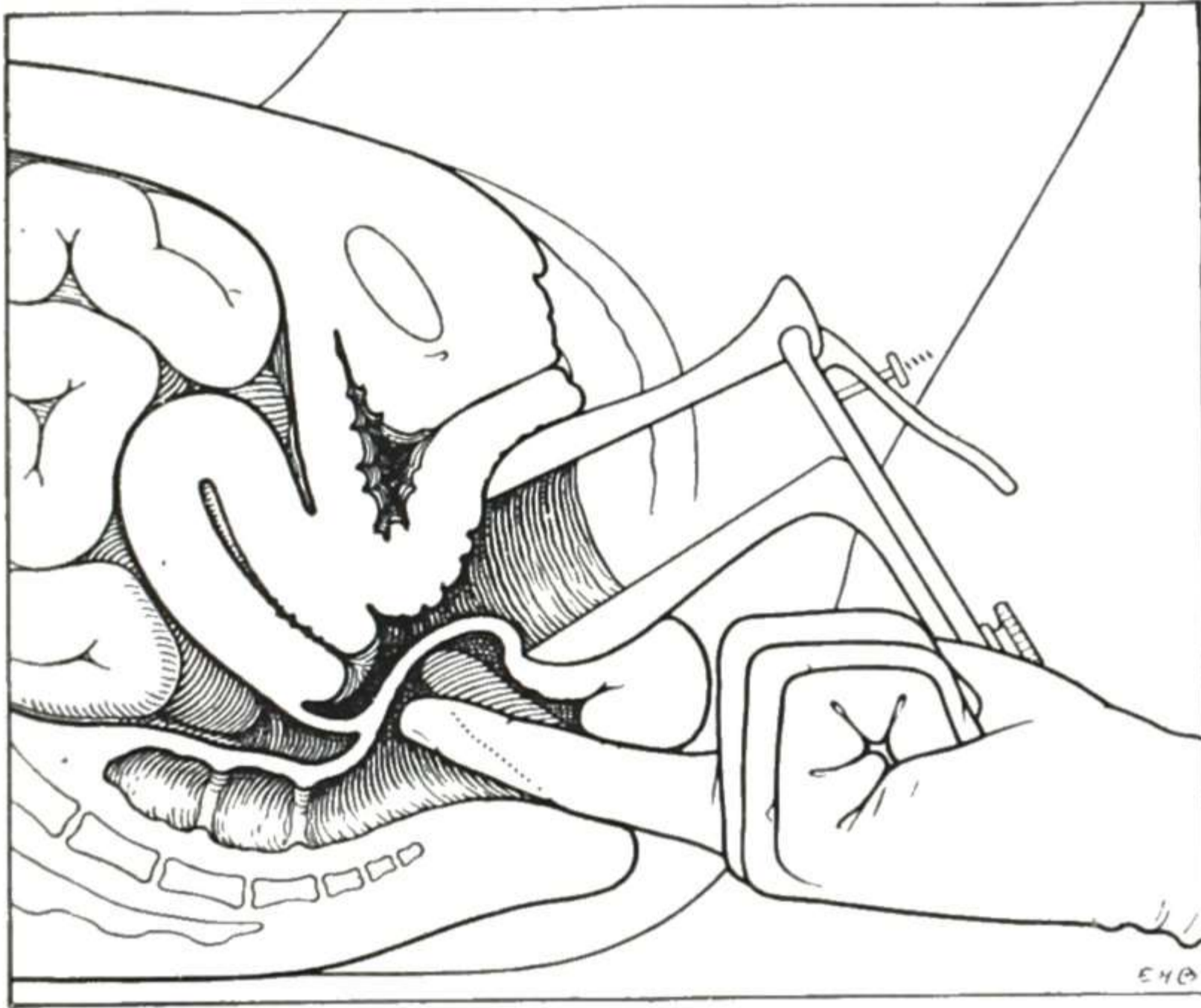


Fig. 384.

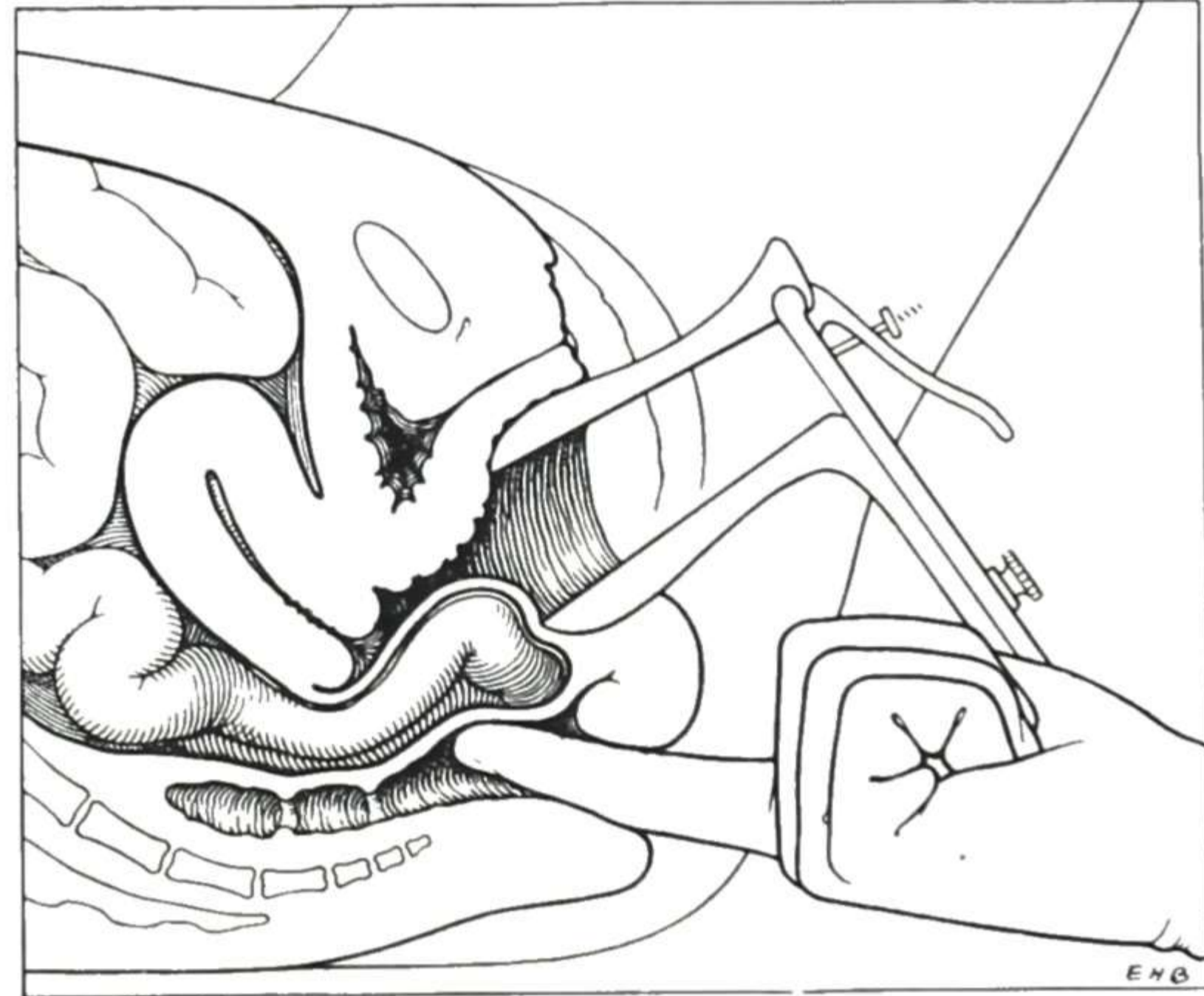


Fig. 385.

Fig. 384.—Demonstrating rectocele above firm perineal body. Withdrawal of speculum permits rectal wall to “fall away” from rectal finger, which follows into sacculated rectocele.

Fig. 385.—Demonstrating enterocele. On withdrawing the speculum the enterocele bulges into the vagina, but the rectal wall maintains contact with the rectal finger, for the enterocele separates and “fills” the rectovaginal septum.

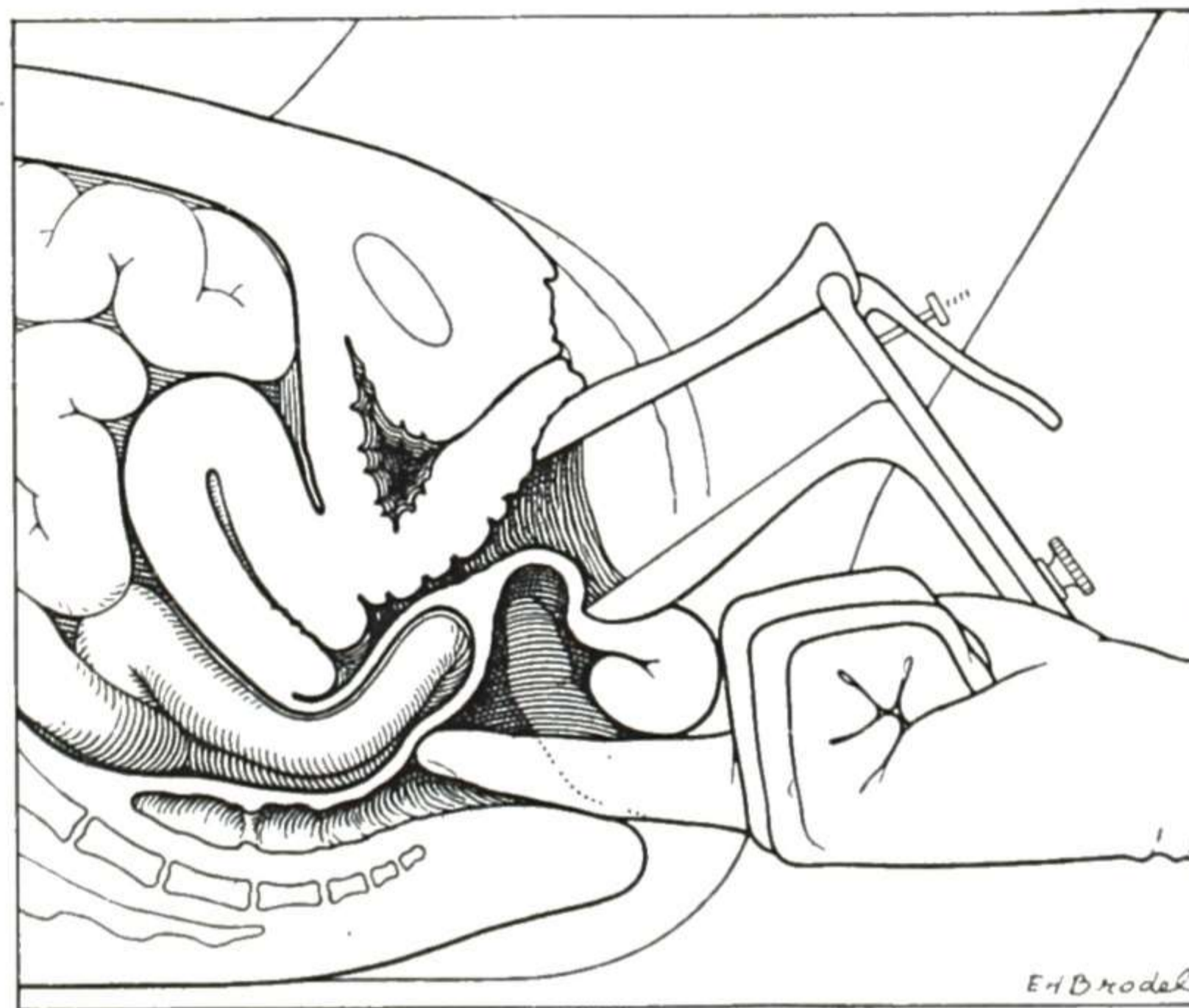


Fig. 386.—Demonstrating enterocele and rectocele. As the speculum is withdrawn, the enterocele herniates into the vagina but the rectal wall maintains contact with the rectal finger. Further speculum withdrawal reaches the site of rectocele, and now the rectal wall falls forward away from the finger, which must flex to maintain contact.

(Figs. 384 to 386 from Waters: *Am. J. Obst & Gynec.*, November, 1946.)

When the vaginal entrance is relaxed, air can enter the vagina, and it is sometimes expelled with more or less noise, which is very annoying to the patient. This phenomenon is known as “flatus vaginalis.” It is merely a symptom of relaxed vaginal orifice. It was formerly described under the queer title of “garrulity of the vulva.”

In relaxation of the pelvic floor, there are frequently present vaginal discharge, painful menstruation, irregular menstruation, excessive menstruation, attacks of severe pelvic pain, dyspareunia, sterility, abortion, backache and dragging; and general poor health. These symptoms, however, are due principally to **associated diseases**, some of which may be traced to the laceration. The diseases frequently associated with relaxation of the pelvic floor are chronic cervicitis, subinvolution of uterus, endometrial hyperplasia, retrodisplacement of uterus, prolapsus uteri, parametritis, chronic salpingo-oophoritis.

All lesions present should be found and their severity determined before operative treatment is undertaken.

Treatment

Kegel has emphasized the physiologic treatment of poor tone and function of the genital muscles. He devised an apparatus by which the patient can reeducate her muscles through resistive exercises. He obtained good results at all ages and in some instances helped cases of stress incontinence.



Fig. 387.—Pessary for moderate-sized cystocele. (From Stimson: *Am. J. Obst. & Gynec.*, September, 1938.)

Operative treatment may be required when the relaxation is causing troublesome symptoms which are not relieved by the resistance exercises mentioned above. But it is important to be certain that the troublesome symptoms are really due to the relaxation, and not to something else. Patients waiting for operation, or inoperable cases, may sometimes be made more comfortable by one of the pessaries used in retrodisplacement or in prolapse.

Various pessaries have been devised to support moderate cystoceles, and one of them is a modified Smith pessary suggested by Stimson (Fig. 387). Astringent douches, and recumbent rest several times daily, also help.

Object of the Operation.—The object of the operation is to restore a strong sling across the pelvic outlet to support the organs above. To restore the integrity of the pelvic floor, the following two things must be accomplished:

1. The musculofibrous pelvic sling must be shortened so that the slack is taken up.

2. The vaginal opening (the necessarily weak place in the pelvic floor) must be brought forward under the pubic arch and, consequently, out of the line of direct pressure from above.

Repairing the perineum is known as "perineorrhaphy." Suturing the vaginal wall is designated as "colporrhaphy."

Though the literal meaning of each of these terms is limited, they are frequently used to indicate the general suturing necessary in these cases. A more accurate and comprehensive designation for this operation is "repair of the pelvic floor." This operation comes under the general class known as "plastic operations," which includes also operation for cystocele and closure of fistulae and certain prolapse operations.

Methods of Shortening Sling.—The treatment of relaxation of the pelvic floor consists in taking up the slack, so that the pelvic sling is sufficiently shortened, and in restoring the perineal body, so as to carry the weak place in the pelvic floor (the vaginal opening) forward, out of the line of direct pressure.

The pelvic sling, the strong supporting part of the pelvic floor, consists of the levator ani muscles and the fascia above and below. This musculofibrous sling or diaphragm is the structure worked upon in repair of the pelvic floor. Shortening of this sling restores the pelvic-floor support, while if there is no shortening of the sling there is no lasting restoration of support.

Steps in Pelvic Floor Repair

Details of the operative steps for the ordinary relaxation operation are as follows:

1. *Planning the Restored Vaginal Opening.*—By careful examination of the vaginal entrance, the opening of the duct of the vulvovaginal gland may be identified on each side. Just below this on each side, at the point marked (x) in Fig. 388, the tissue should be caught firmly with the Allis forceps.

It is well to keep away from the vulvovaginal glands, if practicable, by keeping the incision below, or extending it inside if necessary to go higher. If, however, there are tender tags or infiltrated areas, they should be included in the operative incision.

2. *Opening the Pelvic Floor.*—The incision extends from one forceps to the other (Fig. 389). It should be placed well within the vagina as indicated by the dark line in Fig. 388. When so placed it is farther removed from the rectum, and hence from infection, and is in tissue less sensitive than the perineal skin. The floor may be conveniently opened by clipping off a line of tissue with the scissors, as shown in Fig. 389.

After the line of opening is made, the margin of the flap is bared by knife or scissors and then caught with a T-forceps (Fig. 390). With the gauze-covered finger, the loose connective tissue is quickly rolled off the vaginal flap (Figs. 391 to 393), as high as necessary to make good repair in that case and to take care of any rectocele that may be present.

Care must, of course, be exercised to avoid tearing into the rectum. The layer of veins constitutes the guide to safety. As long as the line of cleavage is kept between these veins and the vaginal wall, the rectum is safe. On the other hand, when the veins are permitted to remain on the vaginal flap, the line of cleavage is going too deeply and a hole may be torn into the rectum at any time.

3. *Identification of the Musculofibrous Sling.*—When the vaginal flap has been raised sufficiently, it is time for the exposure of the pelvic sling. This sling consists of the levator ani muscle on each side and the overlying rectovesical fascia which forms its upper sheath. Both the fascia and the muscle should be included in the sutures, but it is not necessary to

expose the muscle. Exposure and identification of the fascia enable the operator to include the fascia and the underlying muscle in the sutures.

The fascial surface of the pelvic sling is exposed by a combination of two simple maneuvers: (a) the vaginal flap is separated laterally well out to the pelvic wall and (b) the loose connective tissue over the sloping fascial plane is pushed off by a twisting motion of the gauze-covered finger. It is important that the vaginal flap be separated entirely out to the lateral wall (Fig. 394) before trying to bare the fascia, otherwise the twisting finger will not be near enough to the fascia to expose it. The location of the gauze-covered finger and the direction of the pushing-twisting motion for clearing the loose connective tissue from the fascia are shown in Fig. 394.

When the surface of the fascia is exposed, it is identified by its smoothness in contrast to the loose connective tissue around it (Fig. 395). Also when picked up with an Allis forceps or small tenaculum forceps (Fig. 396), it presents the firm substance of fascia with underlying muscle, instead of loose connective tissue. The sling surface is exposed on both sides preparatory to suturing, as shown in Fig. 396.

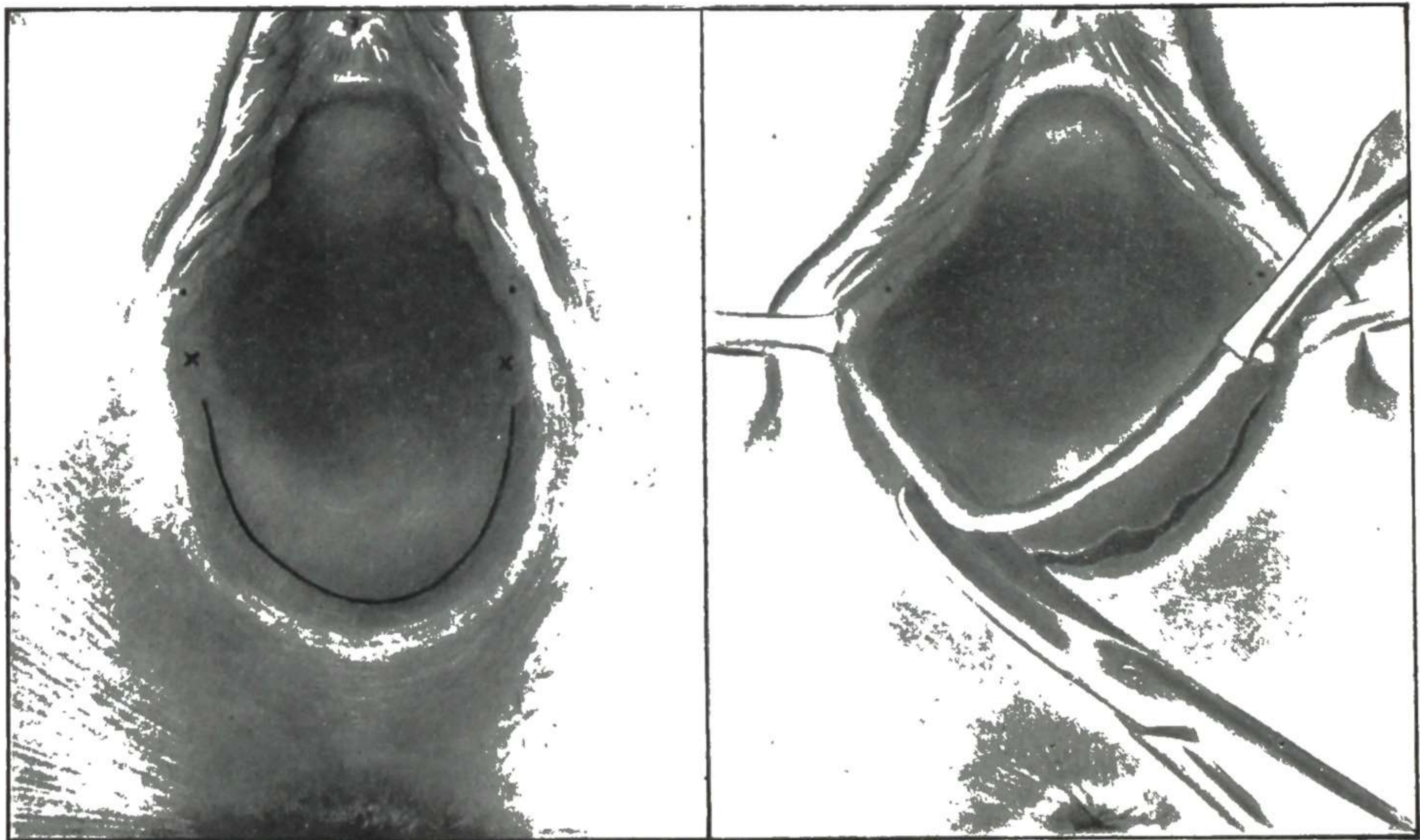


Fig. 388.

Fig. 389

Fig. 388.—The location of the incision for opening the pelvic floor. The authors prefer to place the incision well within the vaginal opening, as indicated by the heavy black line. The cross (x) on each side indicates the area to be caught by the forceps. Notice that the incision is well below the opening of the vulvovaginal gland on each side, which is indicated by the black dot. Allis forceps are most satisfactory for catching the sides.

Fig. 389.—Opening the pelvic floor by excising a strip of tissue.

4. *Approximating the Sides of the Sling.*—The exposed sides of the sling are to be fastened securely together by sutures. It is well to pass the first suture around twice before tying, as indicated in Fig. 397. The upper round includes the connective tissue at the base of the vaginal flap. This is the tissue most likely to bleed, and it cannot be reached for suturing after the approximating suture is tied—hence, the advisability of including it in this first suture.

When this first suture is tied, it makes subvaginal approximation of the sides of the sling at the highest point, and narrows the vaginal lumen accordingly. It is well at this stage to *test the narrowing* to see whether it is too little or too much. The flap is dropped and three finger tips are introduced into the narrowed lumen, as shown in Fig. 398. At this stage of the operation the narrowed area should admit three finger tips easily. It is narrowed somewhat further by the additional deep suturing, but at the end of the operation

the lumen should be large enough easily to admit two fingers deeply (Fig. 399). If on testing after the first suture is tied, the lumen is found still too loose, another bite is taken above the first. If the test shows the lumen too small, the first suture is removed and another introduced somewhat lower in the sling.

After the first approximating suture is tied and the result tested, the lower portions of the exposed sling surfaces are sutured together, as indicated in Figs. 400 and 401. The

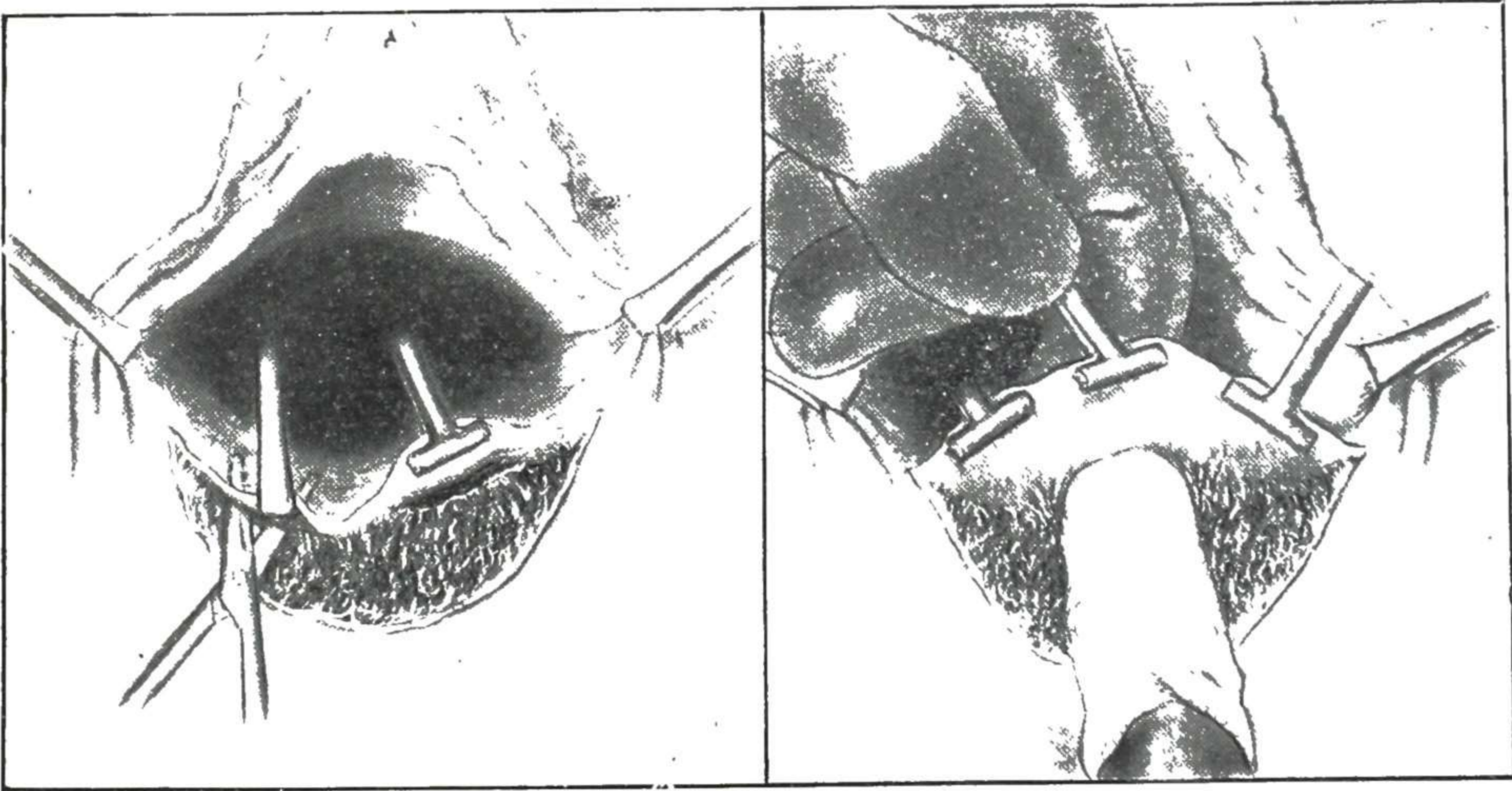


Fig. 390.

Fig. 391.

Fig. 390.—Freeing the vaginal flap on each side so it may be caught with the T-forceps. This may be quickly accomplished by thrusting in the closed scissors' point against the vaginal wall and then opening the scissors. The maneuver has been carried out at the left side of the flap and the T-forceps applied, and the same maneuver is in progress on the right side.

Fig. 391.—Rolling off the underlying tissues from the vaginal wall with the gauze-covered finger. The motion is that of a push and a roll combined, and is made against the left forefinger which furnishes the counterpressure. As long as the dissection is kept close enough to the vaginal wall to push off the veins, there is no danger of injury to the rectum. When noticeable blood vessels are left on the wall, the dissection is progressing toward the rectum.

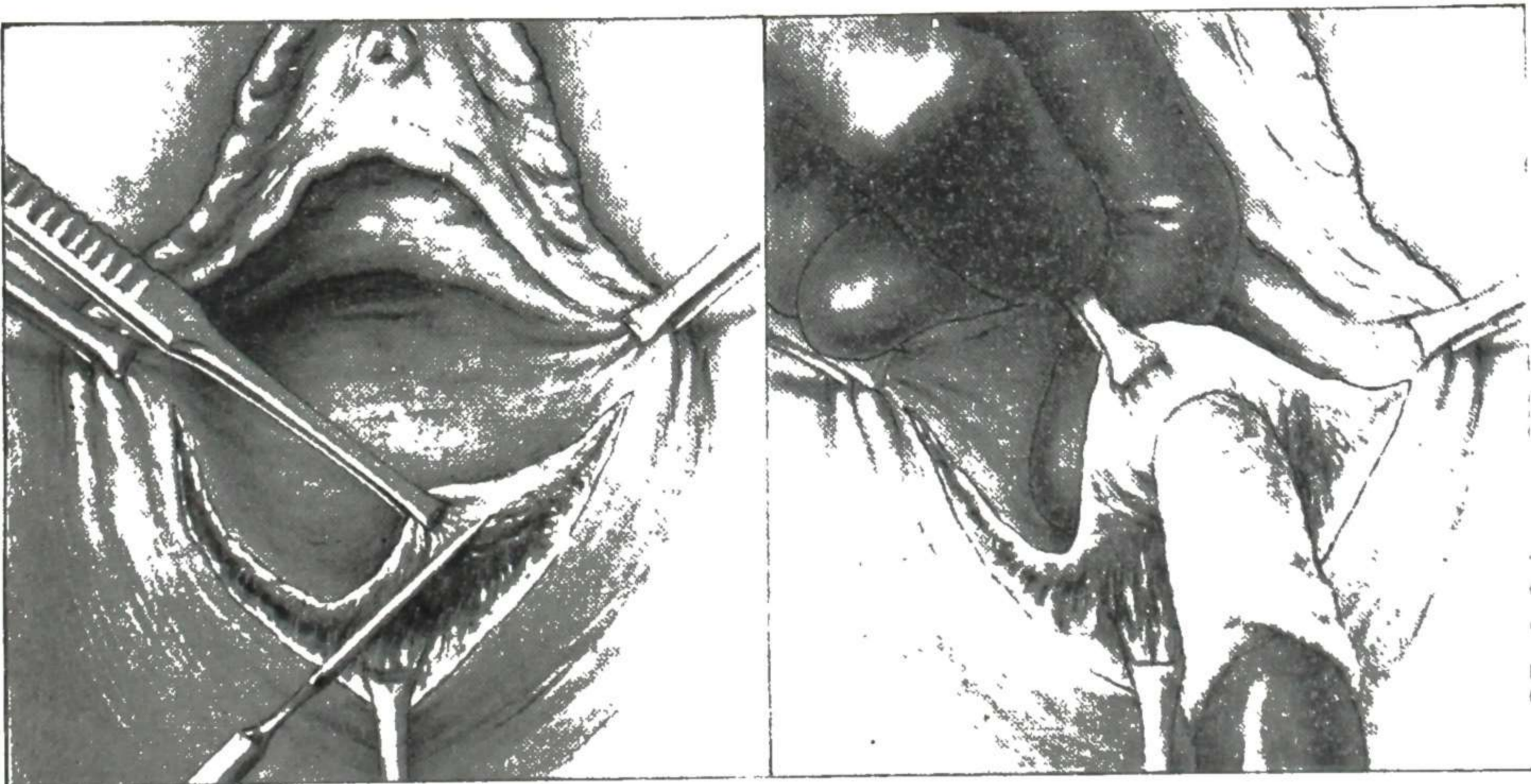


Fig. 392.

Fig. 393.

Fig. 392.—If preferred, the floor may be opened by incision and the edge of the vaginal flap freed with a knife.

Fig. 393.—Next the underlying tissues are pushed off with the gauze-covered finger from the vaginal wall which is held tightly stretched over the index finger of the left hand.

approximation may be made with a continuous suture or with interrupted sutures. The continuous suture saves time and reduces the number of buried knots. Having completed the sling suturing, the overlying connective tissue is approximated by the continuous suture going back (Fig. 401), to be tied finally at the first knot.

5. *Closing the Opening in the Pelvic Floor.*—The excess of vaginal wall is trimmed away, as shown in Fig. 402, and the vaginal wound is closed, as indicated in Fig. 403. In trimming away any excess of vaginal wall, be careful to leave some redundancy in order to avoid scar-tissue constriction which may be uncomfortable later. When the suture has been started in

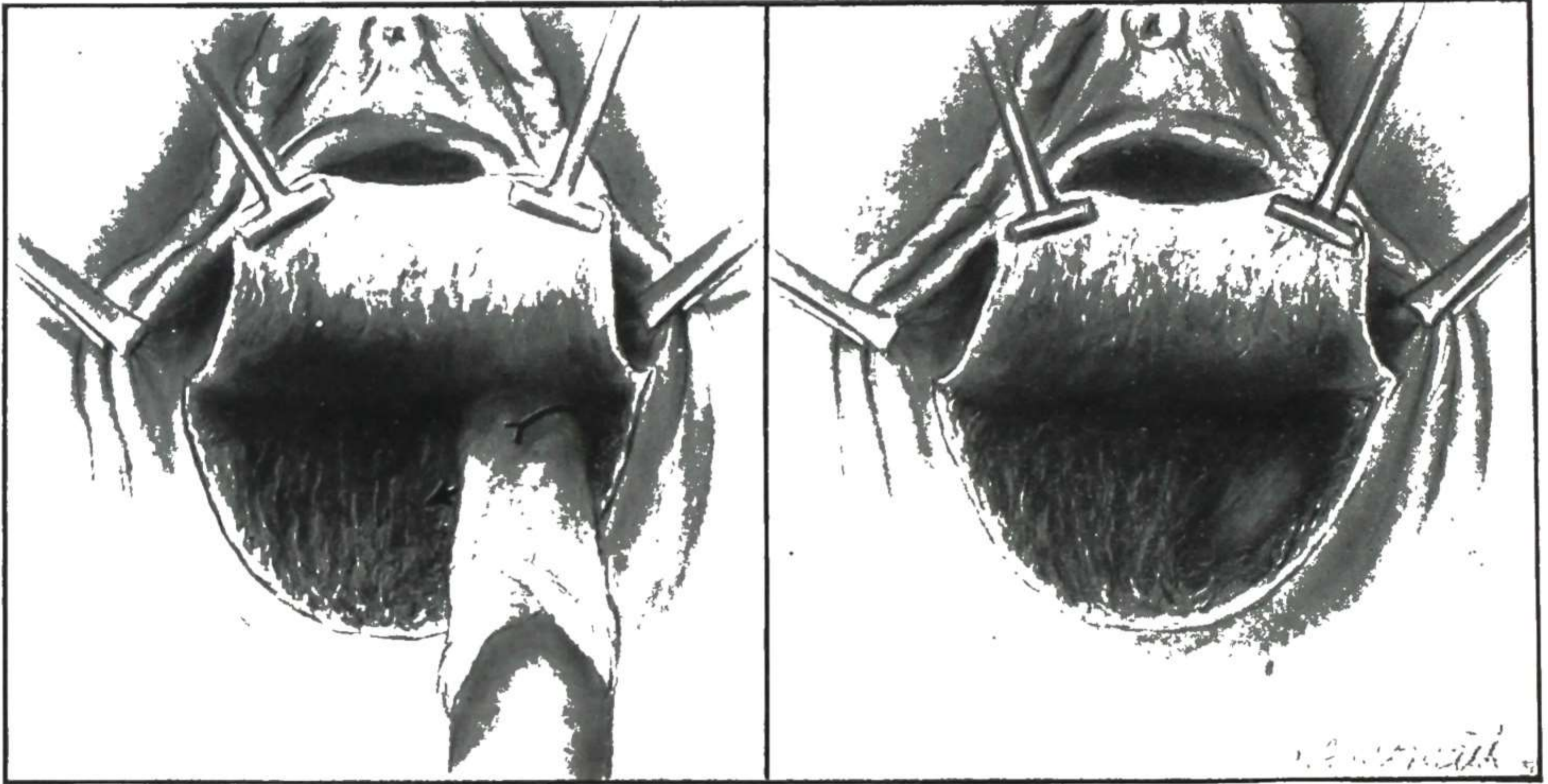


Fig. 394.

Fig. 395.

Fig. 394.—The vaginal flap has been raised well out to the side wall, and the gauze-covered finger is in place for rolling off the loose connective tissue from the fascial surface of the musculofascial levator sling. The loose connective tissue is easily pushed off by a pushing-rolling motion of the finger in the direction indicated by the curved arrow.

Fig. 395.—The fascial surface of the sling exposed on the left side. Its smooth, firm surface distinguishes it from the surrounding loose connective tissue.

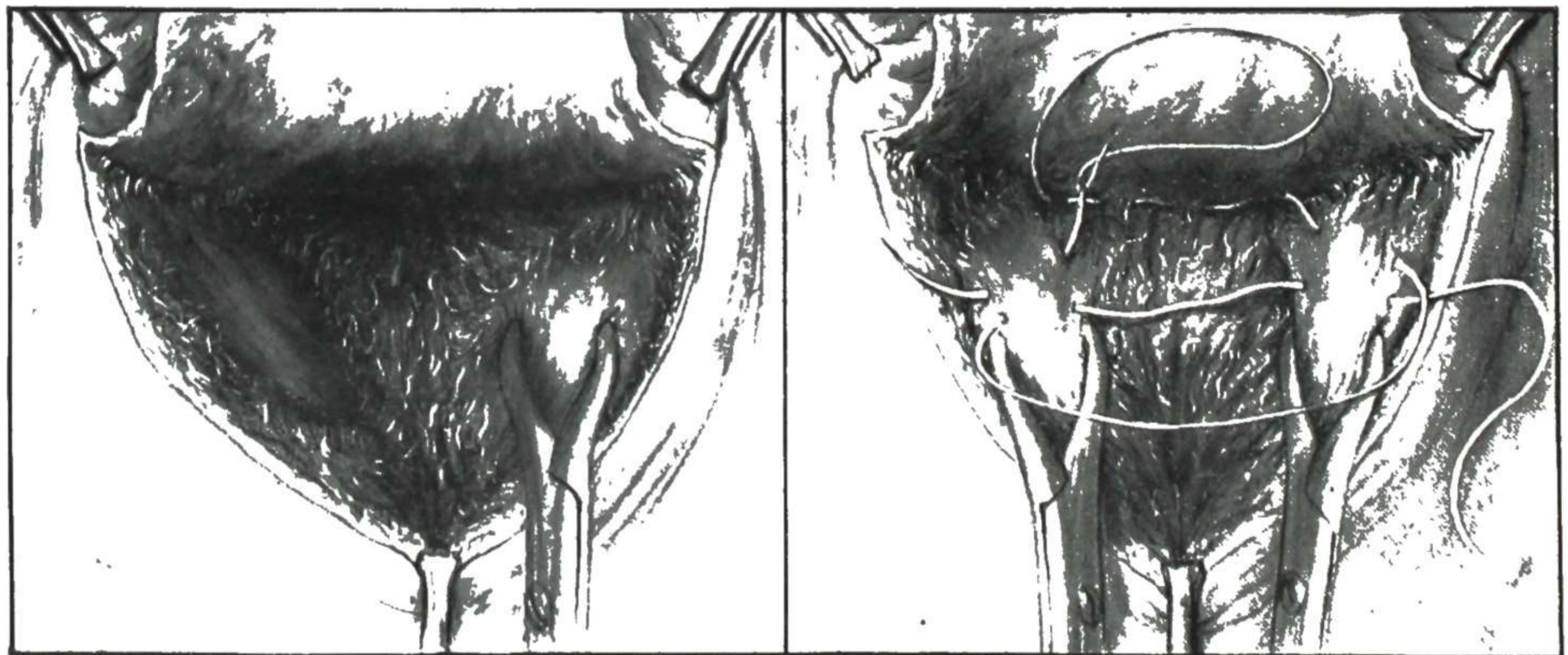


Fig. 396.

Fig. 397.

Fig. 396.—The surface of the musculofascial sling caught with forceps on the left side and raised for better identification and accurate passing of suture. If preferred, the sling may simply be picked up with the needle as the suture is passed, without demonstrating it with the forceps.

Fig. 397.—The first suture passed for subvaginal approximation of the sides of the musculofascial levator sling. It is well to make two rounds with this first suture, the second round including the loose tissue at the base of the vaginal flap, which tends to prevent later bleeding.

the upper angle of the vaginal wound, one bite should be taken into the deeper tissues in order to fasten down this redundant angle of vaginal wall. Unless this precaution is taken, this angle may later form a troublesome projection. Dr. H. S. Crossen recalled one case, operated on before the adoption of the fastening-down stitch, in which this projection was so troublesome that it had to be excised later. Any bleeding tendency of the wound margins is easily controlled by half-locking the running suture, as shown in Fig. 403.

In suturing at the vaginal entrance make the opening wider there than at the supporting area inside, in order to avoid discomfort in coitus, as explained later.

For suture material 40-day catgut No. 1 is very satisfactory throughout, for both deep and superficial sutures. When using a continuous suture, it is well to lock it, as shown in Fig. 403, to control bleeding from the edges. Some may wish to use a subcuticular suture for the outside part of the wound.

6. *Avoid Constriction at Vaginal Entrance.*—Discomfort in coitus after pelvic floor repair is due usually to constriction at the vaginal entrance, rather than to the narrowing in the region of the supporting pelvic sling. Very exceptionally the discomfort is due to the development of a hypersensitive point in the repaired area of the sling, with or without undue narrowing in that region. However, in most of the patients with this postoperative disturbance, the discomfort is due to narrowing of the vaginal entrance at the sensitive mucocutaneous junction. In his anxiety to give good support, the operator is inclined to extend the maximum narrowing out to the sensitive skin margin, which extension is not necessary for support and is very likely to lead to the discomfort mentioned.

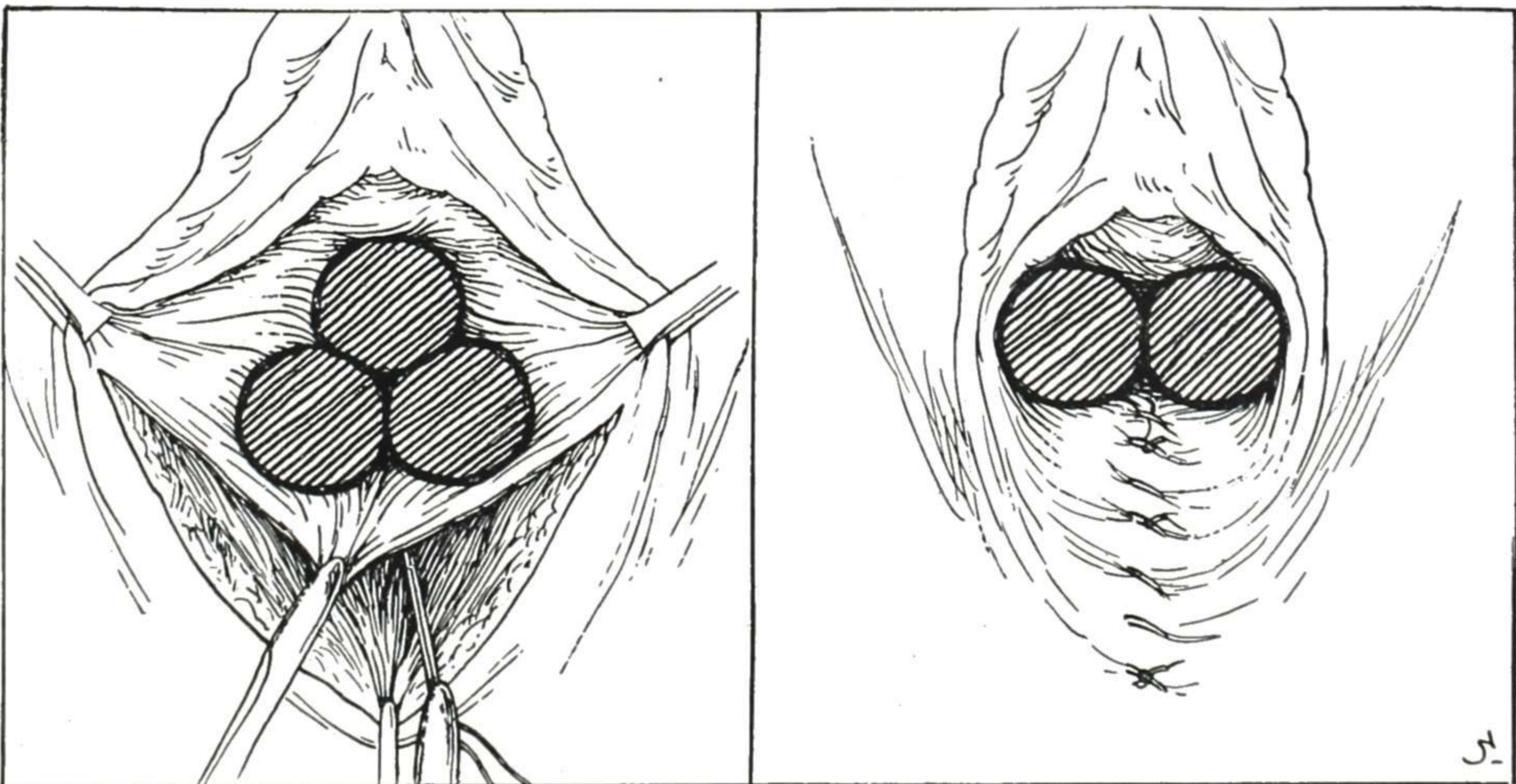


Fig. 398.

Fig. 399.

Fig. 398.—Testing the size of the opening immediately after tying the upper deep sling suture, to see whether the sling is repaired high enough. At this stage of the operation the opening should admit three fingers, as indicated.

Fig. 399.—Testing the size of the vaginal opening at the close of the operation, when it should admit two fingers easily. The supporting constriction should be well inside, as here indicated. Avoid constriction of the sensitive tissues at the mucocutaneous junction.

This postoperative disturbance may be avoided by special attention to certain details. As already explained the essential supporting structures of the repaired floor are some distance inside the vaginal entrance. From this point outward the opening should be left somewhat wider, giving a funnel effect with the narrow part inside away from the sensitive skin margin. If this point be kept in mind in trimming away the excess of vaginal wall, the wound may be sutured in the usual way (Fig. 403). On the other hand, if too much of the vaginal wall has been trimmed away, it is then advisable to close as shown in Figs. 404 and 405, in order to avoid undue narrowing at the vaginal entrance. The horizontal

closure at each end may be little or much, as needed to obviate constriction there. If slight, it is conveniently made by simply placing an interrupted suture at each end, and completing the vertical closure in the usual way. If a large horizontal closure is needed, continuous sutures may be used, as indicated in Figs. 404 and 405.

In certain exceptional cases it is advisable to avoid excision of any vaginal mucosa. After the supporting pelvic sling has been repaired, the raised vaginal flap is brought back into place and the wound is closed in the same direction in which it was made, as shown in Figs. 406 and 407. This maneuver is useful in hypersensitive persons with a tendency to levator spasm, especially when the pelvic floor relaxation is only moderate and without much redundancy of



Fig. 400.

Fig. 401.

Fig. 400.—The first sling suture has been tied, the resulting support-constriction tested (Fig. 398) and found satisfactory, and lower portions of the sling are being approximated by a few turns of the continuous suture. Some upward pull on the first suture and a counter pull below with finger or tissue forceps cause the deep tissues to stand out for easy suturing.

Fig. 401.—The more superficial tissues are being approximated by the same running suture, as it is carried back to be tied to its end.

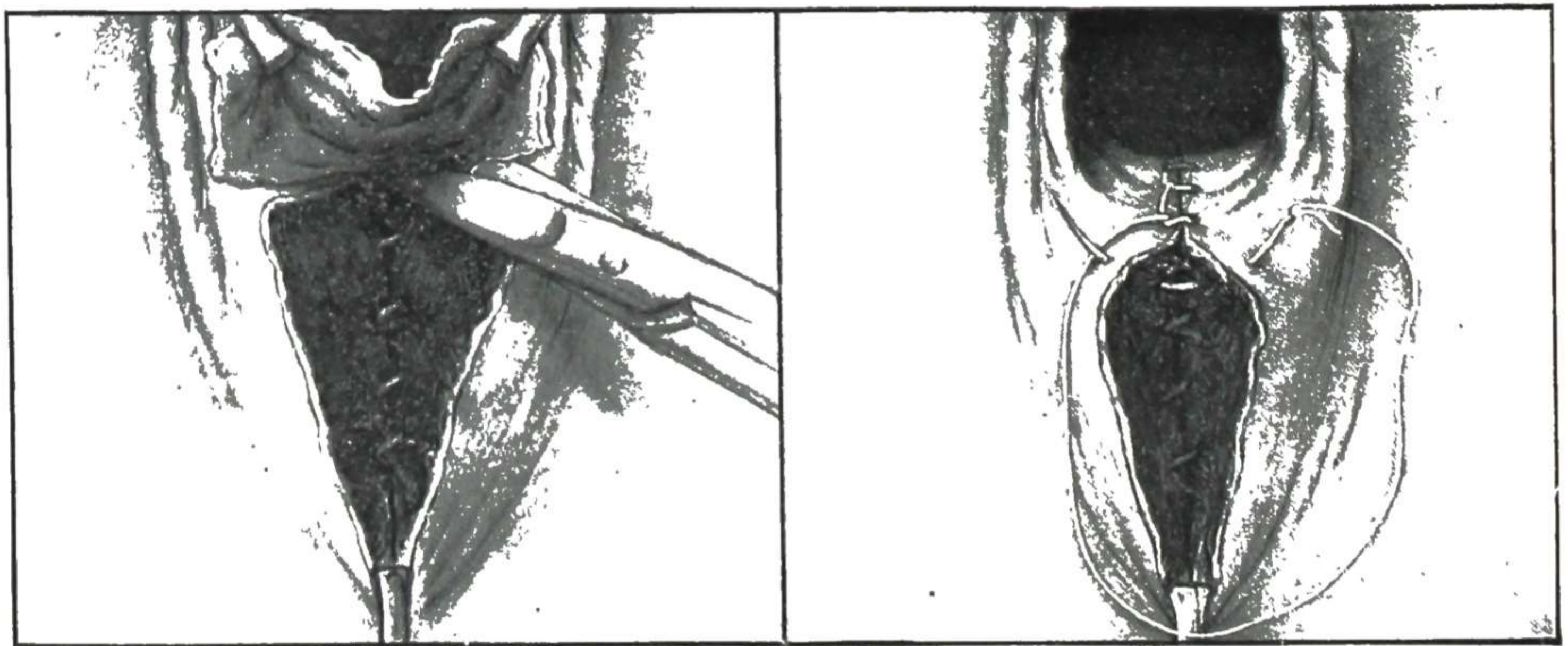


Fig. 402.

Fig. 403.

Fig. 402.—Trimming off the excess of vaginal wall where it is decidedly redundant. Some redundancy of the vaginal wall is beneficial in that it tends to prevent scar-tissue constriction which may be uncomfortable later. Consequently, any trimming should be done sparingly, leaving plenty of vaginal wall, so that there will be some looseness after the suturing is completed.

Fig. 403.—Closing the wound. The half-locked suture checks bleeding from the wound margins. Avoid constriction at the vaginal opening that may cause discomfort later, as explained in the text.

vaginal wall. It is indicated also in patients near the menopause without much vaginal wall redundancy. In patients in the menopause or after that period, there is a tendency after operation for the tissues about the opening to shrink gradually, rather than stretch as in earlier life, and this fact should be kept in mind in repairing the pelvic floor in patients of that age if subsequent coitus must be provided for.

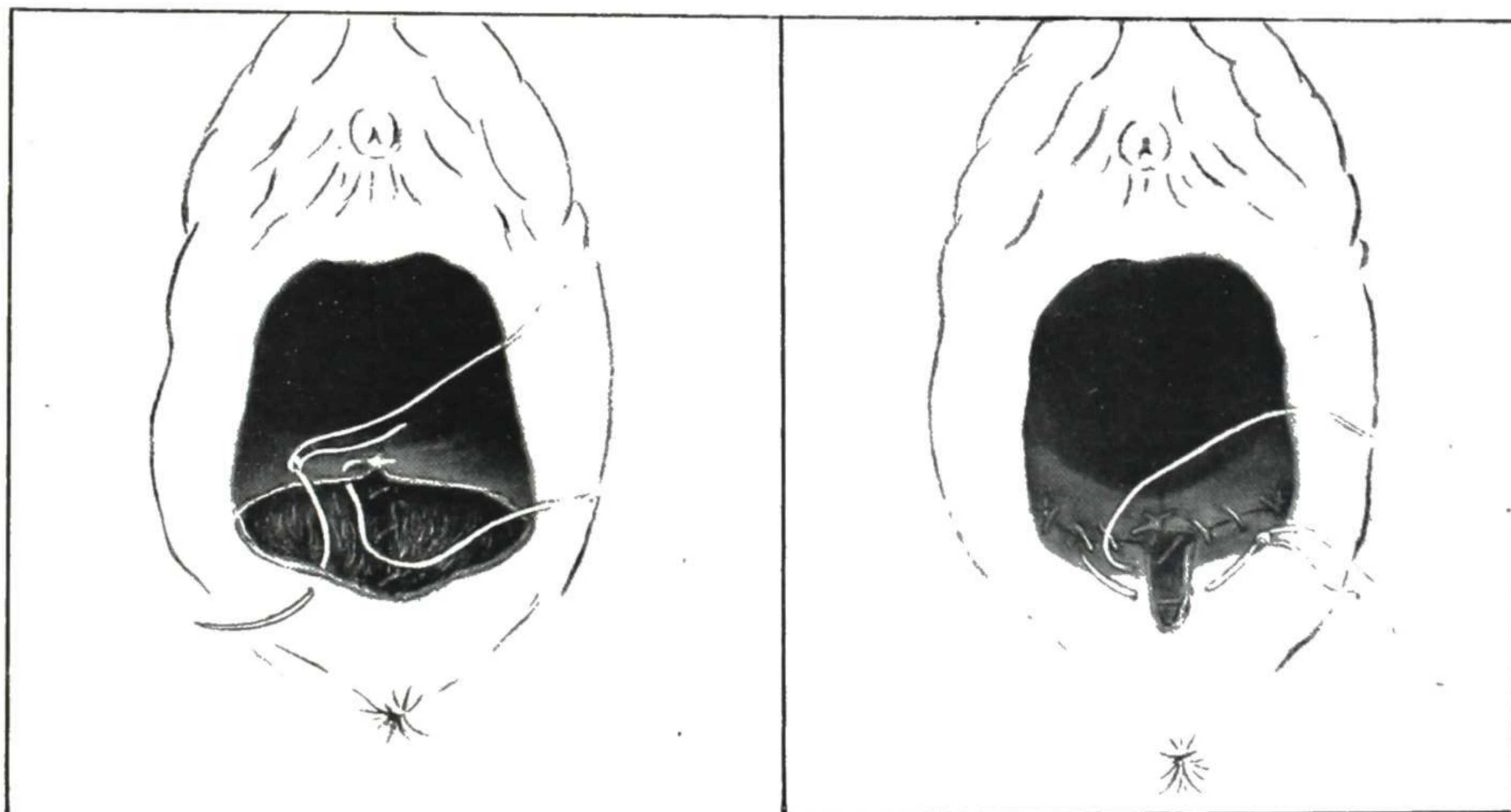


Fig. 404.

Fig. 405.

Fig. 404.—Closing each end of the wound horizontally in a case where this is necessary in order to avoid constriction at the vaginal entrance.

Fig. 405.—Closing the median portion of the wound vertically. As explained in the text, the relative amount of horizontal closure at each end (and the resulting amount remaining for vertical closure) is easily varied to meet the conditions in the individual case.

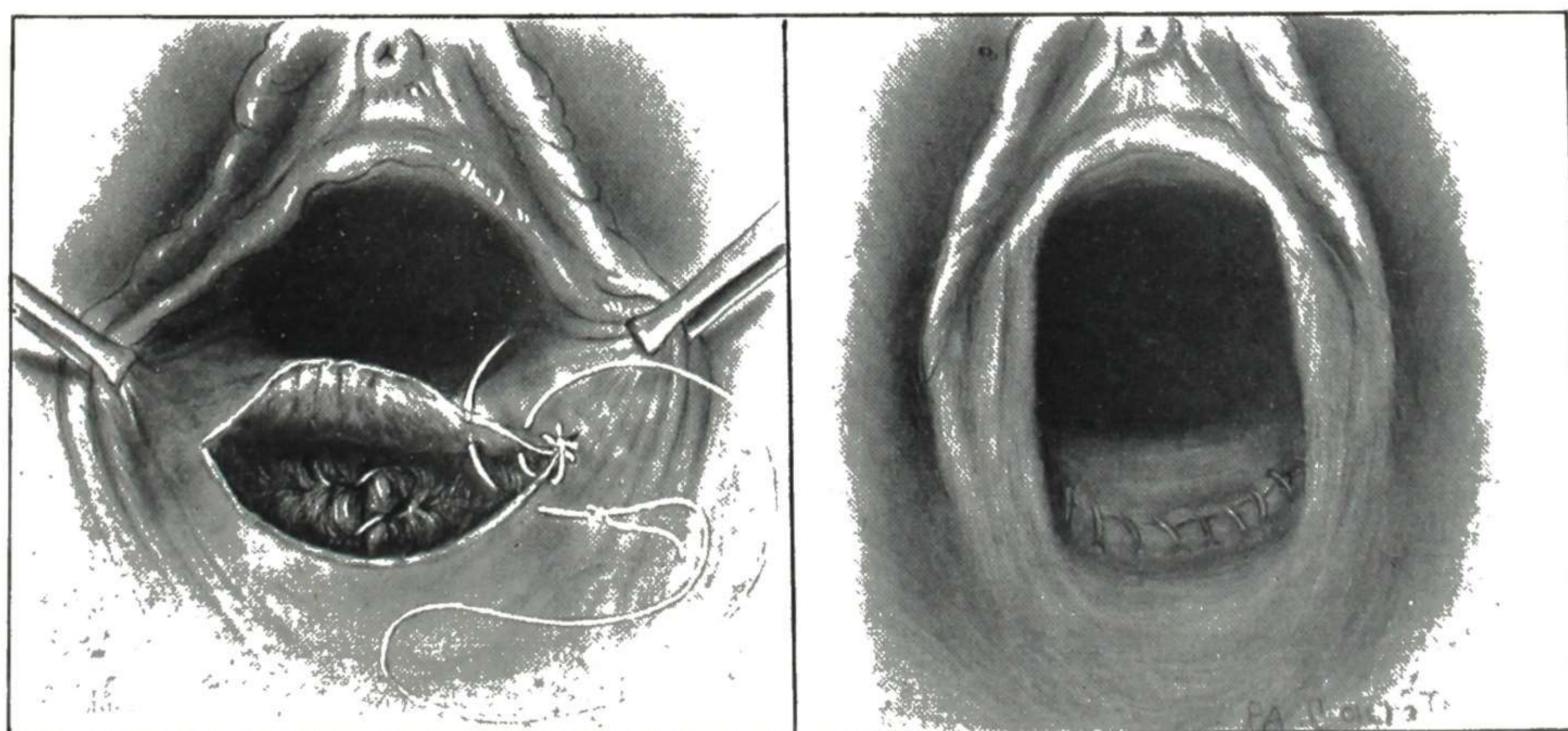


Fig. 406.

Fig. 407.

Fig. 406.—Closure of the wound after repair of moderate relaxation of pelvic floor without much redundancy of vaginal wall. There is no excision of vaginal wall. After the deep supporting tissues have been repaired as usual, the wound is simply closed horizontally, in the same direction in which it was made.

Fig. 407.—The horizontal closure completed. This preservation of a rather wide opening and redundancy of vaginal wall is especially important in nervous hypersensitive patients with a tendency to levator spasm.

RECTOCELE

A moderate rectocele is taken care of by the regular repair of the pelvic floor, which gives strong support over the whole area. A marked rectocele presents so much redundancy of the anterior rectal wall that the pouch should be obliterated by infolding with some extra sutures. The vaginal flap is separated very high, in some cases two-thirds of the distance to the cervix uteri. Then, before the deep muscular sutures are passed, the projecting pouch of rectal wall is obliterated by a row or two of fine chromic catgut suturing, as shown in Figs. 408 and 409. After that the regular pelvic floor repair is proceeded with, the next step being the suturing of the strong pelvic sling in front of the infolded rectal wall.

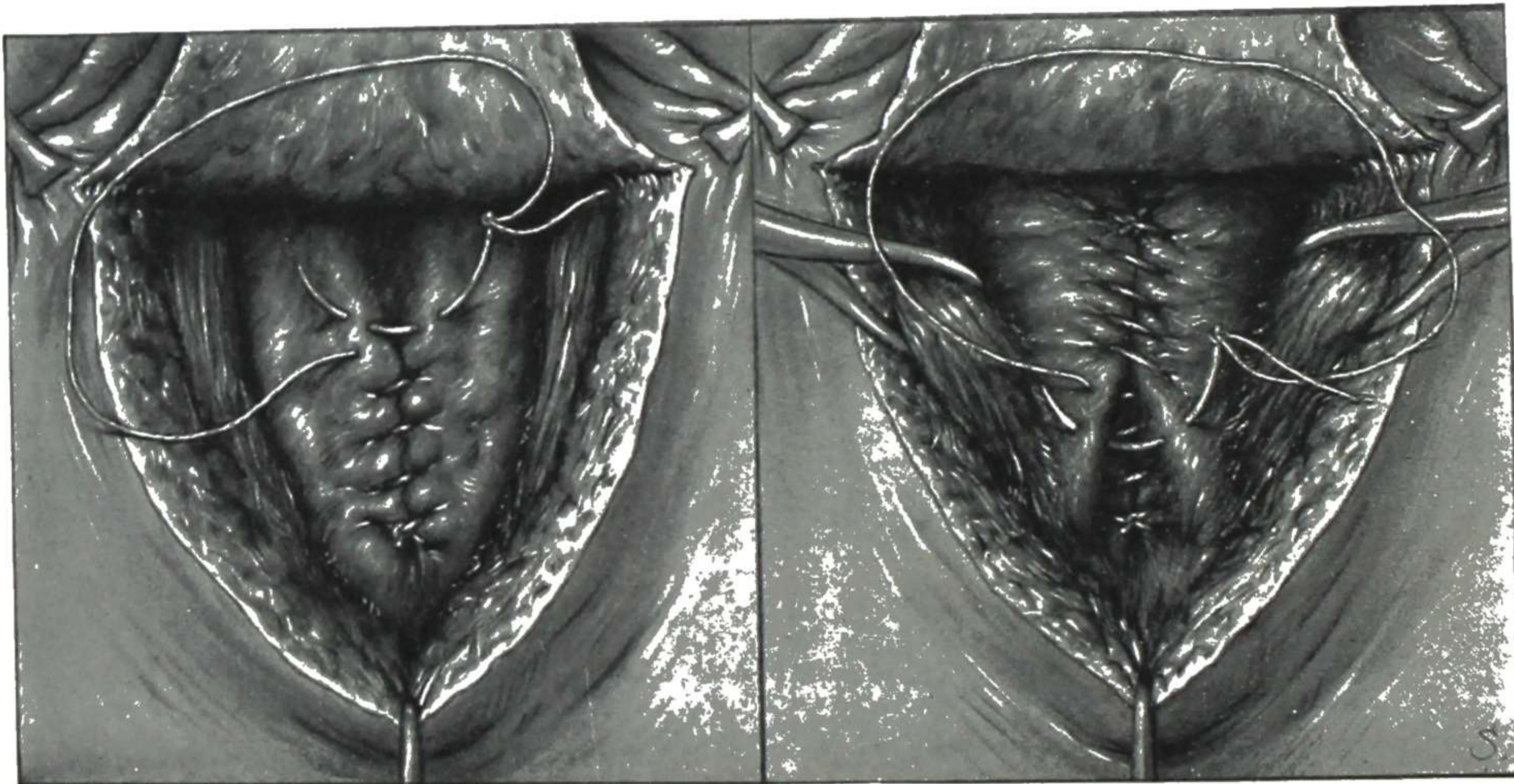


Fig. 408.

Fig. 409.

Figs. 408 and 409.—Special sutures for rectocele. Fig. 408 shows method of placing the first row of sutures for turning in the redundant rectal wall. Fig. 409 shows the first row completed and the second row being passed.

CYSTOCELE

Cystocele of the most severe type occurs in conjunction with prolapse of the uterus, and its correction constitutes one of the important features in operation for prolapse, with which subject it is considered. Cystocele of moderate degree not complicated by uterine prolapse or retrodisplacement does not require such extensive operation for correction, but it does require careful investigation to determine the exact type of lesion present in the particular case and an accurate operative procedure adapted exactly to the conditions found.

The small or moderate cystocele (Fig. 410), which seems such a simple lesion and so easy to correct, is really a lesion of unusual interest. There are important hidden features which required a long time to work out, and which are still unappreciated by many operators. The troublesome symptoms of this type of cystocele are largely those of mild bladder irritation—frequency, urgency, recurring desire to urinate, and imperfect control. In many cases these

symptoms persist after operative correction of the vaginal cystocele. It was this persistence of symptoms which led to the prolonged study that brought out the following facts:

TYPES.—There are two kinds of cystocele—the high one which occurs above the upper margin of the vesical trigone, and on vaginal examination is found immediately in front of the cervix uteri, and the low one which involves the vesical trigone and sphincter area and urethra and is found at the vaginal entrance. The first (posterior cystocele) is a simple stretching of the bladder wall and adjacent supporting tissues, and is taken care of by the usual infolding operation with elevation of the bladder to its normal position on the uterus.

The anterior cystocele, involving the trigone and urethra, represents serious damage to the bladder control mechanism, and its cure requires study of this mechanism, determination of the exact damage in the particular case and adaptation of measures to restore normal functioning. The projecting pouch at the vaginal entrance may be obliterated by suturing and still the patient continue to have the annoying bladder symptoms, for the relief of which she went through the operation.

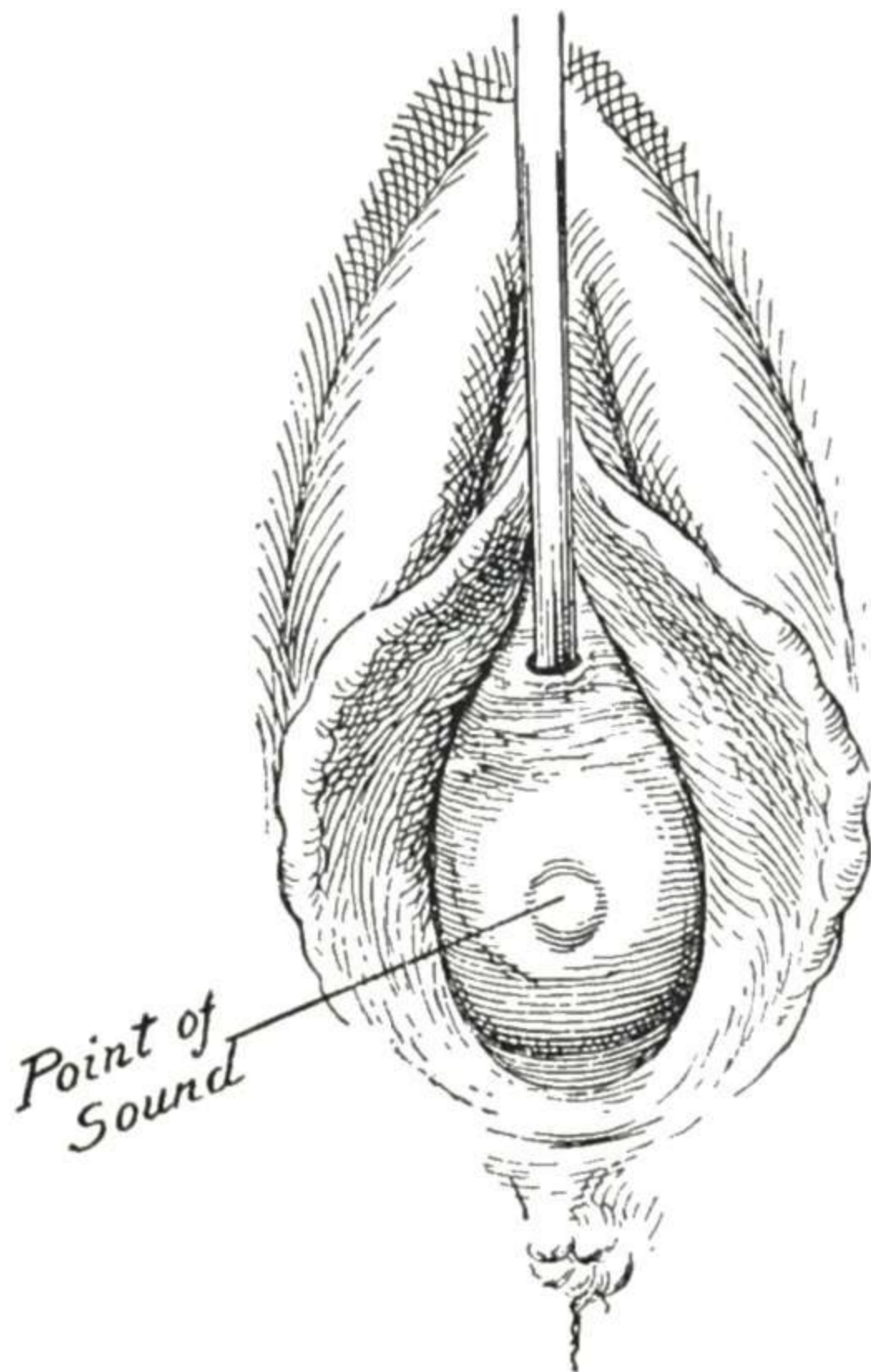


Fig. 410.—A small cystocele. (From Ashton: Practice of Gynecology.)

ETIOLOGY.—Study of these cases has shown that from the stretching and pressure of the tissues in labor, between the advancing head and the pubic arch, there has been damage to the trigone longitudinal muscle and sphincter and urethra, which structures must cooperate in the normal mechanism of bladder evacuation and urine control. The trigone muscle, which passes from the trigone forward through the internal sphincter and is attached along in the urethra, is an important factor in normal evacuation of the bladder, for contraction of this longitudinal muscle opens the sphincter and at the same time depresses its lower margin so that all urine can escape. This muscle is torn across more or less in these cases so that the lower margin of the sphincter is not depressed, and residual urine remains. The irritation from the residual urine and other factors causes strong contraction of the sphincter, which draws it up farther and makes more pouching and more residual urine. Thus there is established a vicious circle which makes the lesion a progressive one. That is the reason why troublesome cystocele may not appear till some years after the childbirth which caused the primary damage, and also the reason why the partial immediate relief following simple obliteration of the vaginal pouching gives way later to return of the old bladder symptoms.

In addition to the damage to the trigone muscle and vesical area, the urethra also suffers a functional disorganization. The stretching, with pinching of the structures

between the child's head and the pubic arch, damages the urethra and its fascial sheaths so that they sag and form a urethrocele. The meatus, being out of the line of direct compression, retains its high position. Thus, instead of a fairly straight urethra with strong walls, the patient has a curved, wide, sagging urethra. The dragging on the high fixed narrow meatus tends to narrow it still further toward stricture. This urethral distortion also is progressive, and continues so after simple operation for obliteration of the vaginal pouch.

TREATMENT.—The cure of this condition necessitates, first, its recognition through competent cystoscopic investigation which determines the particular type and combination of lesions in that case and, second, the employment of special suturing which restores the functional continuity of the trigone muscle, obliterates the urethrocele and straightens the sagging and bowed urethra. The details of this operative work are described and illustrated in our operative volume.

Three other points of interest are: (a) For permanent relief, it is important to repair also the pelvic floor and any rectocele, so as to back up the repaired anterior plane by good support in the posterior plane. (b) Cystoscopic investigation of the trigone muscle area and also of the urethra is advisable in all cystocele cases before operation, that the exact conditions may be determined and the operation planned accordingly. (c) Trigone muscle injury may be present without any evident vaginal cystocele, and hence there should be cystoscopic examination for this lesion in any case of persistent bladder discomfort even though there is no outside evidence of childbirth damage.

PREVENTION.—This troublesome lesion, which is progressive and hence gives increasing disturbance through the years, may be prevented by well-timed episiotomy, which permits delivery of the head and shoulders without the serious overstretching of the tissues at the base and neck of the bladder and along the urethra.

Partial Incontinence of Urine

Some patients complain of inability to control the urine when coughing, laughing, sneezing, etc. Others state they must empty the bladder promptly or there will be leakage. In case of inability to control the urine, resulting in some escape at times, the first thing is to determine whether the escape is due largely to irritation, causing premature expulsive contraction, or altogether to weakness of the vesical sphincter control.

In the cases due largely to mild cystitis or other irritation, the leakage is preceded by a desire to urinate which must be responded to promptly or leakage will follow. In such a case, cystoscopic investigation and treatment will often restore control by eliminating the mild cystitis or pyelitis.

Rashbaum and Mandelbaum described a false incontinence due to irritative lesions of the vesicle neck and bladder. These were frequently confused with cases of true stress incontinence because the symptoms are similar. The procedure they advise as a therapeutic test to differentiate false from true stress incontinence prior to surgery is as follows: The urethra is dilated once weekly with graded Hegar dilators from No. 6 to No. 9. After the urethra has been dilated for about five minutes, a topical application of 5 per cent silver nitrate is made to the urethra, bladder neck, and trigone. This may be done with or without an endoscope. An attempt is made to strengthen the voluntary urinary sphincters by having the patient start and stop the urinary stream several times during urination. Ephedrine, 25 mg., is prescribed three times a day, and this helps to contract the internal sphincter and at the same time depress the contraction of the bladder. Of the 82 cases of urinary incontinence treated, 40 per cent were cured, and an additional 41 per cent were improved. In twenty-three cases which had to be operated upon for

incontinence without being cured, these workers cured 8 and improved an additional 7 patients by the office treatment. These results certainly warrant a trial of this treatment before advising surgery.

Endocrines, male as well as female, have been found to influence bladder and ureteral function. Schultz and Anderson report 50 cases of enuresis in children treated with male hormone, with 54 per cent cured. Kuhnet recommends inserting a Hodge pessary in reverse so that the curved portion presses against the urethra in cases of stress incontinence.

LACERATION OF SPHINCTER ANI MUSCLE

If the laceration of the pelvic outlet has extended through the sphincter ani muscle, there will be incontinence of feces and intestinal gases, making the patient miserable and excluding her from society. When completely torn, the sphincter ani retracts—sometimes to such an extent that it scarcely reaches halfway around the rectal opening. It may be felt as a thick cord at the posterior part of opening. A slight dimple, or retraction of tissue, frequently marks the location of each end (Fig. 411). A small area of the rectal mucous membrane may be visible as a red inflamed-looking spot, marking the situation of the anus. Fig. 412 shows a patient of ours with a huge third-degree tear and a large posthysterectomy vaginal hernia. She gave a history of five previous attempts at repair of the tear. The large area of prolapsed rectal mucosa can be seen posteriorly below the hernia which is being held up for exposure. The repair of the tear was successful and the patient is to return for repair of the hernia.

If the sphincter muscle is not completely torn, a few fibers remaining intact, the patient may be able, even from the first, to retain solid feces—that is, there is only partial incontinence. In these cases of partial rupture of the sphincter, and also in cases of complete rupture in which the muscle was paralyzed by the stretching before rupture and the ends of the muscles or tissues close to the muscle lay in contact and became partially united, the patient has control of the bowels except when diarrhea is present. In some cases the patient has control over feces, both solid and liquid, but there is incontinence of gases.

A laceration through the sphincter ani muscle and pectovaginal septum does not necessarily mean that there has been great damage to the pelvic sling. The principal part of the sling passes back of the rectum, not between it and the vagina.

If the rectal tear is accompanied by deep lacerations at the sides of the vagina, involving the levator ani muscles, then there will be marked loss of support in the pelvic floor and consequent relaxation of the vaginal outlet. Such accompanying deep lateral lacerations do frequently occur with the result mentioned. But in some cases, the tear in the median line into the rectum seems to have been the only serious damage. In such a case, the incontinence of feces is the only troublesome symptom, there being no evidence of want of support for the pelvic organs.

This essential difference between median and lateral lacerations explains why it is that some cases of complete perineal laceration with incontinence are

not accompanied with the prolapse of the uterus and vaginal walls, so frequently seen in incomplete perineal lacerations. On the old theory that the perineum (perineal body) was the important supporting structure at the pelvic outlet, this class of cases was inexplicable. Since the facts in regard to the anatomy and function of the component parts of the pelvic floor have become known, these cases are easily explained.

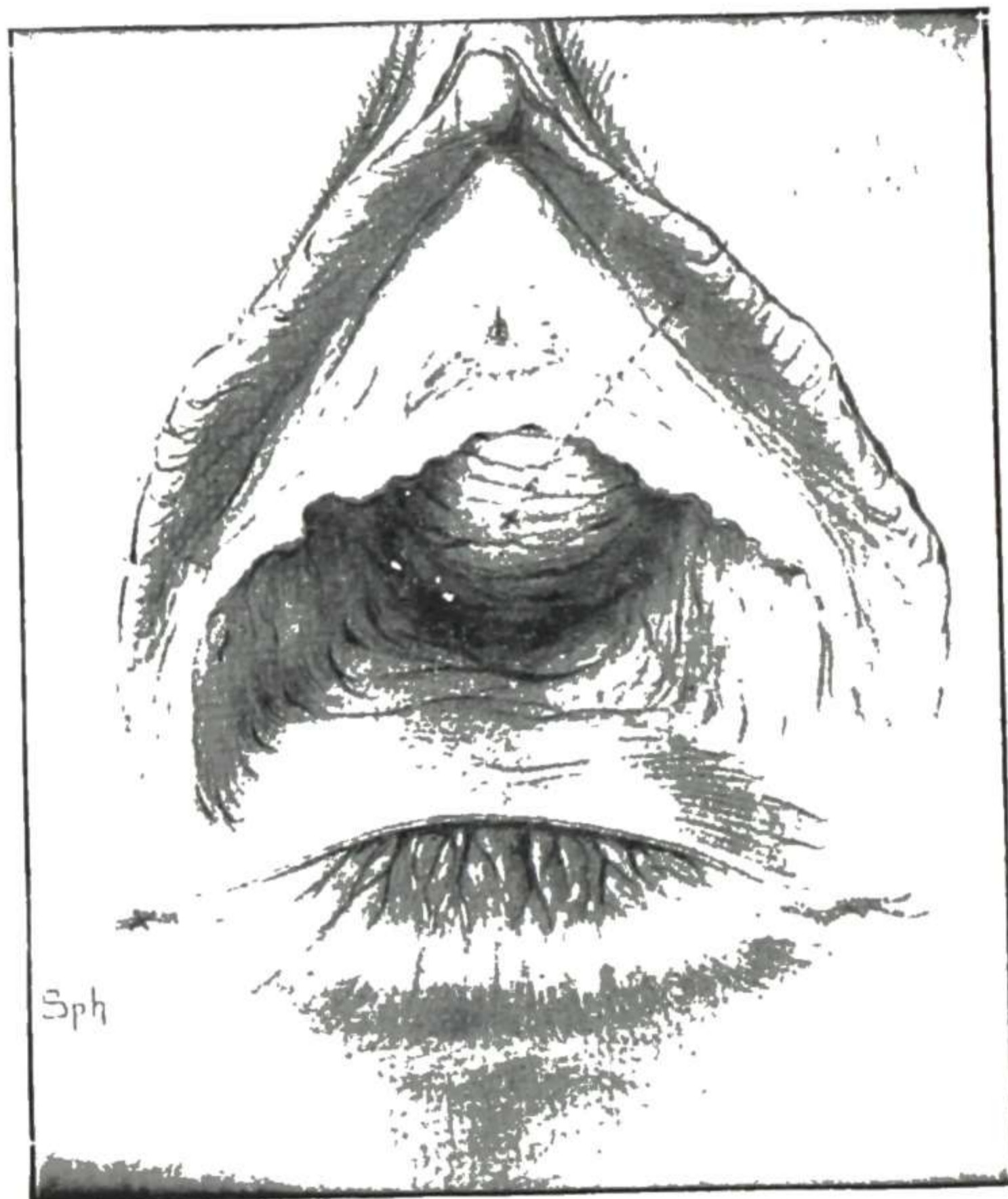


Fig. 411.—Representation of the conditions present in an old laceration through the sphincter ani. Notice the wide separation of the sphincter ends and also the exposed rectum mucosa. Each end of the torn sphincter ani muscle is indicated by a slight dimple in the skin. (From Kelly: *Operative Gynecology*.)

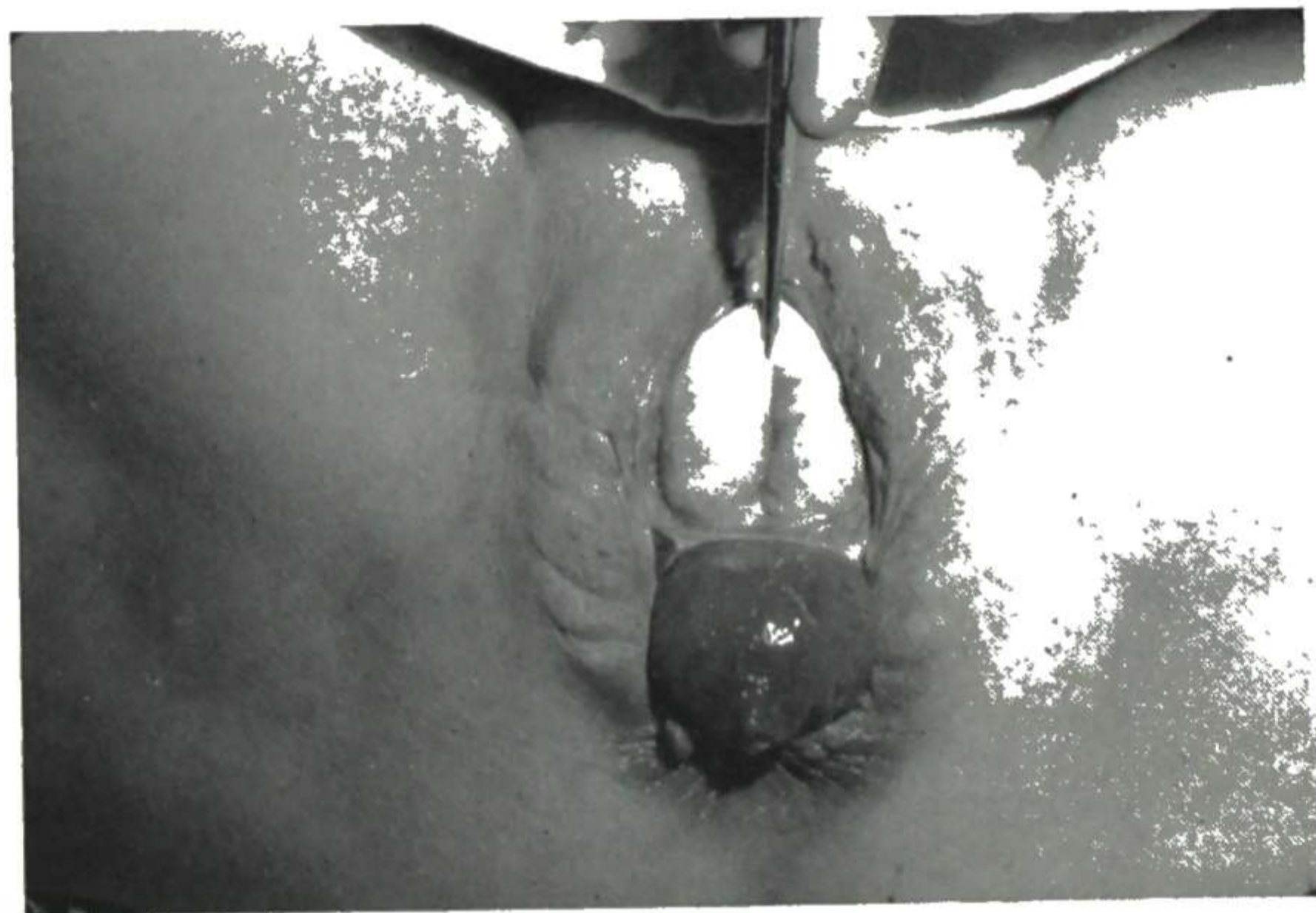


Fig. 412.—Extensive third-degree tear and vaginal hernia. (For details see text.)

The unusual condition shown in Fig. 413 resembles a complete tear of the anal sphincter, but it is due to a defect in development of the primitive cloacal sphincter. The vestibular abnormal anus shown here is a case reported by Johnston; there is present a rectovaginal spur, thick in its upper two-thirds and gradually becoming thinner in its lower third. De Oliveira Figueiredo

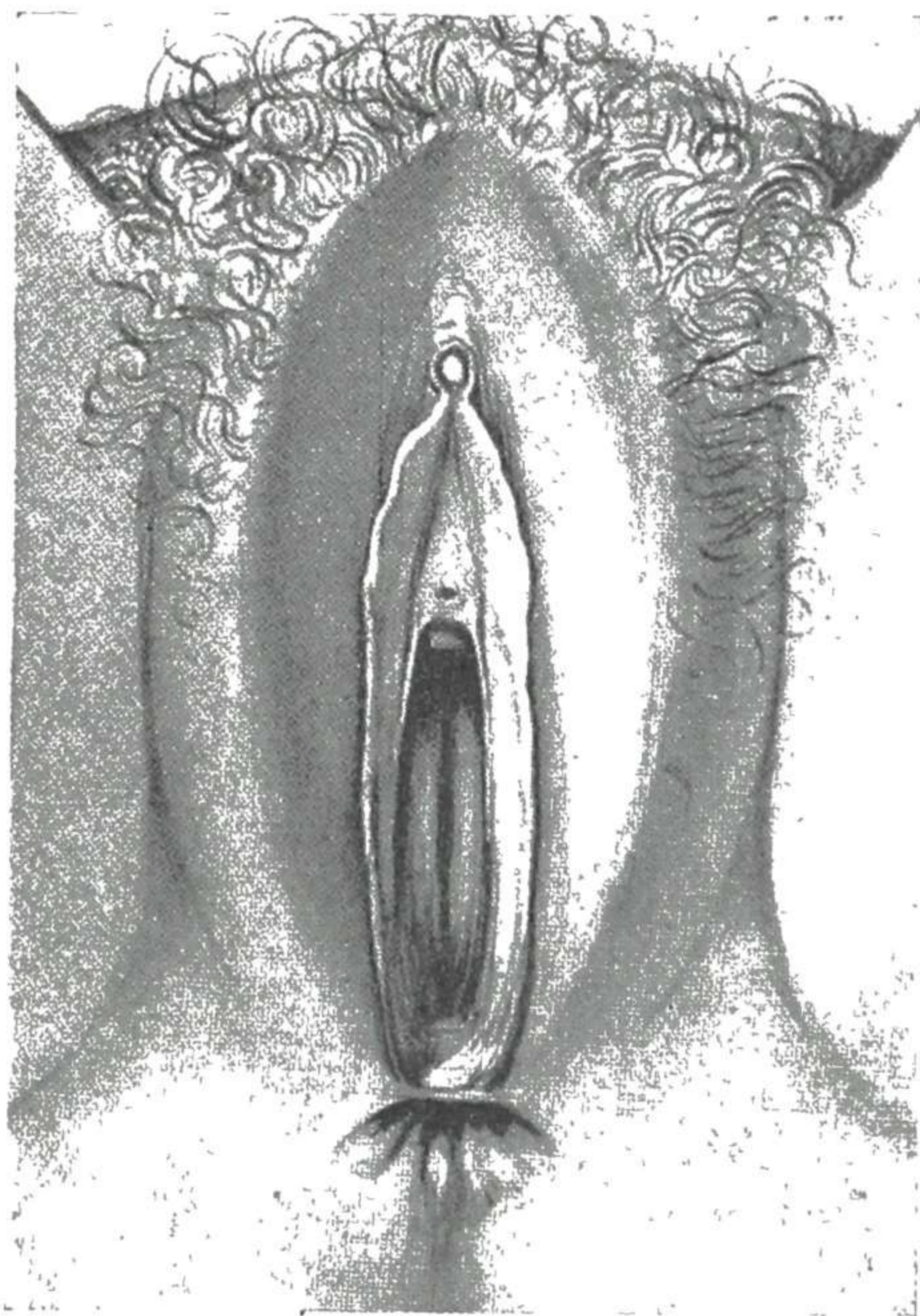


Fig. 413.—Vestibular abnormal anus. (From Johnston: Am. J. Obst. and Gynec., April 1946.)

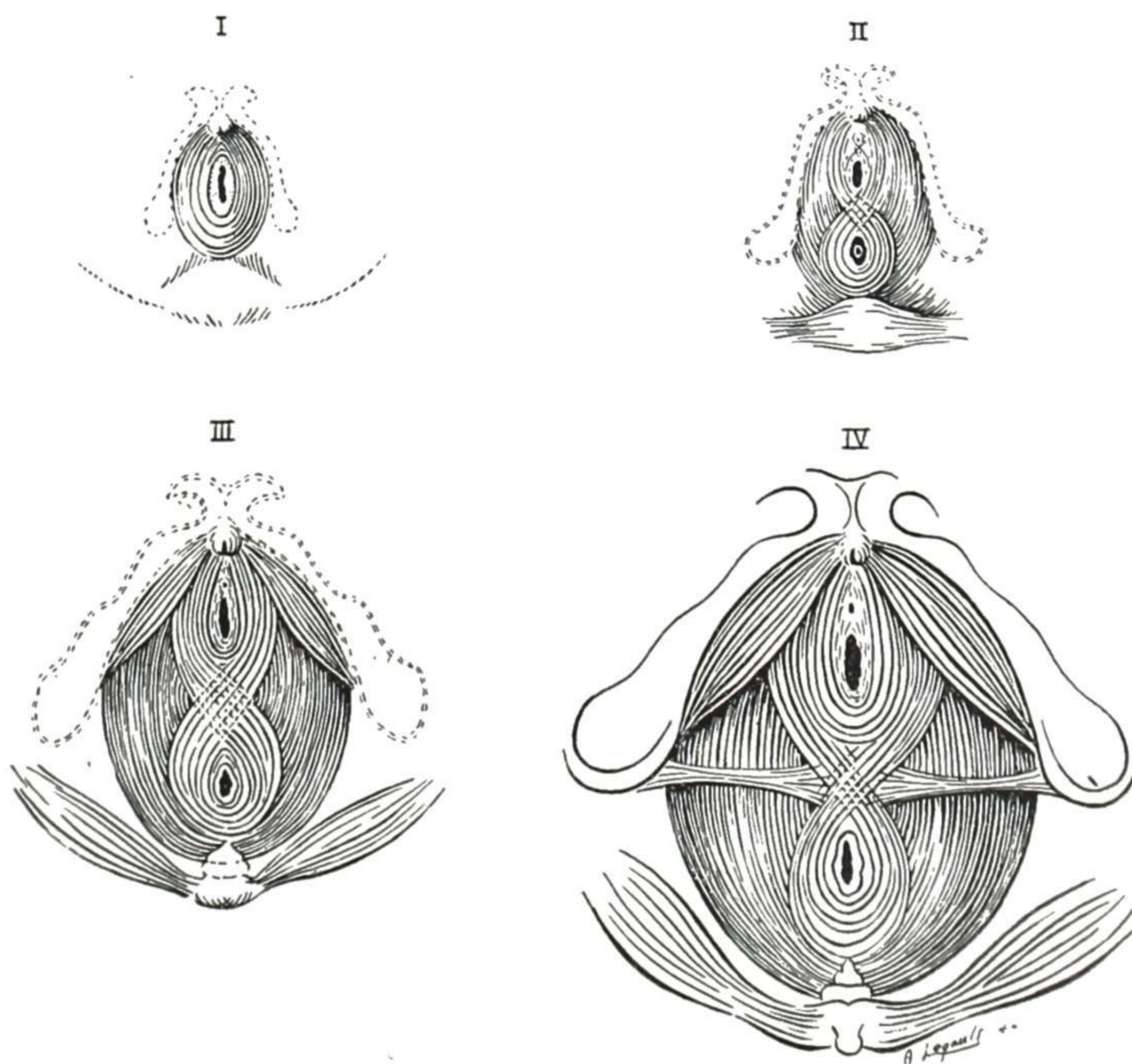


Fig. 414.—Successive differentiation of the cloacal sphincter in embryos of two, three, five, and seven months. (From Power: Am. J. Obst. & Gynec., March, 1948.)

reported two cases and quotes Trelak to the effect that the condition occurs once in 73,000 labors. We have seen one case in an eighteen-year-old nullipara. Power has reviewed the literature on the embryological development of the levator ani muscle and, after extensive study on young embryos, term babies, and adults, confirmed the previous work on this subject; Fig. 414 is from his article.

Steps in Repair of Lacerated Sphincter Ani

When the tear has extended into the rectum (laceration through the sphincter "third degree tear"), a more thorough preoperative preparation of the intestinal tract is required, for it is advisable that there be no bowel movement for a week to ten days after operation. The patient should be on

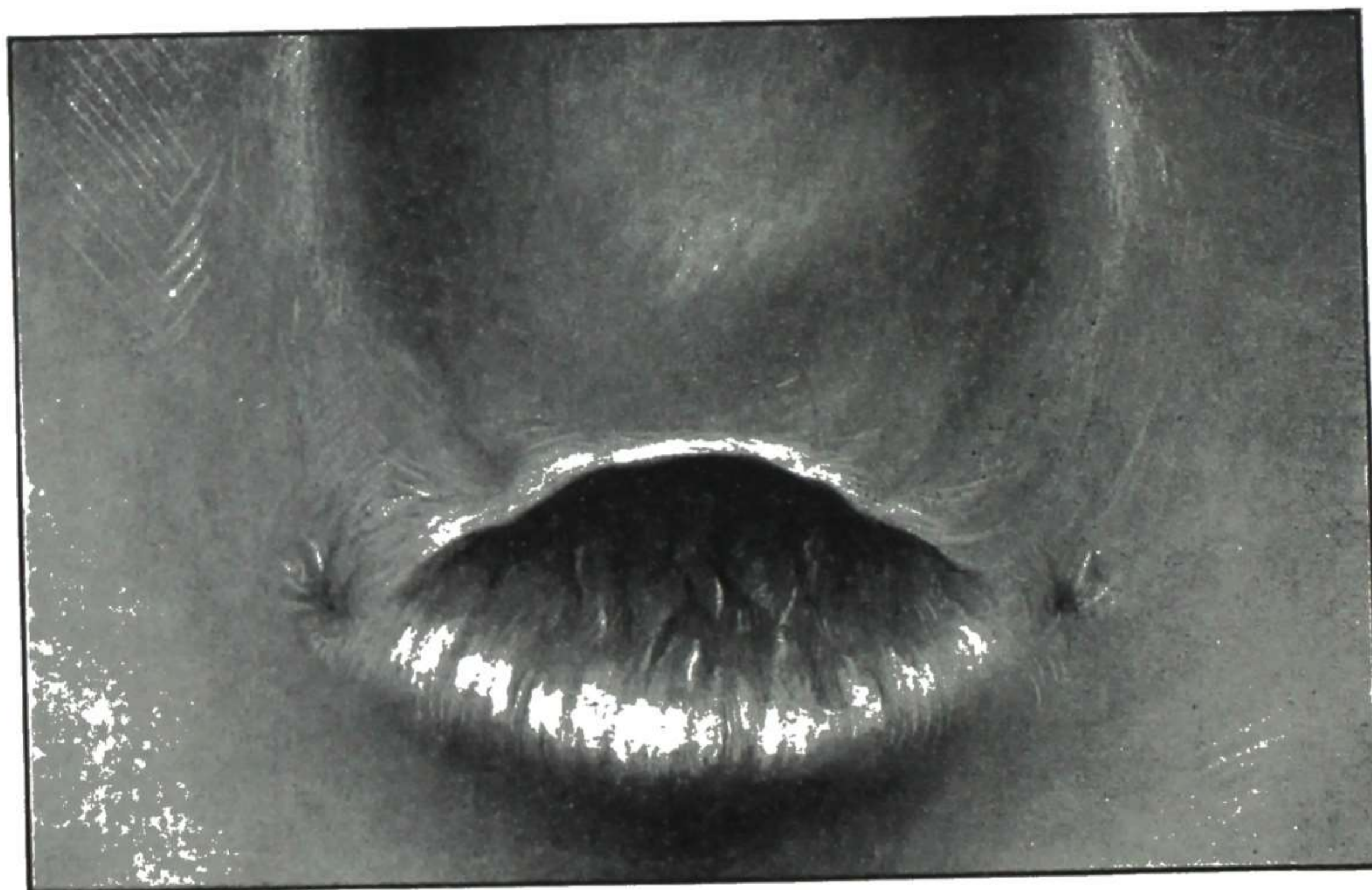


Fig. 415.—Laceration through the sphincter ani muscle. In the course of months and years the torn muscle tends to straighten out, causing the torn ends to become widely separated, as here shown. Also, the upper angle or point of the rectal tear is gradually drawn downward.

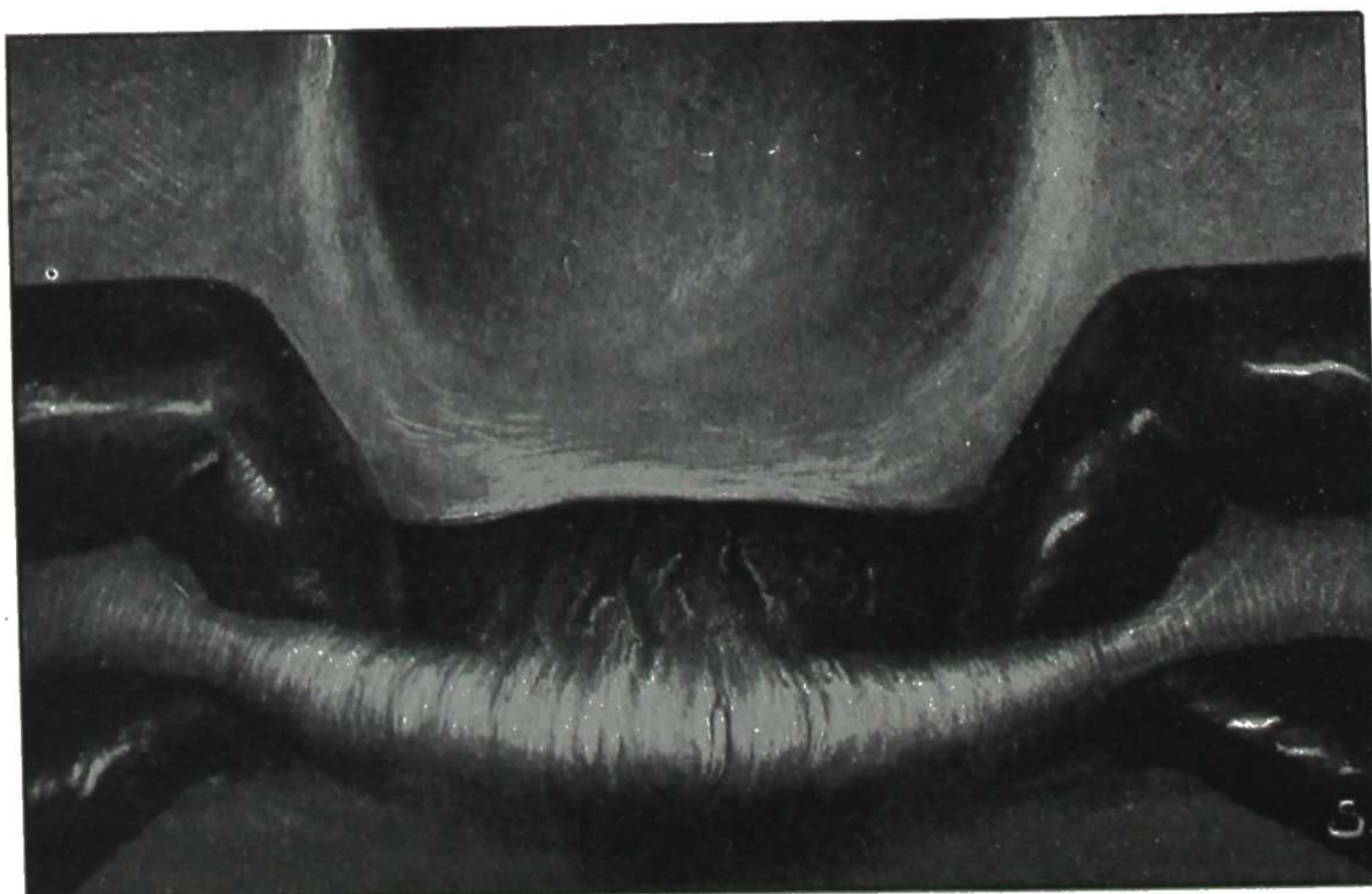


Fig. 416.—Stretching the atrophic and contracted sphincter ani muscle, preparatory to repair.

restricted diet, principally liquids, for two or three days before operation. She is to be given a moderate dose of castor oil one or two days before, an enema the evening before, and colonic flushing the morning of the operation.

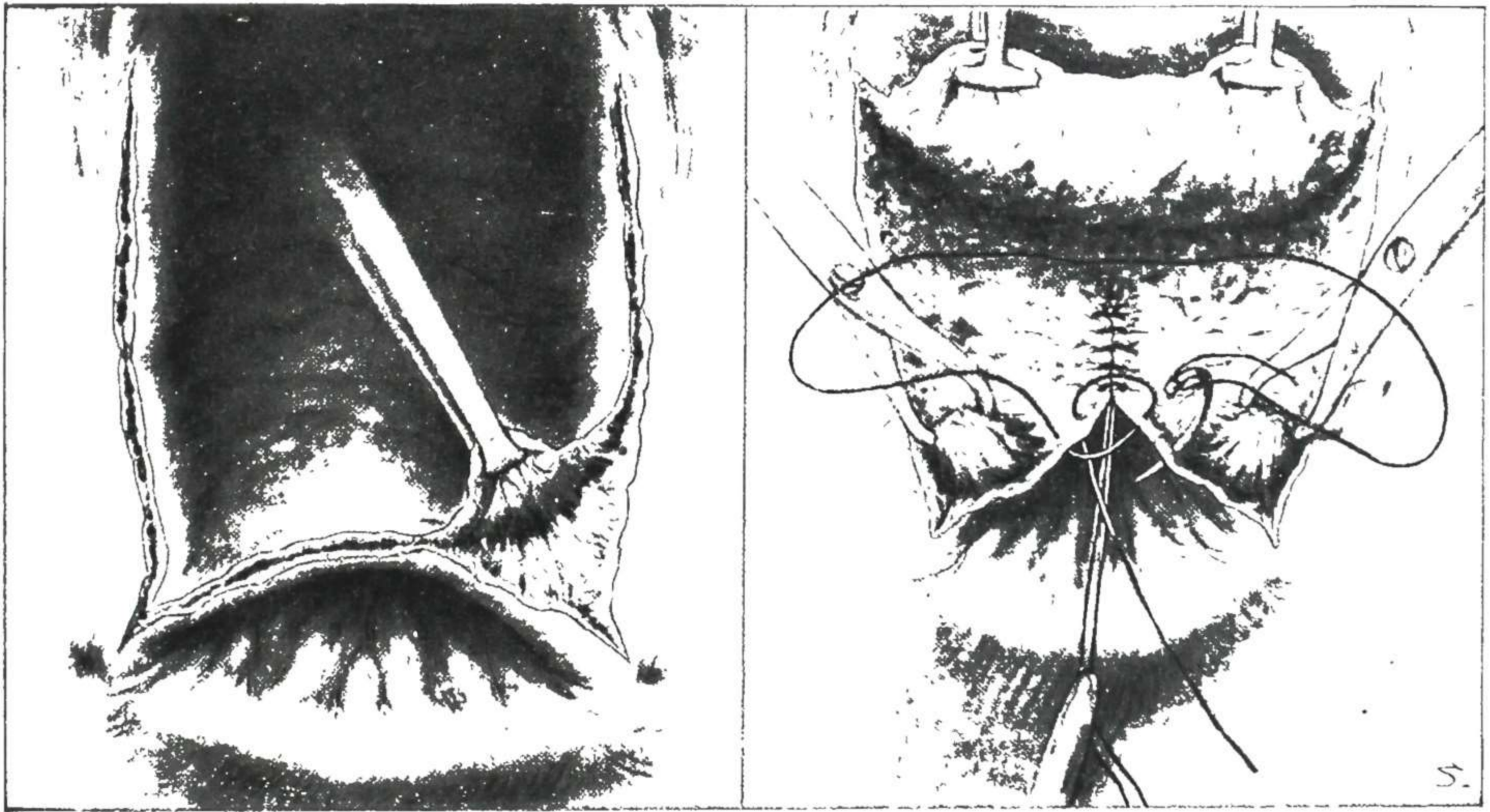


Fig. 417.

Fig. 418.

Figs. 417 and 418.—Rectal suture method of repairing complete laceration. Fig. 417 shows line of incision. Fig. 418 shows method of suturing rectal wall.

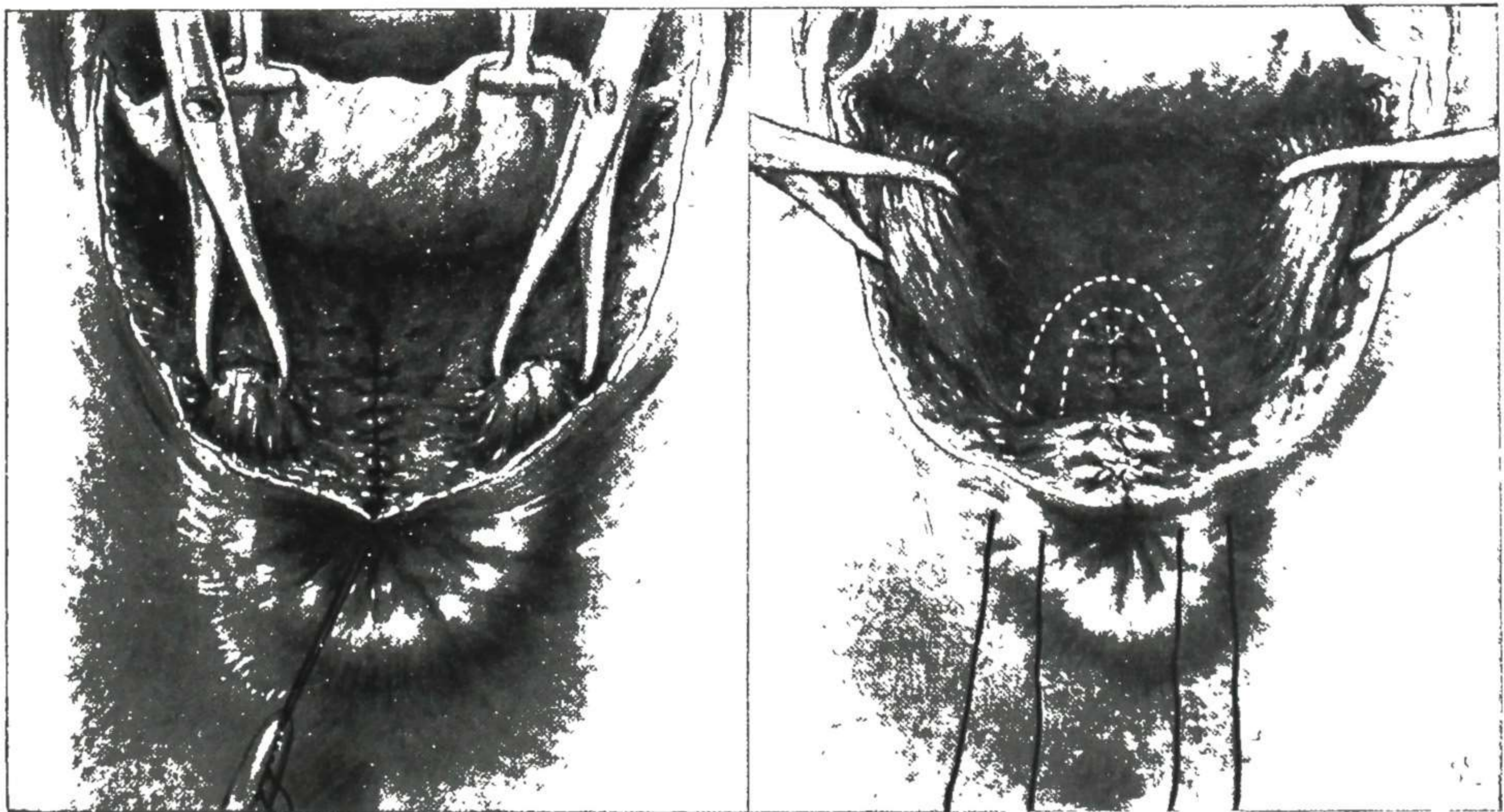


Fig. 419.

Fig. 420.

Figs. 419 and 420.—Rectal suture method of repairing complete laceration. Fig. 419 shows rectal suture completed, and sphincter ends isolated ready for suturing. Fig. 420 shows sphincter ends sutured, and the re-enforcing silkworm-gut sutures passed.

Repair of the torn and incontinent sphincter muscle and rectal wall injury is a difficult operation requiring familiarity with surgical work in this region and particular care. Even then there is failure at times, and every attempt increases the difficulties of the next attempt. The details of the operation for

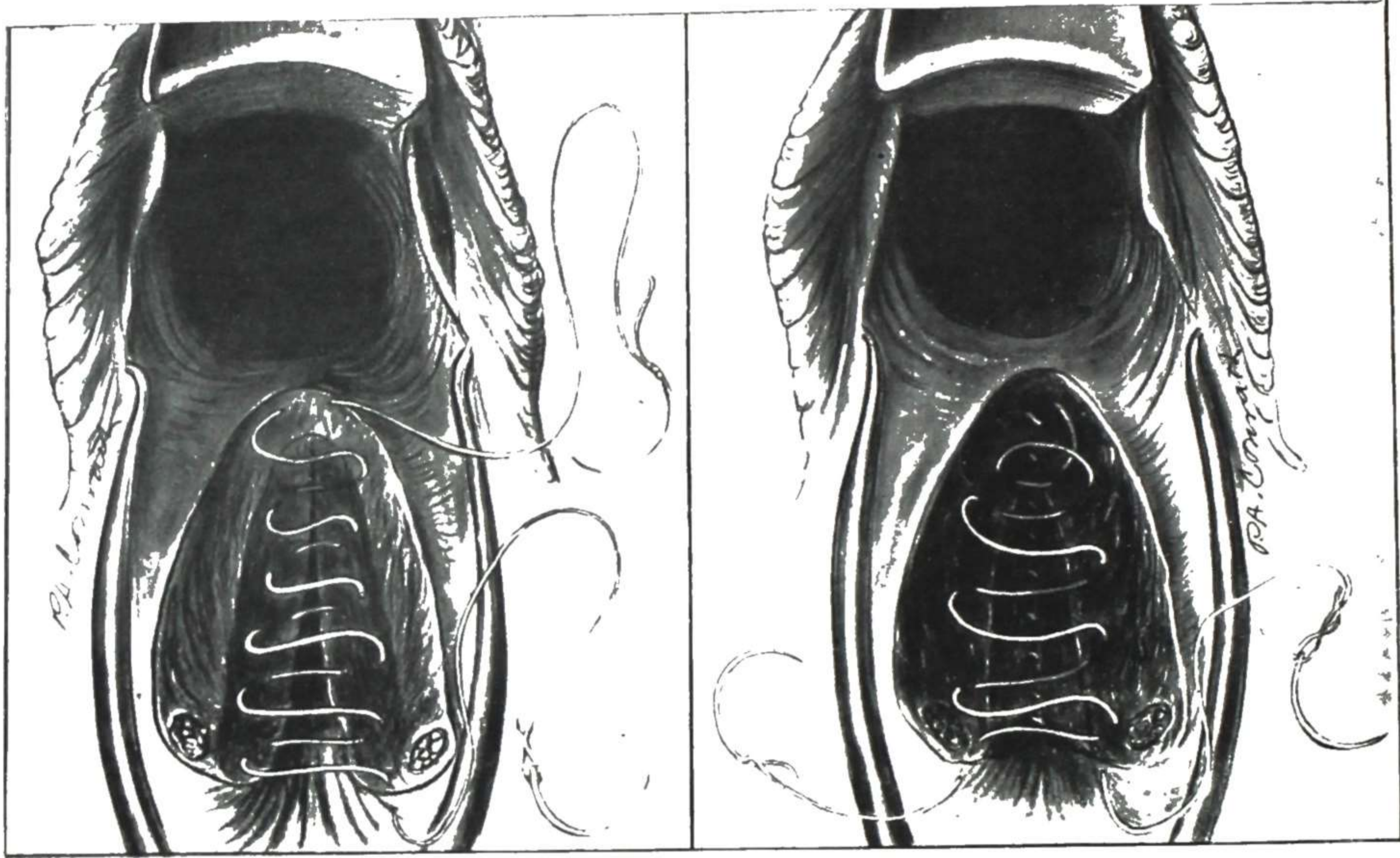


Fig. 421.

Fig. 422.

Fig. 421.—Closure of rectal wall by a continuous suture, with a small curved needle on each end. The suture begins in the muscle *above* the apex of the tear and ends in the anal skin superficial to the sphincter ani.

Fig. 422.—The other end of the suture approximates the perirectal tissues over the first line of suture. Using a continuous suture the rectal wound is thus closed in two layers. No suture penetrates the rectal wall, and there are no knots buried or anywhere in contact with the rectum, the two ends of this suture being tied outside and constituting the lowermost perineal suture outside the skin.

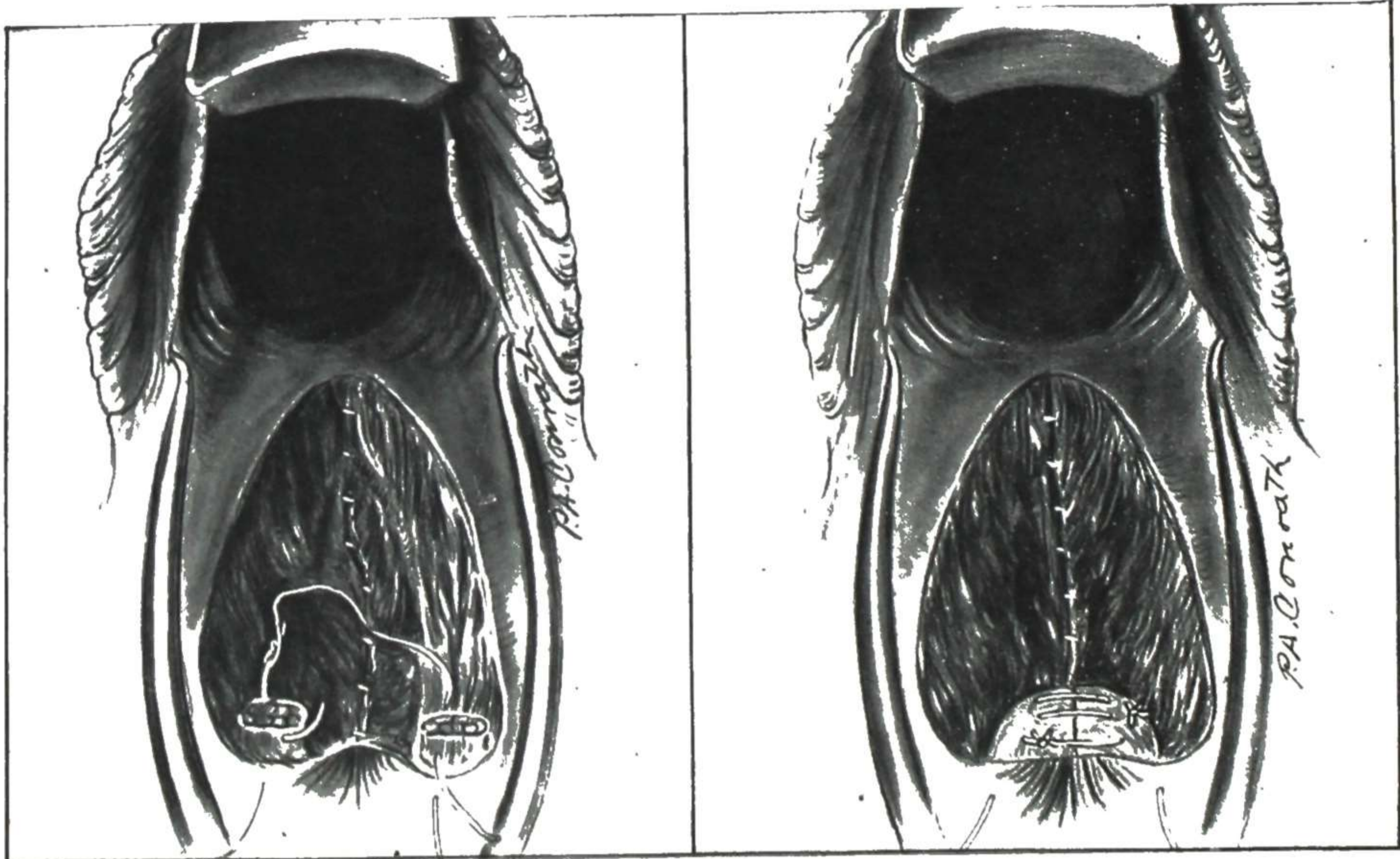


Fig. 423.

Fig. 424.

Fig. 423.—The rectal wound has been closed in two layers with ends shown not yet tied. The sphincter ani is now united by a deep suture through the inner third.

Fig. 424.—Two sutures, preferably mattress or simple interrupted sutures, are carried through the outer third of the sphincter ani and now approximate the margins of the latter. The knots are placed on opposite sides away from the line of union. Note the free ends of the sutures used to close the rectal wound.

(Figs. 421 to 424 from Royston: *Am. J. Obst. & Gynec.*)

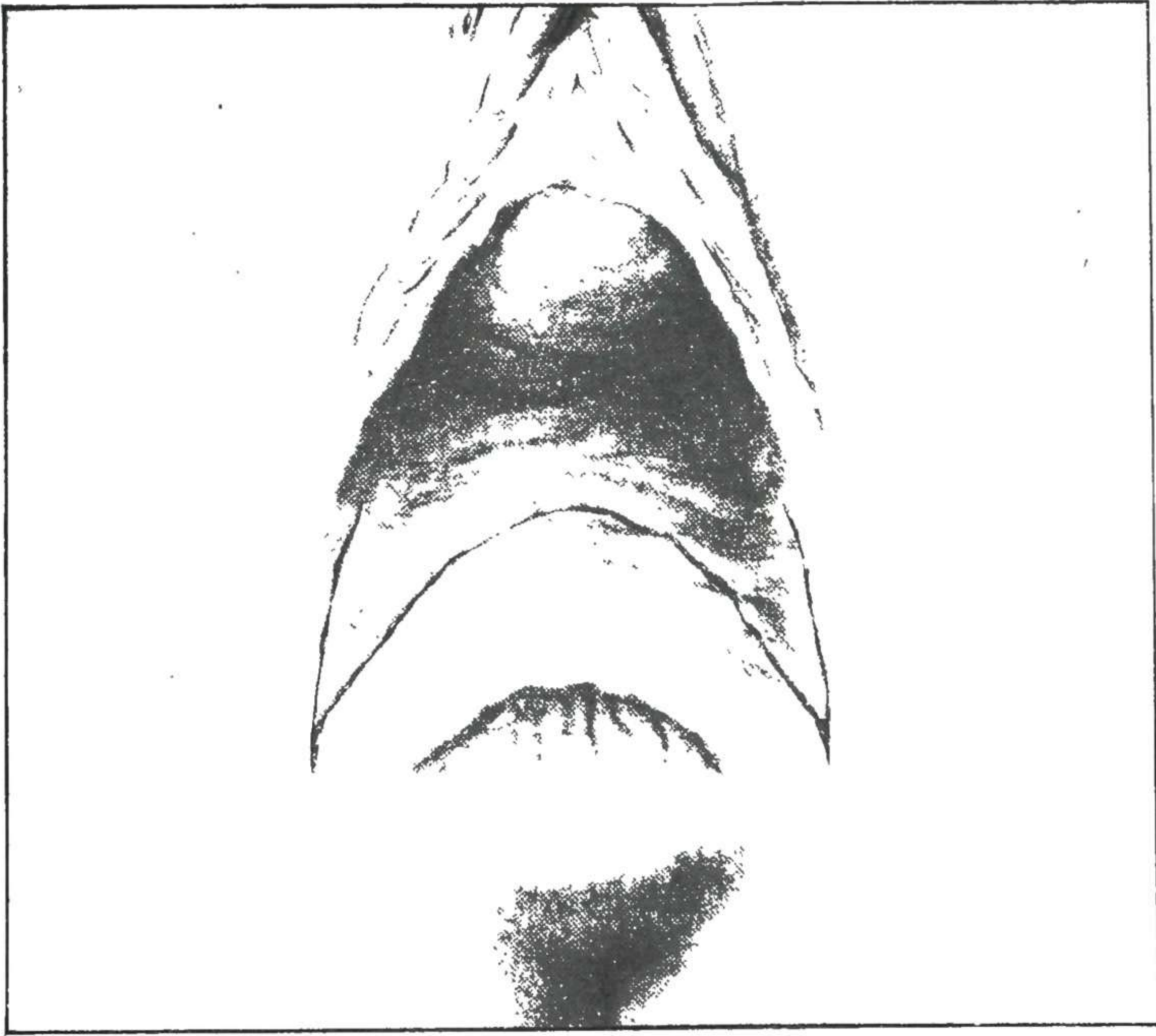


Fig. 425.—Flap operation for torn sphincter ani. The incision for opening the pelvic floor. The angle of the incision on each side should be kept well above the depression marking the end of the sphincter.

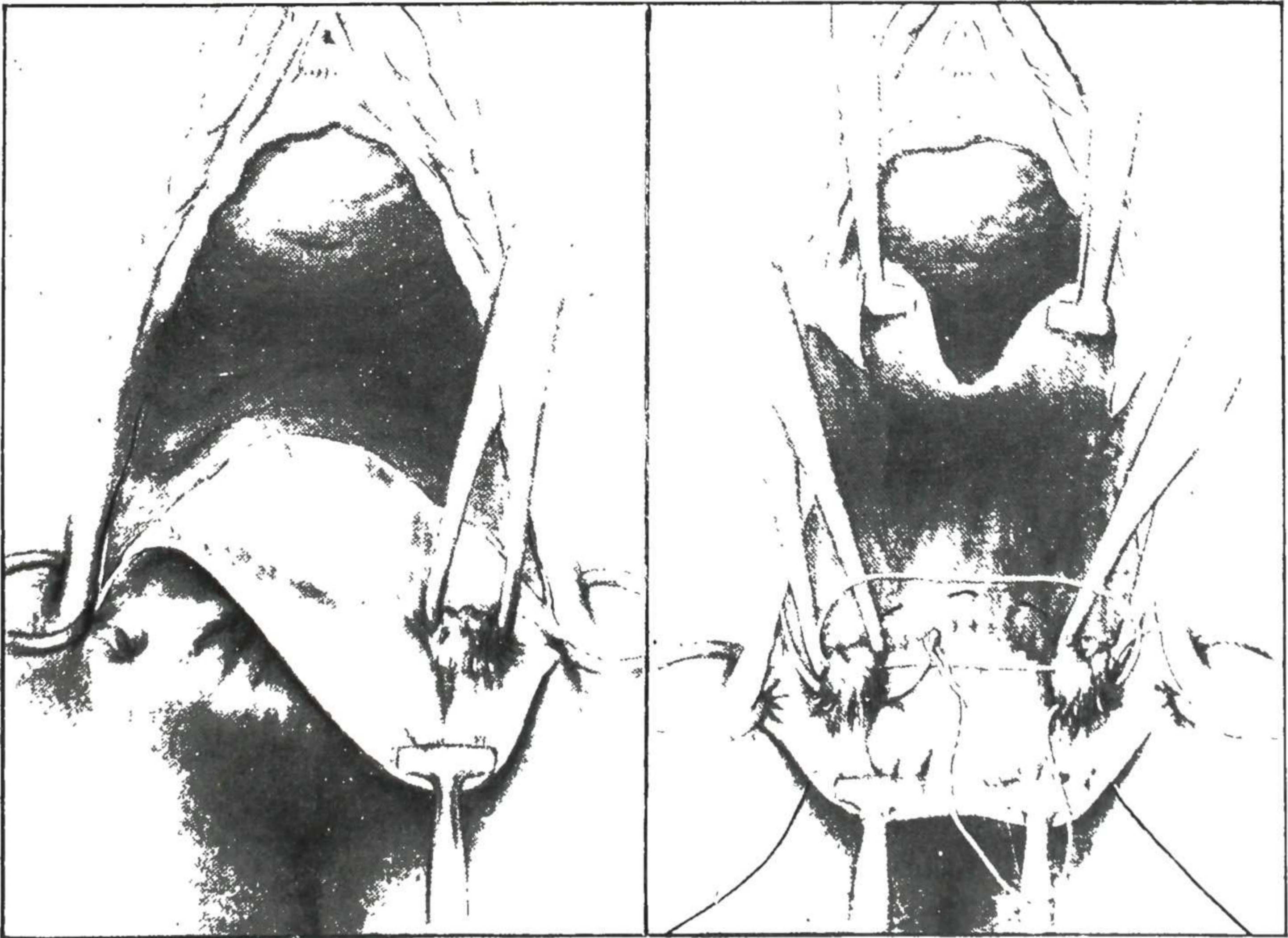


Fig. 426.

Fig. 427.

Fig. 426.—Turning down the flap. Care should be taken to avoid separating the flap too near to the rectovaginal scar, as that might interfere with its blood supply and cause sloughing. Buttonholing of the flap also is to be avoided—a difficult task at times. If the flap is buttonholed in a location to interfere with its integrity, it is preferably excised and the regular repair previously described is carried out.

Fig. 427.—Identifying and suturing the sphincter ends. The course of the silk worm-gut suture is also shown.

this condition are given in the operative volume, but the principles of the correction are shown in the accompanying illustrations.

The first step, common to all three types of operative correction, is stretching of the contracted sphincter muscle, as shown in Figs. 415 and 416, to lengthen it so that it can encircle the rectal exit.

The regular open method of repair with suturing through rectal mucosa is shown in Figs. 417 to 420. The pelvic sling suturing and other steps of pelvic floor suturing are completed after this special work.

The open method of repair with submucosal suturing is shown in Figs. 421 to 424.

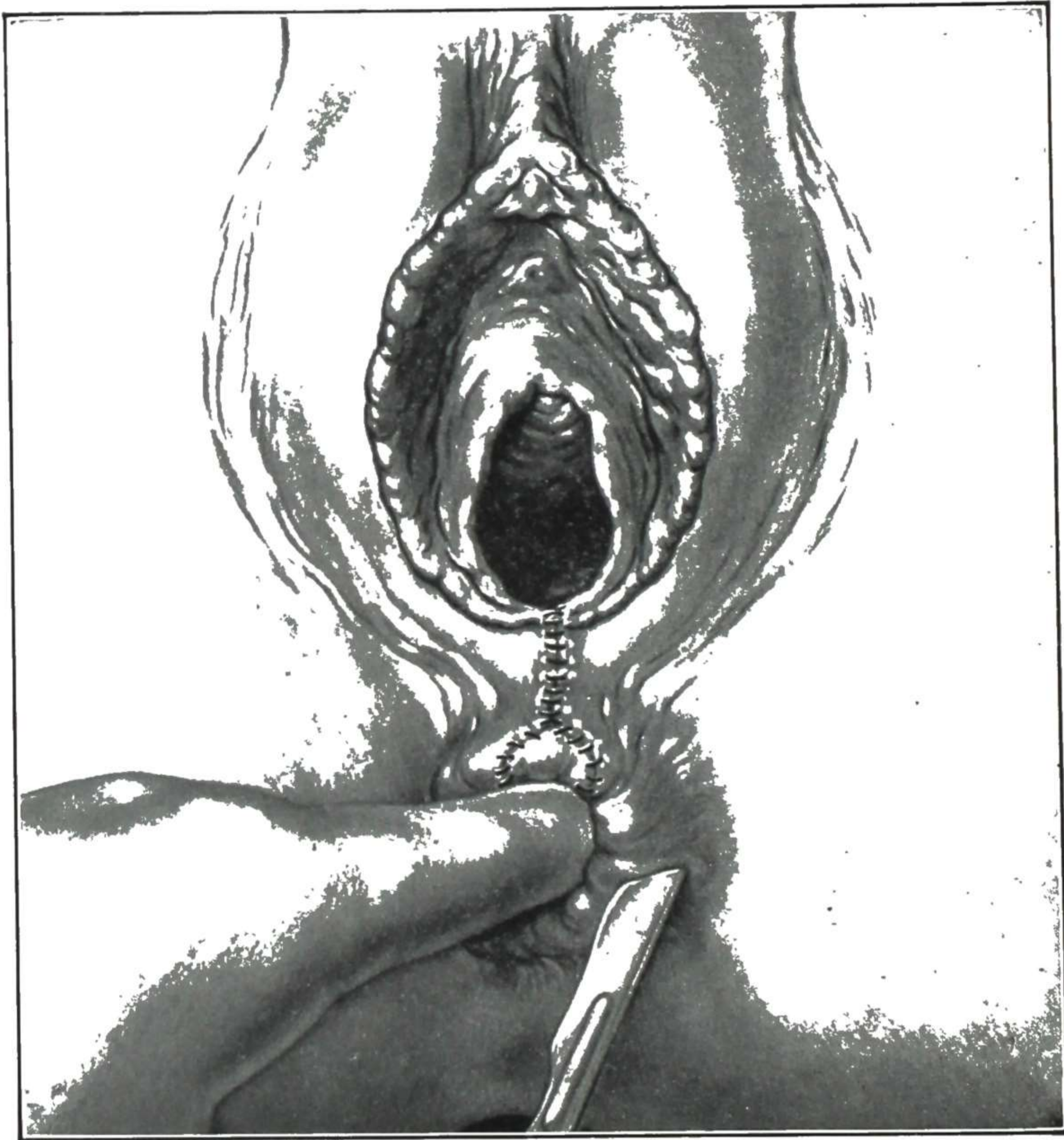


Fig. 428.—Incision of the sphincter muscle at the end of the operation. This may be done earlier if the muscle ends cannot be brought together readily. Called "paradoxical" operation for repair of the sphincter. (From Miller and Brown: *Am. J. Obst. & Gynec.*)

The flap method of repair is shown in Figs. 425 to 427. After the suturing of the sphincter muscle and the pelvic floor repair, the flap is brought up and sutured in place. This plan eliminates the rectal mucosal wound and leakage through it. Particular care, however, must be exercised to avoid sloughing of the flap, and consequent opening of the wound to rectal contents.

Miller and Brown report a series of cases in which incision of the repaired sphincter muscle was employed to prevent spasm and tension which might interfere with healing. Their technique is shown in Fig. 428.

Postoperative Care

The items of special care after repair of laceration into the rectum relate to protection of the healing area in the rectum from irritating material there

and from strain or stretching that may tear apart the newly healed sphincter muscle. Both of these objects are best attained by keeping the rectum empty for ten days to two weeks. This means no bowel movement during that time, and requires special diet and codeine or other sedative to avoid peristalsis.

Protection of the outside wound is probably best secured in many cases by leaving it alone, free from irritation by douching, sponging, dressing, etc. If there is already an irritating vaginal discharge, pitcher douching without handling and perhaps vaginal douching also may be advisable, if they make the patient more comfortable. There is a good deal to be said pro and con in regard to douches and dressings in postoperative care; and as the matter is still in the balance and cases differ so much, the comfort of the patient may usually be taken as the guiding factor. In general, the less any clean wound is disturbed by handling and dressing, the better it heals. On the other hand, an irritating vaginal discharge remaining and decomposing on a wound is more likely to cause discomfort and infection than if removed at suitable intervals by a nonirritating douche.

When the time comes for bowel movement, a soft stool is to be secured without straining and if possible without disturbing the healed rectum by enema or rectal tube. In case an enema should be found necessary to supplement the laxative, an enema of an ounce of oil should be carefully injected through a small catheter and allowed to remain until a bowel movement is accomplished without straining. This may be supplemented later, if necessary, by a small enema of water, not more than four ounces, and given slowly to avoid distention.

RECTOVAGINAL FISTULA

From injuries in labor or from destructive ulceration or from other causes, fistulous openings may form, extending in various directions. The different varieties of genital fistulae, with the name given to each, are shown in Fig. 429.

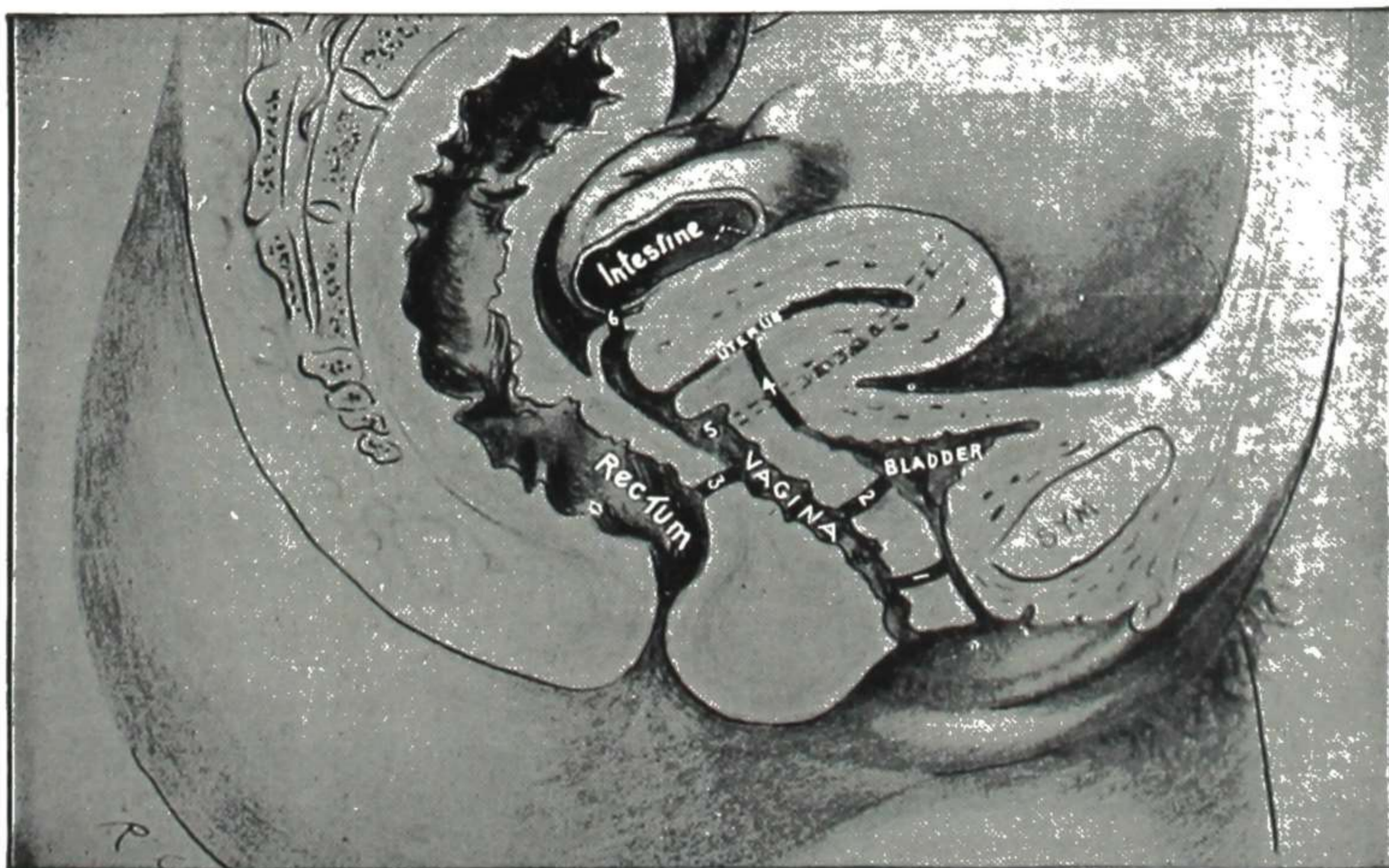


Fig. 429.—Fistulae of the genital tract. 1, Urethrovaginal fistula. 2, Vesicovaginal fistula. 3, Rectovaginal fistula. 4, Vesicouterine fistula. 5, Ureterovaginal fistula. 6, Intestinovaginal fistula. (From Gilliam: *Practical Gynecology*.)

A rectovaginal fistula is an opening from the rectum into the vagina. The size of the fistula may vary from a small tortuous tract, admitting only a small probe and permitting only gas or fluid to escape, to a large opening, involving a large part of the rectovaginal septum, through which pass practically all the rectal contents.

Etiology and Pathology

The following are the causes of rectovaginal fistulae:

1. *Injuries in Labor*.—In rare cases a hole may be torn through the rectovaginal septum, resulting directly in a fistula. Usually, however, a fistula resulting from labor is due to a complete laceration of the perineum, which is repaired at once or later but fails to heal entirely. The lower part of the approximated surfaces unites, but a small part of the upper angle fails to heal, and the result is a fistula extending from the rectum into the vagina.

2. *Chronic Ulceration* of the posterior vaginal wall, which may be chancreoid or syphilitic or tuberculous. It usually affects the lower part of the vagina.

3. *Stricture of the Rectum*, with dilatation and ulceration of the rectal wall above it.

4. *Malignant Disease* of the rectovaginal septum is usually secondary to cancer of the cervix uteri or cancer of the rectum.

5. *Operation*.—A pelvic abscess which has ruptured into the rectum will, if opened into from the vagina, give a rectovaginal fistula. Again, in stricture of the rectum, there may be dilatation and ulceration of the rectal wall above the stricture with perirectal inflammation and an abscess. Such an abscess, if opened into from the vagina, will give a rectovaginal fistula. Again, the rectal wall may be injured directly in various operations.

Diagnosis

The diagnostic symptoms of rectovaginal fistula are the escape of some of the rectal contents into the vagina, and the vaginal irritation caused thereby. The amount and character of the leakage from the rectum vary much in different cases. In the smallest fistulae only gas, with occasionally some liquid, passes. With the opening a little larger, there may be free leakage only when the bowels are loose and the contents fluid. In still other cases, nearly all the rectal contents, whether fluid or solid, pass through the fistulous opening.

Digital examination reveals a rough place in the posterior vaginal wall. On inspection, if the opening should be large, it may be seen; but if small, only a rough place with a small slit is visible. Very often a red papule marks the vaginal opening of the fistula. Exploration of the opening with a probe, with a finger of the other hand in the rectum, shows that the sinus communicates with the rectum. In a doubtful case in which the opening cannot be found or in which a probe cannot be introduced, the fact that there is a rectovaginal fistula may be established and its location determined by injecting colored water (methylene blue, $\frac{1}{5}$ per cent solution) into the rectum and watching for its appearance on the posterior vaginal wall. If there is syph-

ilitic or chancroidal or tuberculous ulceration, or if there is a stricture of the rectum or malignant disease, the evidences of the complicating disease will be present, in addition to the evidences of fistula.

Treatment

In the rectovaginal fistula following labor, that is, where part of the repaired rectovaginal septum failed to heal, no secondary operation should be undertaken for the closure of the fistula for six or eight weeks after labor. The fistula may close spontaneously within a few weeks. Again, an operation in the genital tract during the puerperium increases the chances of puerperal sepsis, and later, when she has recovered from the debilitating effects of parturition, the patient will be in much better condition generally for the operation. Locally, also, the tissues have returned to their normal condition, and complete primary union is much more certain to follow the operation. For some time following labor the uterine discharge would tend to interfere with healing, and the tissues are so friable that the sutures are much more liable to cut through.

Palliative Treatment.—In the meantime, the vagina must be kept clean by antiseptic vaginal douches, once, twice, or three times daily, as indicated by the amount of leakage through the opening. If the opening is very small, stimulation by touching it occasionally with silver nitrate stick, or with carbolic acid, will sometimes cause the fistula to close. If the fistula persists after thorough recovery from the parturition, it may be closed by operation.

Operative Treatment.—The preparation of the patient, operator, instruments and dressings are the same as for complete laceration of the pelvic floor. This apparently simple operation is frequently a disappointing one, on account of infection from the rectum preventing healing, even in spite of the care and skill of those specially trained and experienced in this operative field. A point to be kept in mind is that every failure adds to the difficulty of subsequent repair, hence operation should not be undertaken unless one is prepared to deal with the condition in a thorough way.

Other Fecal Fistulae

Occasionally there occur other varieties of fecal fistula, opening into the genital tract. There may be an opening into the vagina from the sigmoid flexure or from the colon or from the small intestine. There may be an opening into the uterus from the sigmoid or from the colon or from the small intestine.

VESICOVAGINAL FISTULA

There may be an opening between the genital tract and the urinary tract at one of several situations (Fig. 429). The location is indicated by the name as follows:

- Urethrovaginal Fistula—Between Urethra and Vagina.
- Vesicovaginal Fistula—Between Bladder and Vagina.
- Ureterovaginal Fistula—Between Ureter and Vagina.
- Vesicouterine Fistula—Between Bladder and Uterus.
- Ureterouterine Fistula—Between Ureter and Uterus.

All of these fistulae are rare, the most common being the vesicovaginal. A **vesicovaginal** fistula is an opening from the bladder into the vagina. The size of the fistula may vary from a small opening, permitting only slight leakage, to a large opening through which all the urine passes.

Etiology

The following are the causes of the vesicovaginal fistula:

1. *Injuries in Labor*.—In prolonged labor where the lower portion of the bladder is caught and held for several hours between the head and the pubic bone, sloughing may follow. Part of the base of the bladder and the anterior vaginal wall are bruised, the circulation is more or less cut off, the parts become gangrenous and after a few days the slough separates, leaving a vesicovaginal opening through which the urine passes. Such injuries are rare in recent years on account of the great improvement in obstetric teaching and practice. Now, the head is not permitted to remain for several hours in such a position that it makes serious pressure on the bladder. If the head does not advance satisfactorily within a reasonable time after the rupture of the membranes, the child is delivered by forceps or otherwise.

A still rarer form of damage to the bladder in labor is that in which the bladder is torn directly, either by the manipulations incident to a version or by the forceps. In that case the dribbling of urine is noticed immediately, or within a few hours after labor, whereas if the fistula is due to sloughing, there is no escape of urine until the separation of the slough, which requires several days.

2. *Chronic Ulceration* of the anterior vaginal wall or the base of the bladder. The ulceration may be chancroidal, syphilitic, or tuberculous.

3. *Malignant Disease* of the vesicovaginal septum is usually secondary to cancer of the cervix uteri.

4. *Operations*.—One of the methods of treating severe chronic cystitis is to make an opening from the vagina into the base of the bladder, so as to give constant drainage of the latter. Such an opening usually closes spontaneously a short time after the drainage tube is removed. It may, however, fail to close promptly after its usefulness is ended, and in that case becomes a vesicovaginal fistula, requiring operation. Another cause is accidental injury of the bladder during hysterectomy.

Diagnosis

The patient complains of urine coming from the vagina and of much vaginal irritation. In some cases the patient complains simply that she cannot control the urine.

Digital examination reveals a rough place on the anterior vaginal wall. If the opening is large, it may be distinctly made out with the finger. If the opening is small, only a slight elevation or depression or rough place may be felt. Upon inspection, if the opening is large, it may be seen, but if it is small, only a red papule marks the site. If the opening be watched a few minutes, urine may be seen escaping from it. Cystoscopic investigation shows the location and size of the opening in the bladder. If the diagnosis is doubtful, sterile methylene blue solution may be injected into the bladder and its appearance

watched for at the supposed vaginal opening of the fistula. There is another condition which must be carefully differentiated from vesicovaginal fistula, namely, ureterovaginal fistula.

When the vesicovaginal opening is large, the fact that it communicates with the bladder is apparent, and the margins of the opening and the adjacent surfaces of the vaginal mucosa and vesical mucosa are frequently encrusted with the phosphates from the decomposed urine. In one of our cases there was a large phosphate stone nearly filling the contracted bladder and projecting through the large vesicovaginal opening into the vagina.

The irritation caused by the decomposition of urine in the vagina is very great, and the constant odor of decomposing urine combined with the constant leakage of fluid, soaking pads and clothing, makes the patient miserable.

Treatment

If the fistula is due to malignant disease, no attempt should be made to close it unless the malignant infiltration is so situated that it can be completely extirpated. In the inoperable cases, local cleanliness and local sedatives are indicated.

If the fistula has resulted from sloughing after labor or from operation, it is best to postpone the operation for repair until the patient has fully recovered, and the tissues have become strong enough to hold the sutures well. During the time the patient is waiting, palliative treatment will be necessary.

Palliative Treatment consists in keeping the parts clean and in receiving and disposing of the urine so that it does not come in contact with the clothing. To accomplish the first object, a urinary antiseptic such as the sulfonamides or antibiotics should be given internally. Also a vaginal douche of 1:4,000 potassium permanganate should be given twice daily, and the external genitals should be washed frequently with a 1:1,000 Zephiran solution. If there is much vulvar irritation, the measures mentioned under Acute Vulvitis may be employed. Some relief may be given by coating all surfaces, with which the urine comes in contact, twice daily with benzoated zinc-oxide ointment.

For catching the urine and protecting the clothing from constant contamination, one of the urinals found in the instrument stores may be helpful. Many types of apparatus have been devised to relieve the discomfort of these patients. Figs. 430 and 431 show a special bed pad which has proved practical and useful in this matter. The quotation is from the description by Murphy.

Patients having inoperable, vesicovaginal fistulas suffer much distress from being constantly wet. At night, the necessity of getting out of bed, in order to remove wet clothing, interrupts their sleep to such an extent that a full measure of rest is impossible. Furthermore, the heat of the body hastens the decomposition of the urine, which is absorbed by the clothing, with the production of the well-known disagreeable odor, distasteful to patient and family alike. The device shown eliminates the above difficulties, for by its use, the patient is able to remain dry, and at the same time experiences no odor of decomposing urine.

The apparatus consists of two parts, a rubber pad and an envelope. The pad is made of sponge rubber and measures 18 by 24 by 3 inches. It possesses a centrally placed fenestration, measuring approximately 8 by 8 inches, which is somewhat the shape of a toilet seat. The sponge rubber is entirely covered by having cemented to its surface a sheet of smooth, soft texture rubber.

The envelope fits the pad, for which purpose its corners are mitered and supplied with metal snap fasteners; it is made of the same fine quality rubber sheeting as is cemented to the pad. Additional equipment includes bath towels to absorb the urine, and three triangular pieces of cotton cloth, to protect the patient's body from the rubber.

The bed is prepared for sleeping in the usual manner. Several bath towels are placed in the bottom of the rubber envelope, and upon these is laid the rubber pad. The corners of the envelope are then fastened. Next, the pad and envelope are placed across the bed with the tapered end of the fenestration toward the foot. The pad is covered by using the three triangular pieces of cotton cloth as shown in Fig. 431. The two pieces covering the ends of the pad are applied last, since they are the ones which might possibly get wet. Either of these end pieces can be removed independently, without the patient being required to get out of bed to do so. In actual practice, however, the wetting of these covers is very rare.

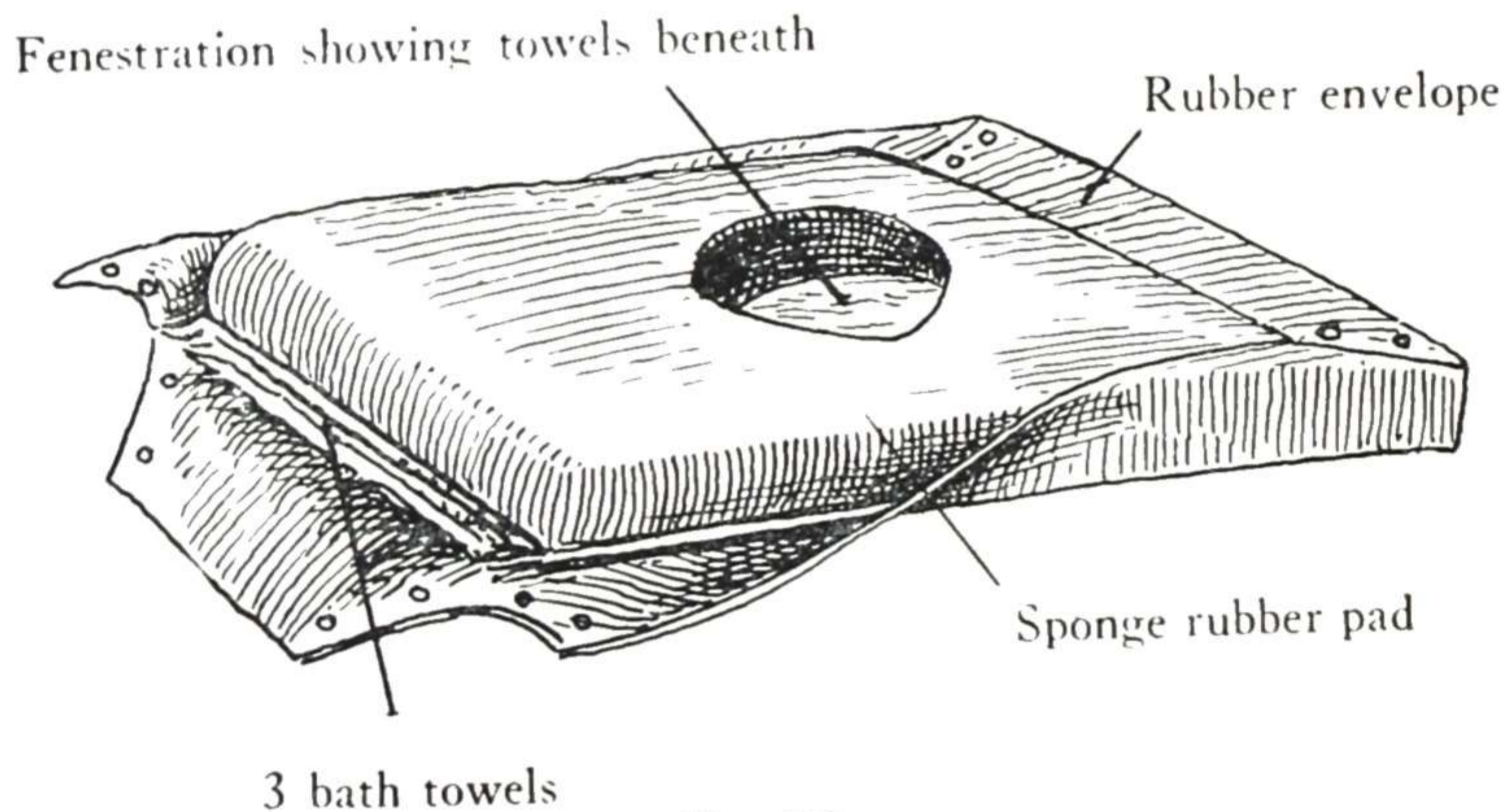


Fig. 430.

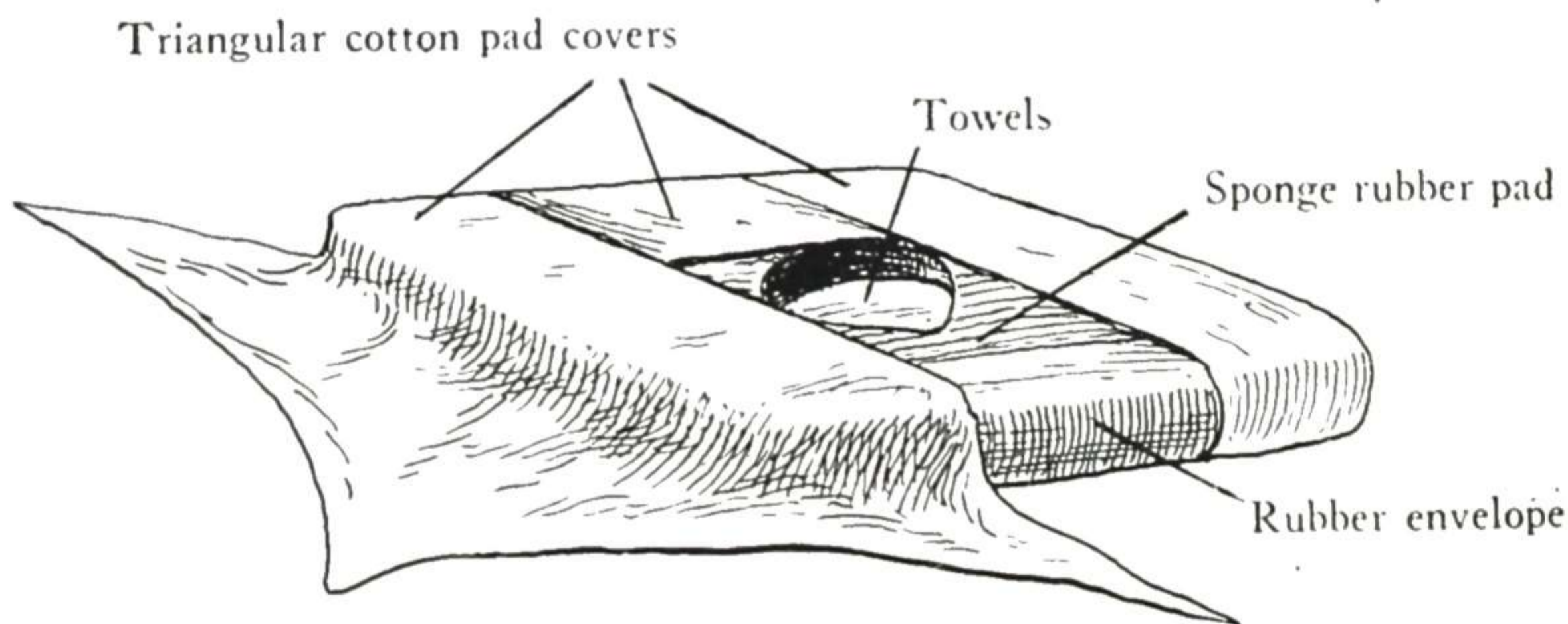


Fig. 431.

Figs. 430 and 431.—A special pad for keeping the patient dry in bed in cases of vesicovaginal fistula. (From Murphy: *Am. J. Obst & Gynec.*)

In order to create an even sleeping surface, patients can make themselves comfortable by utilizing pillows. The consistency of the sponge rubber pad is such that the patient is not conscious of its presence when awake, and she can assume any position during the night and still remain dry.

The patient lies with her vulva overhanging the fenestration in the pad. The urine drops through the fenestration and is absorbed by the toweling, where it spreads out beneath the pad, and thus is not exposed to the patient's body heat. As a result, no offensive odor is produced. The following morning, the moist towels are removed, the pad and envelope are cleaned with a damp cloth, fresh towels replace the moist ones, and the apparatus is again ready for use. The rubber fails to absorb any odor from the urine.

The device was developed through the cooperation of Mrs. S. M., a patient in the Philadelphia Home for Incurables, who has been using it constantly for more than two

years. She had suffered from vesicovaginal and rectovaginal fistulas for more than eight years before she had the opportunity of using the present apparatus. She has found the bed pad to be the only satisfactory method for keeping herself dry at night.

Fig. 432 shows another type of apparatus for this purpose. It is an adaptation of continuous suction toward the solution of this difficult problem, and is presented by Saltzstein for the care of patients with vesicovaginal fistula from advancing cancer of the cervix. The following quotation is from his article, as are also the references to articles by Draper, Hendrickson, Kenyon, Lowsley, Stedman, and Tillotsen, which give a good survey of efforts in this direction.

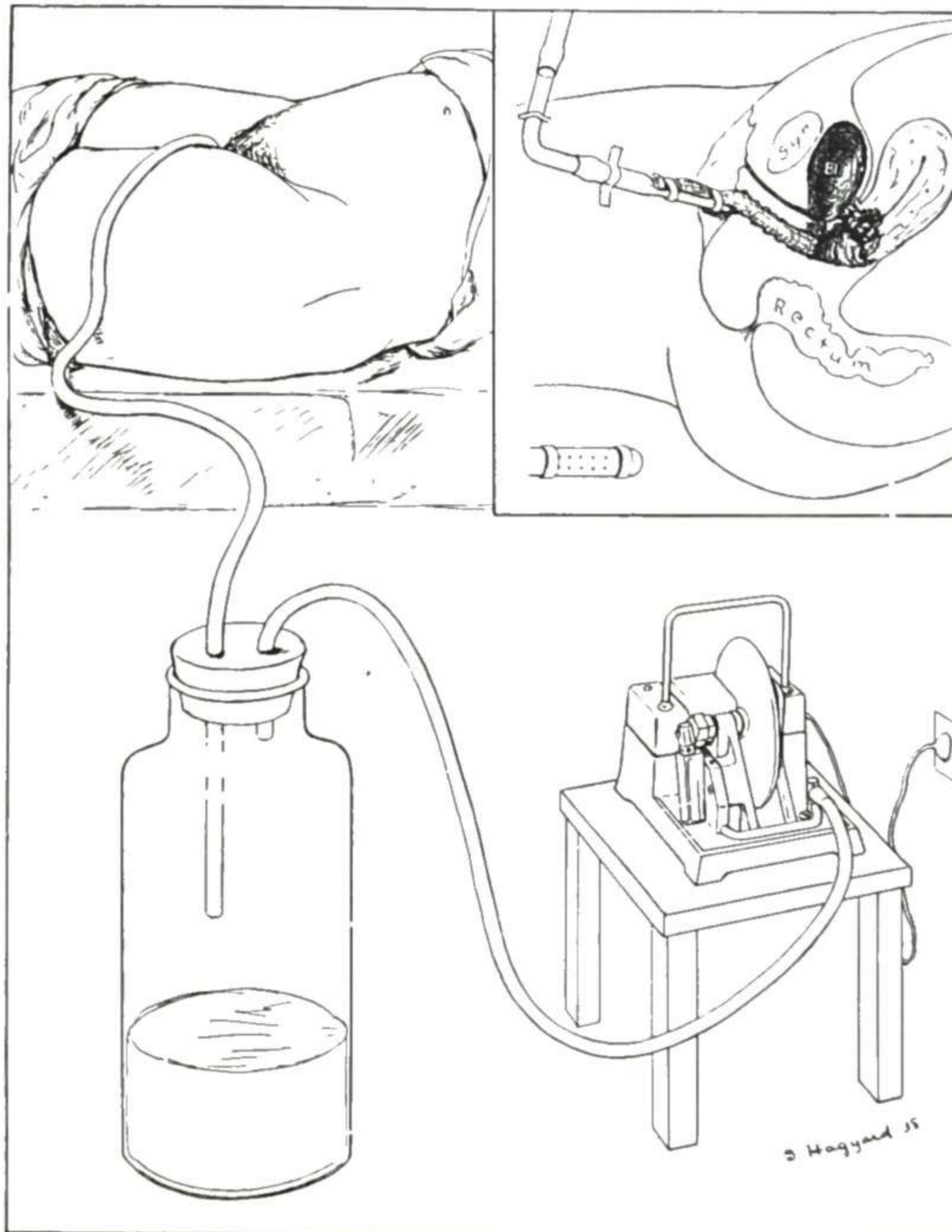


Fig. 432.—Suction drainage applied to vagina for urinary fistula. Tubing from catheter is led into a trap bottle to which mild suction is applied by means of a Stedman electric supra-pubic pump. Inset in upper right shows gauze wick in vagina. The outer end of the gauze is held against the perforations in the end of the catheter. The catheter is taped on to the inner thigh and does not enter the vagina. (From Saltzstein: Surg., Gynec. & Obst.)

When carcinoma of the cervix ulcerates into the floor of the bladder, a very disagreeable and uncomfortable condition ensues. To the infected necrotic cervix discharges is added the pooling of stagnant urine in the vagina, thus making this tender mucosa increasingly irritated, inflamed, and sore.

The care of this condition has been unsatisfactory. Transplantation of the ureters into the sigmoid has been considered, but at this stage of the disease the ureters are usually dilated from the stricture caused by cancer extension into the broad ligament, and the prognosis for length of life is too uncertain (2 to 6 months) to make this extensive operation practicable. Bilateral lumbar ureterostomy has been done occasionally with success.

The employment of a permanent urethral catheter will keep some patients dry if the hole in the bladder is high up near the cervix and is not too large. Very often the catheter soon irritates the urethra, however, and the patient demands its removal. Locally, we have tried to keep these patients comfortable by means of rubber sheet and double pads placed underneath the hips and thighs, and by giving them a supply of perineal pads which

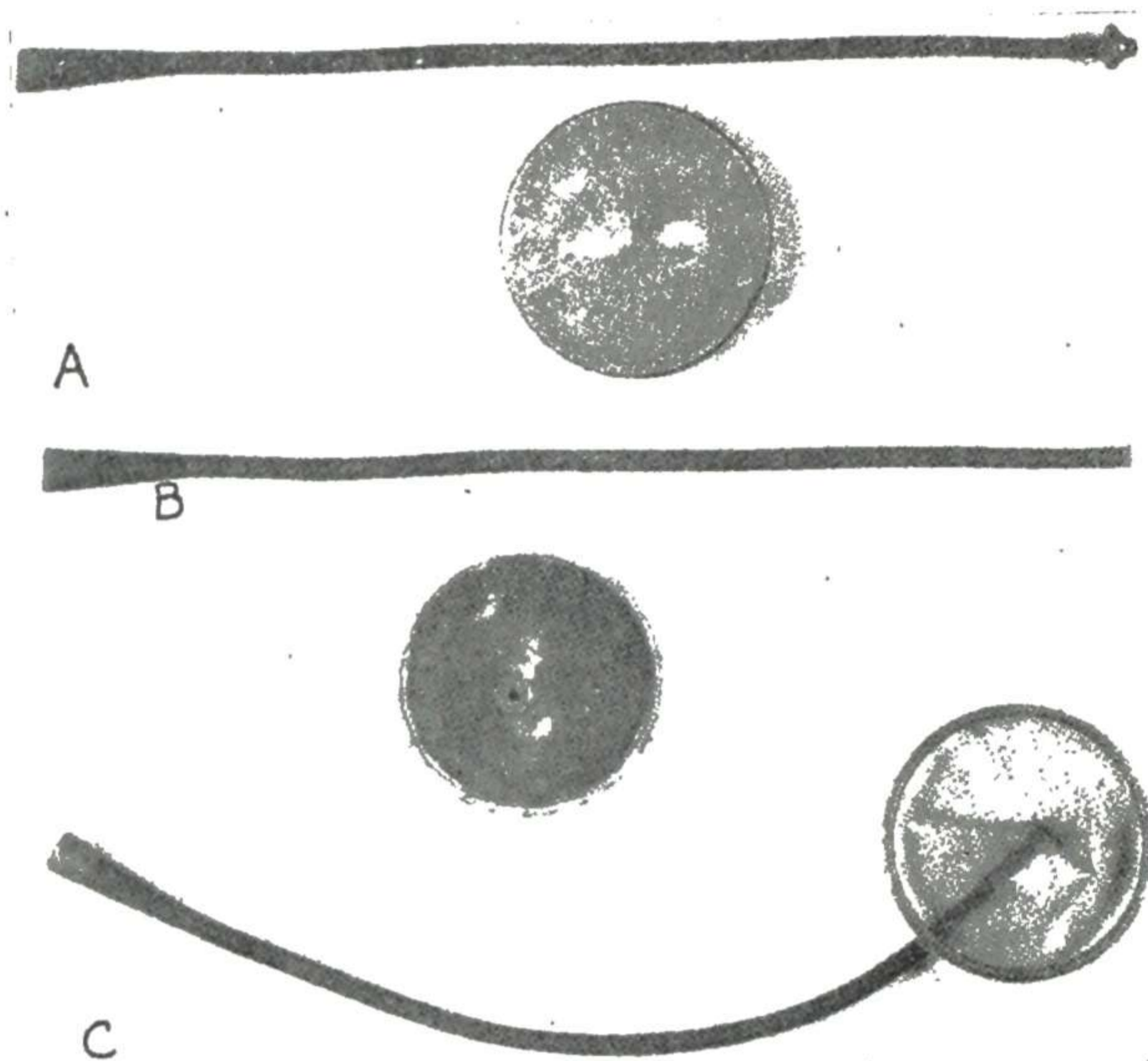


Fig. 433.—A, Mushroom catheter and vaginal diaphragm. B, Upper portion of catheter is cut off. C, Resultant flange is glued to the inner side of the diaphragm. (From Castallo: J. A. M. A., Jan. 25, 1947.)

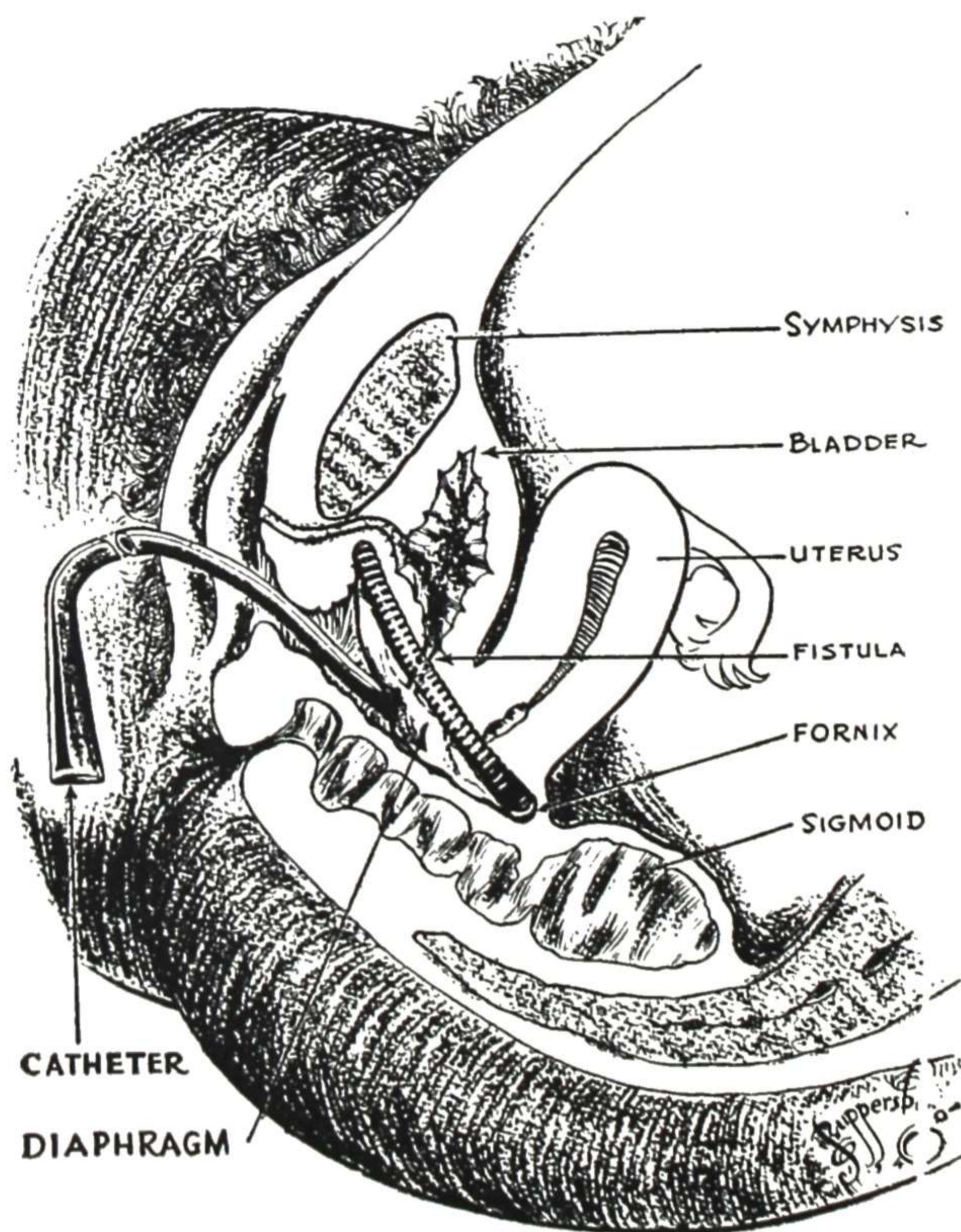


Fig. 434.—Diaphragm in the vagina. (From Castallo: J. A. M. A., Jan. 25, 1947.)

they may change as frequently as necessary (every 20 to 40 minutes). Some have used a sea sponge in the vagina. Others have used an inflated toy balloon.

Urologists have, during the past few years, made increasing use of continuous suction to carry off the urine from draining bladder wounds. The principles of applying suction to an open wound or orifice are that no vacuum be formed in the wound, and that there be no cupping action on the walls or bottom.

Various devices have been described to fit onto the body surface comfortably in order to dispense with drainage tubes or for use when these tubes are not needed. In all such devices a gauze wick lies in the urine or in the secretion to be absorbed. Air is sucked through a perforated catheter, tube, or mask attached to the gauze. The suction pulls the urine through the gauze, into the tubing, and then into a trap bottle.

The slightest suction or cupping pull in the vagina is painful, but a piece of gauze can be inserted into the vagina, attached to a perforated catheter outside the vaginal orifice, and the proper suction will transport the urine out into a bottle and keep the vagina clean. We have used the Hendrickson catheter attached to the Stedman electric supra-pubic pump. This catheter ends in a flat spade-like tube, on one surface of which are 6 to 8 large perforations. A thick gauze wick is attached to this tube, and the free end is moistened and inserted three to four inches into the vagina. The catheter remains just outside the vagina. The tubing is then led over the patient's thigh to a gallon drain bottle on the floor. The pump is attached to the other tube of the bottle.

The vaginal wick must be changed as it becomes soiled, that is, every one or two days. No other care is necessary except the routine cleansing of tubing and bottle.

Another device which permits the patient to be up and about consists of a contraceptive diaphragm with a catheter extending through a hole in the center of the rubber portion. The rubber is cemented to the catheter to make it watertight. The diaphragm should be large enough to occlude the vagina, and the catheter is clamped off and drained as often as needed (Figs. 433 and 434).

In recent years, in hopeless cases of cervical carcinoma with fistulae, the Brunshwig operation has been successful in selected cases, but it is too early as yet to assess its real worth.

Operation.—Operation for vesicovaginal fistula should be undertaken only by those experienced in surgical work. Even a small fistula may be difficult to close, and is likely to be converted into a larger one by unsuccessful attempts. The operation must in each case be carefully planned, and be based on accurate knowledge of the relation of the fistula to the ureters and urethral sphincter and the extent of fixation of tissues to be used in repair. Details are given in *Operative Gynecology*.

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