VAGINAL HYSTERECTOMY*

Operative Technique

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VAGINAL hysterectomy with repair of defective pelvic supporting structures when present is one of the most useful of all gynecological operations. Its increasing popularity is well attested by the large series being reported in the current literature.[1-6] Particularly impressive are the greater safety and comfort of the patient with a high percentage of symptomatic relief as compared to results obtained with abdominal hysterectomy or with one of the various pelvic plastic procedures without removal of the uterus.[7-10] Actually, vaginal and abdominal hysterectomy should not be competitive operations as there is a definite place for each and usually clear-cut indications or contraindications. The merits of the vaginal approach will not be discussed here; suffice it to say that with increasing familiarity with the operative technique we will find more and more patients to whom this procedure is applicable.

Preoperative Work-up

A meticulous history is taken, followed by a complete physical examination. The minimal required laboratory and special studies are x-ray of the chest, complete blood count, urinalysis, serological test for syphilis, blood type and Rh factor determination, and a vaginal cytological study for malignant cells. All patients over 45 years of age have an electrocardiographic tracing; those presenting symptoms of urinary stress incontinence or any other symptoms referable to the urinary tract are examined by the urologist. Cytoscopy and intravenous pyelography are performed in all cases of prolapse of long standing even though the patient does not complain of any urinary symptoms.[11] If the cervix shows any pathological changes or if the Papanicolaou slide is not normal, multiple biopsies are taken. Blood chemistry, glucose tolerance, liver function, and other special tests are ordered when indicated.

No effort is spared to place the patient in the best possible mental and physical condition prior to surgery. She is reassured and briefly informed of the preoperative, operative, and postoperative plan. If unduly apprehensive or unable to secure rest at home she may be brought into the hospital for four

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or five days prior to the performance of the operation. Cervicitis and vaginitis are treated, cervical polyps are removed and submitted to the pathologist. Obesity, anemia, dietary deficiency, and urinary tract infection are treated to maximum response prior to operation. The patient with atrophic vaginal mucosa is often given a course of topical estrogens and those with dysfunctional uterine bleeding may benefit from a course of androgen therapy prior to operation.

All patients are admitted to the hospital at least twenty-four hours prior to surgery and are placed in bed for a rest. Enemas are given only on definite indication and not as a routine. A careful pelvic examination is performed to re-evaluate the pathology and to confirm the wisdom of the selection of operative procedure. Surprising changes, including those associated with intrauterine gestation, can occur within a few days' time! Following the pelvic examination the vagina is irrigated with 1:10,000 solution of potassium permanganate. A member of the anesthesia department then visits the patient to discuss the anesthetic agent with her and to assure himself that she is ready to receive an anesthetic. Every patient is cross-matched for 1,000 c.c. of whole blood, which accompanies the patient to the operating room and is given whenever the need arises.

Operative Technique

The technique to be described will be based in the main upon that originally advocated by Heaney.[12] Certain important modifications are added, however, these to be used in every case and not reserved for the occasional one with large enterocele or complete procidentia, as has been advocated from time to time.[13-16]

Subarachnoid anesthesia is preferred unless there is some contraindication. This is usually supplemented with a small amount of intravenous Pentothal sodium. Upon completion of injection of the spinal anesthetic agent, the patient is carefully placed in the lithotomy position, buttocks well down over the edge of the table, feet and legs suspended high in the air by slings about the ankles with no pressure exerted on the calves, knees, popliteal spaces, or thighs. The table is elevated to its full height, which allows the assistants to stand inside the legs without making any pressure on them, and to assist without undue strain and fatigue. As soon as anesthesia is obtained the table is placed in a 15 degree Trendelenburg position to facilitate light centering, exposure, and to aid in keeping the bowel out of the pelvis. The vagina, perineum, and thighs are scrubbed with tincture of green soap, flushed with sterile water, and painted with a mercurial antiseptic; the patient is catheterized and draped. The operator seats himself on a high stool directly in front of the operative field and a sterile draped Mayo stand is placed directly before him immediately below the patient's buttocks. This has been found to be most useful for those instruments which are used repeatedly. If the labia minora are redundant they are sutured to the skin of the adjacent thigh with one catgut suture. A bimanual examination is performed, the anterior lip of the cervix is grasped with a sharp tenaculum and the uterine cavity sounded, the cervical canal is dilated to admit a small sharp curette, and the endometrial cavity is thoroughly curetted.

Both lips of the cervix are now grasped with the tenaculum and the cervix is held downward while a circumferential incision is made completely around

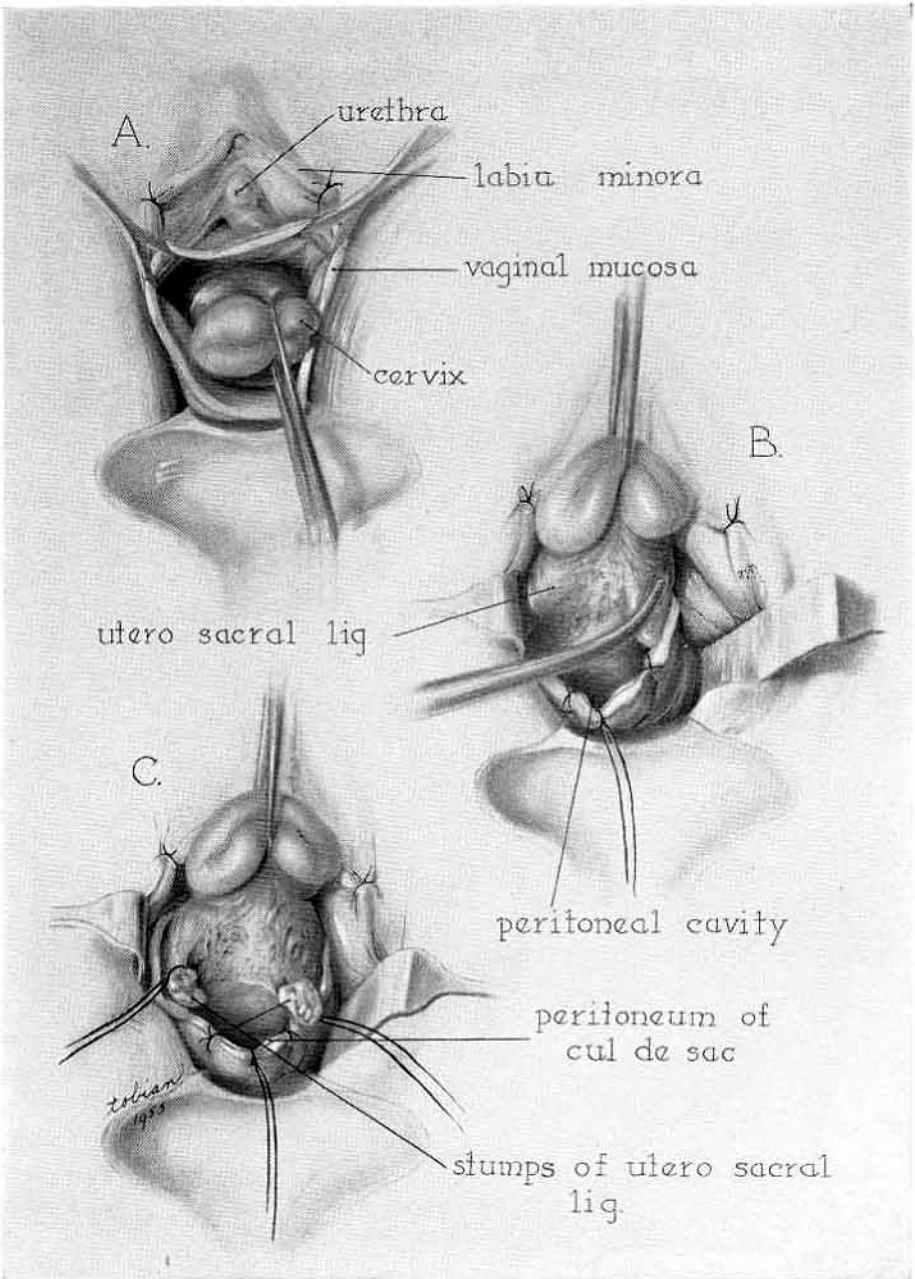

Fig. 1.—*A*, A circular incision has been made at the junction of the vaginal mucosa with the portio vaginalis of the cervix, preserving as much mucosa as possible. The mucous membrane alone is mobilized outward for a distance of about 3 cm.

B, The uterosacral ligaments are laid bare and are clamped with Heaney clamps. The posterior peritoneal sac has been opened, and the edge of the cut peritoneum has been coapted to the mucous membrane with three sutures.

C, The uterosacral ligaments have been clamped, severed, and ligated, and a second double-strand tie has been placed for traction.

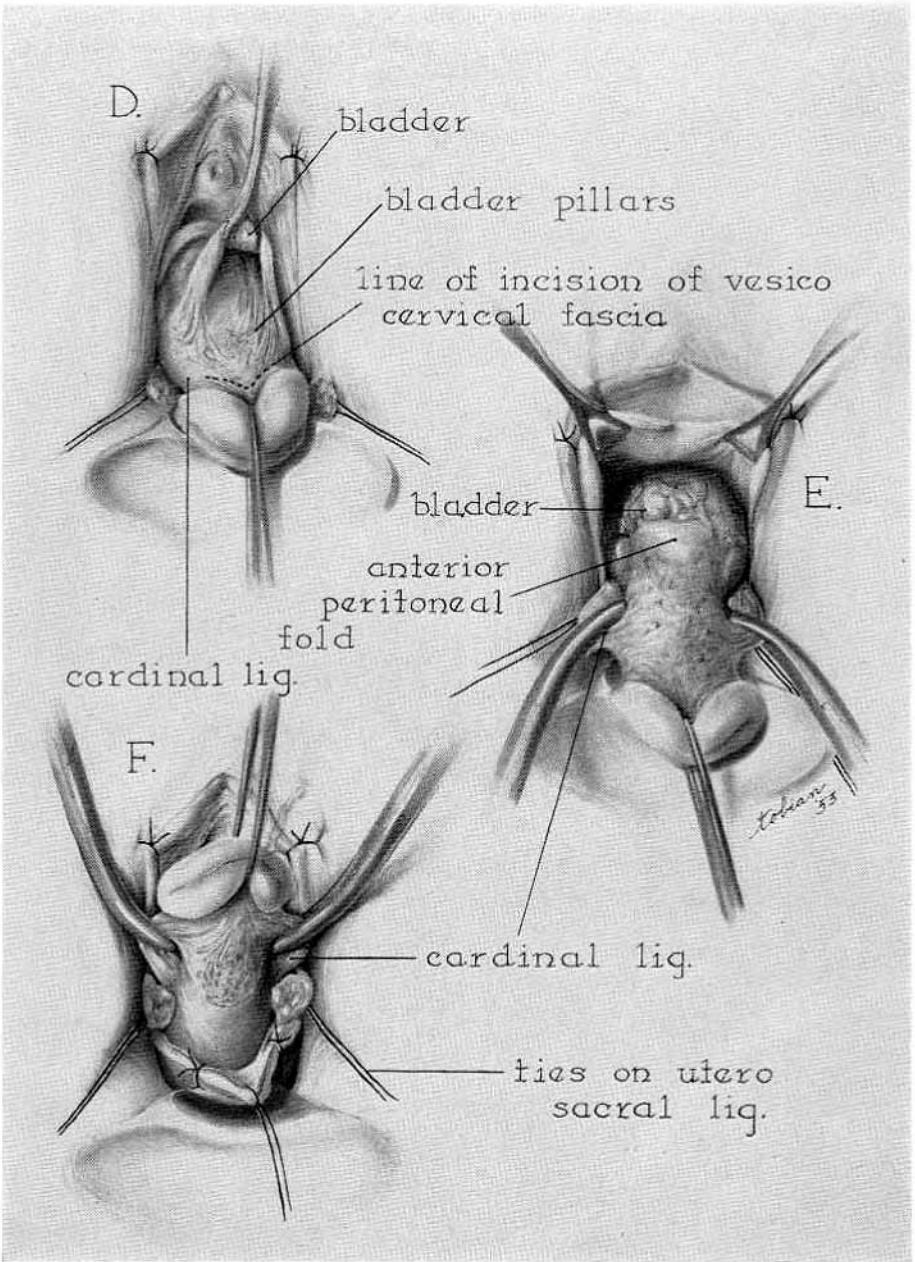

Fig. 1.—*D*, The vesicocervical fascia has been incised transversely and the bladder pillars have been partially stripped back from the cardinal ligaments by means of a gauze-covered finger. The Pennington clamp holds the lower margin of the bladder. Note the pillars only partially liberated on each side.

E, The bladder has been pushed up so that the pillars are completely retracted. The anterior peritoneal fold is visible at the lower bladder margin. Heaney clamps have been placed on both cardinal ligaments.

F, Posterior view of Heaney clamps as placed on the cardinal ligaments.

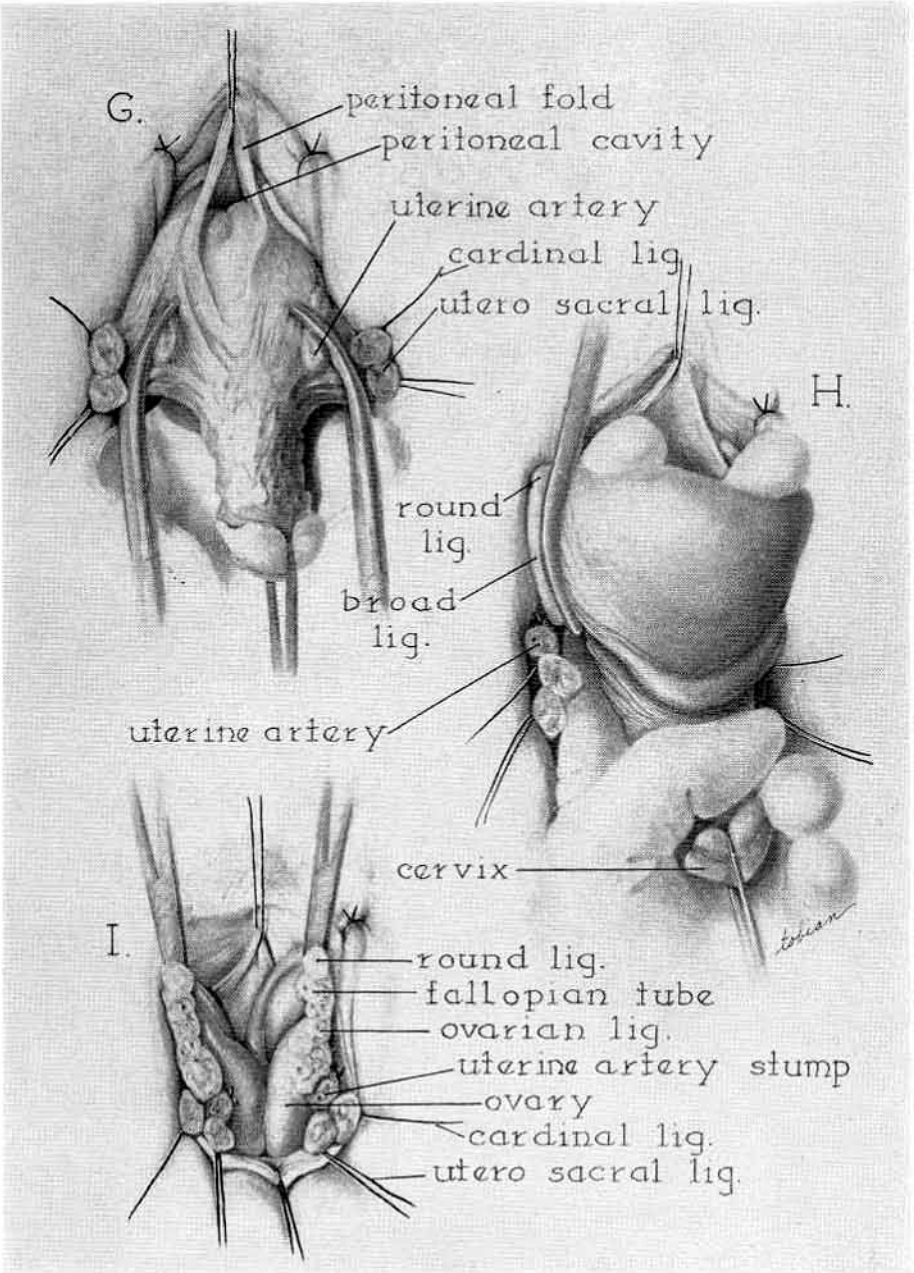

Fig. 1.—*G*, The cardinal ligaments have been severed and tied. Immediately below them is seen the double-strand traction suture on the uterosacral ligaments. The anterior peritoneal fold is now opened and is held upward by a traction suture. Heaney clamps have been placed across the knuckles of both uterine arteries.

H, The uterus has been delivered anteriorly and the Heaney clamp is placed across the entire right broad ligament. If this proves to be large, a second clamp would be inserted from below upward on the same side, dividing the ligament into two portions for tying.

I, The clamps are in place, and included from above downward are the round ligaments, Fallopian tubes, ovarian ligament, and upper broad ligament. The stump of the uterine artery is not included in this bite.

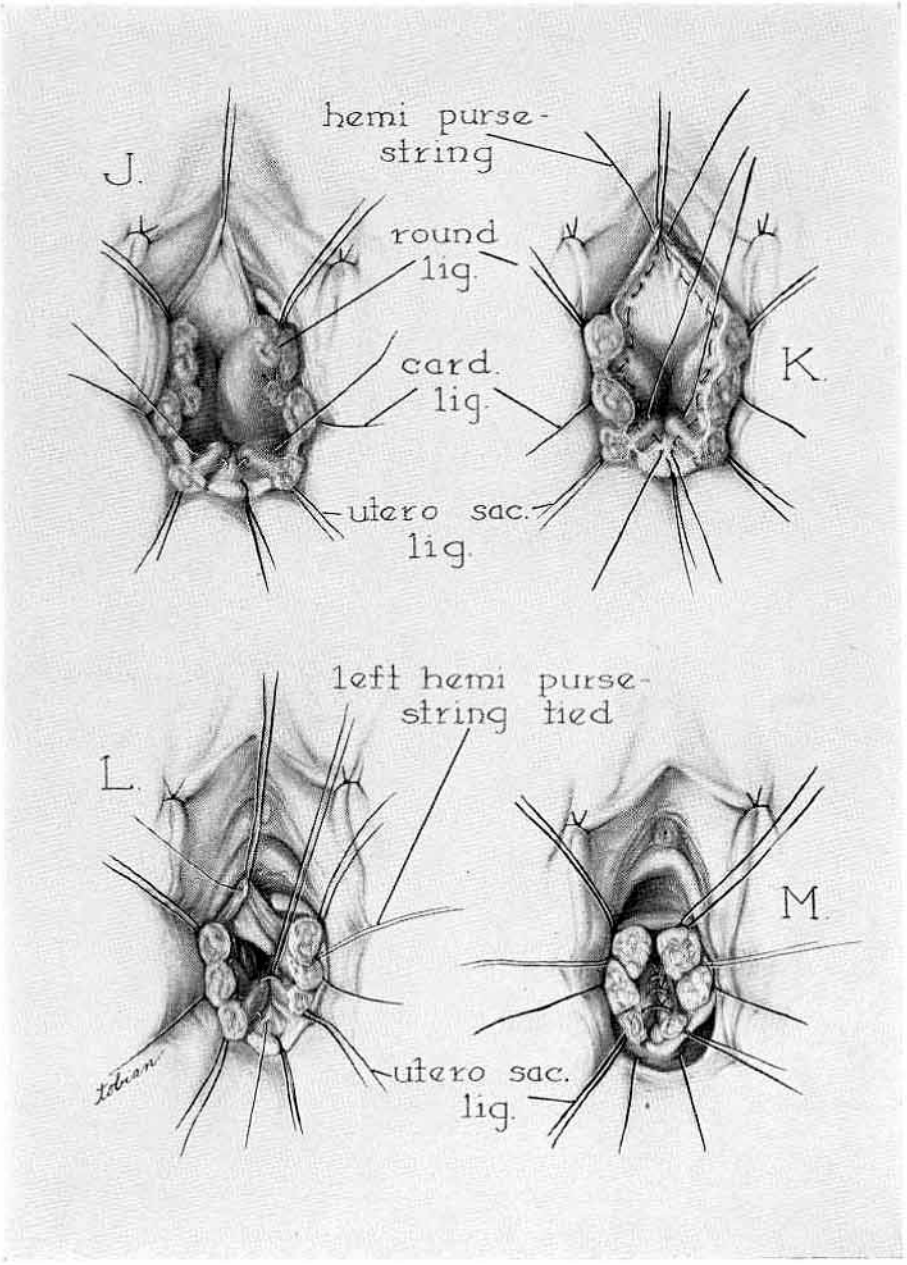

Fig. 1.—*J*, All pedicles are now ligated and are held downward and outward by secondary traction sutures. A chromic No. 1 suture has been inserted to coapt the two uterosacral ligaments. This is placed as high as possible in the cul-de-sac and is usually about 5 cm. from the cut end of the ligaments.

K, Two hemi-purse-string peritonizing sutures have been inserted near the peritoneal margin. The first uterosacral coapting suture is held upward.

L, The left hemi-purse-string suture has been tied, partially closing the peritoneal opening. The first uterosacral coapting suture has been tied.

M, The peritoneal cavity is closed. The uterosacral ligaments have been completely joined with three interrupted sutures, the last of which starts and ends on the posterior vaginal mucous-membrane surface. The traction sutures on the uterosacral ligaments will be tied to each other and cut.

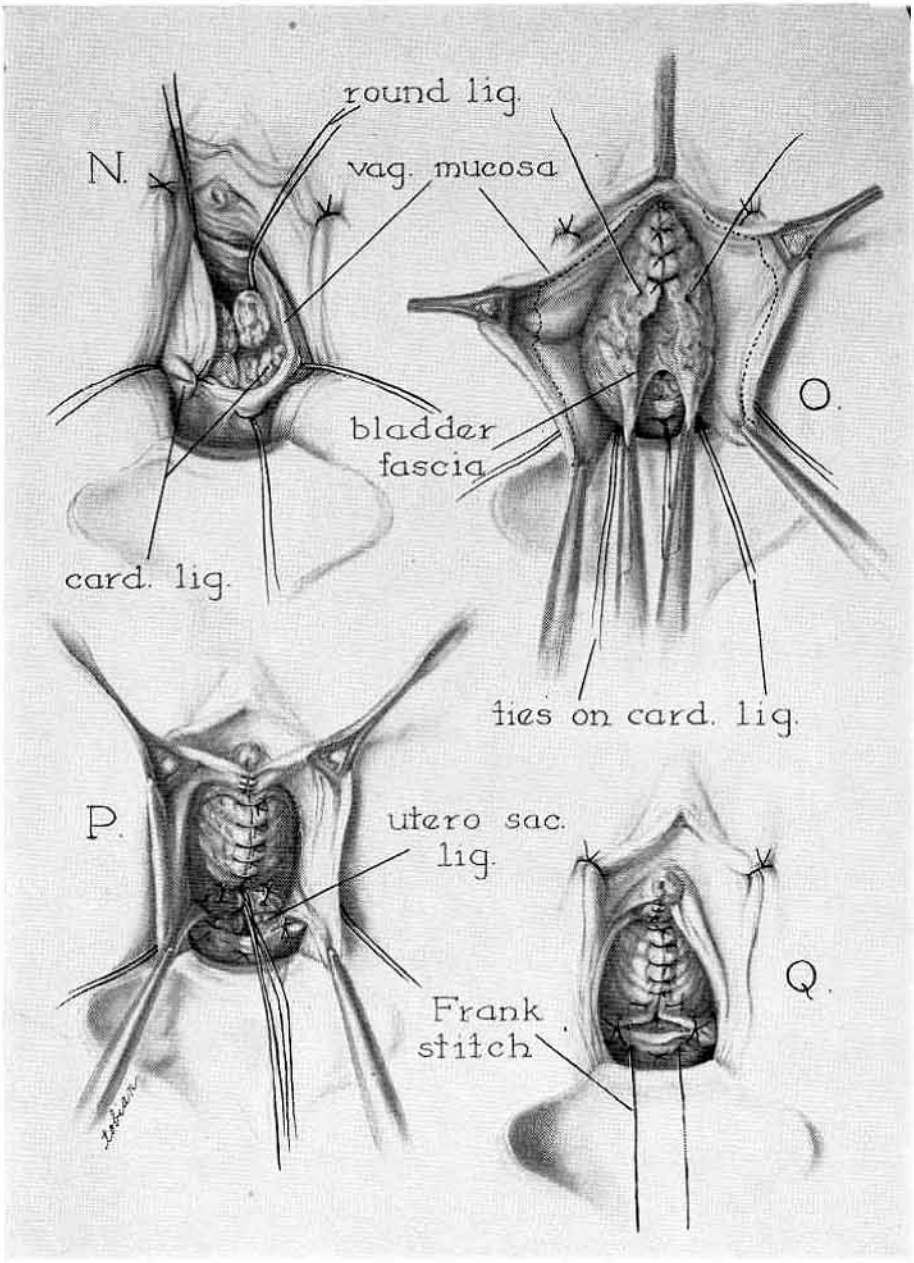

Fig. 1.—*N*, The right cardinal ligament has been incorporated into the right-hand vaginal corner. This suture starts and ends on the mucous-membrane surface. It is held for traction. A second suture has been inserted 1 cm. medial to this to continue the transverse closure of the vaginal vault. The left cardinal ligament has also been sewed into the left corner of the vagina. The two ties held upward are those from the stumps of the round ligaments.

O, The anterior vaginal wall has been completely dissected. The vaginal mucosa is held out laterally. The dotted line shows excess mucosa to be trimmed. Note the laceration of the fascia propria of the bladder which resulted in the cystocele.

P, The urethrocele and cystocele have been repaired with interrupted atraumatic sutures, and Kelly sutures have been placed at the urethrovesical junction. The round ligaments have been tied together and have been sutured to the posterior edge of the repaired fascia of the bladder.

Q, The transverse repair of the vaginal vault is being completed by means of a Frank stitch which starts in the mucous membrane posteriorly, goes through the anterior mucous membrane, then across the edges, and reverses to end up posteriorly. The anterior vaginal wall and vault have been completely closed.

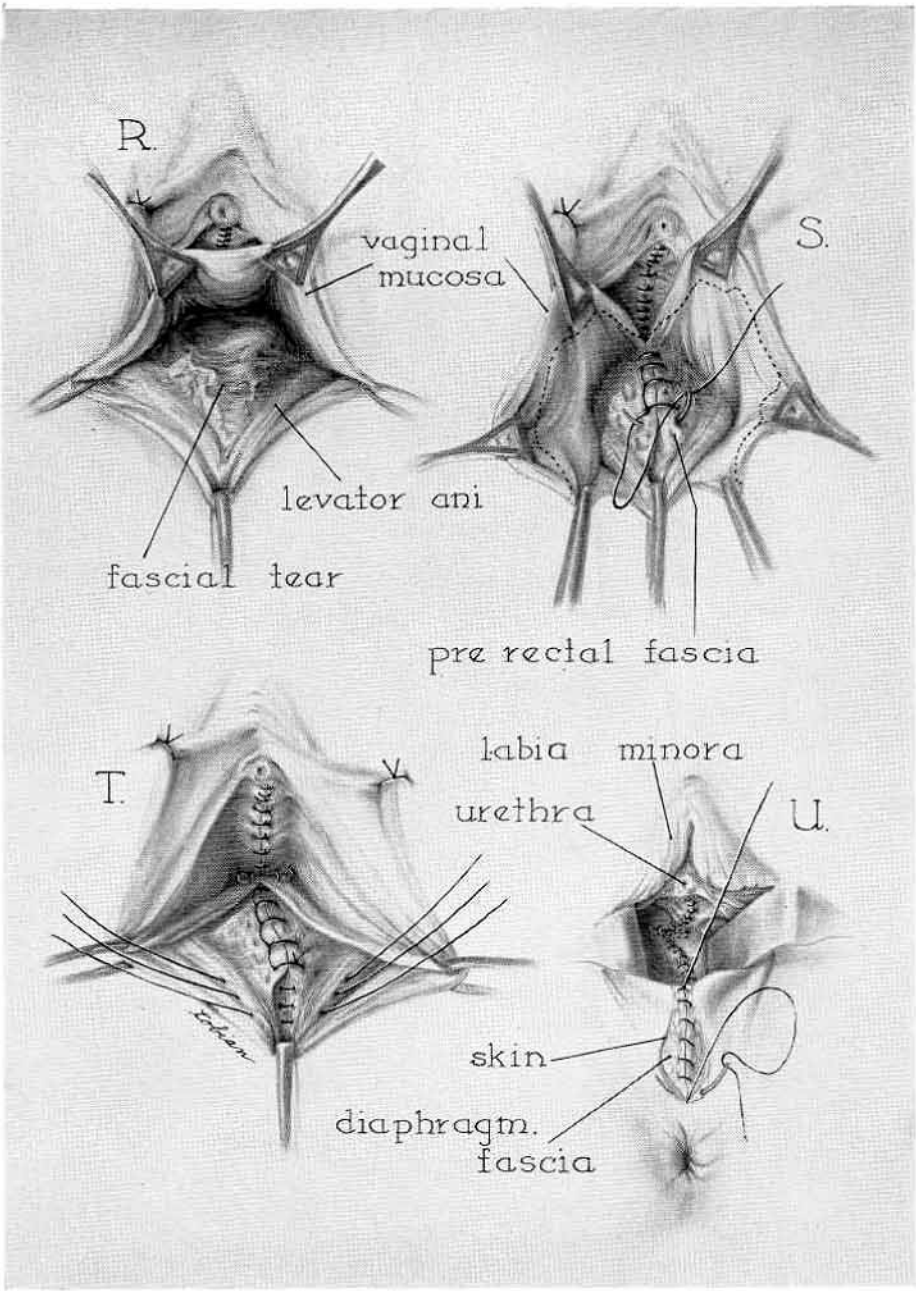

Fig. 1.—*R*, Allis clamps have been placed at the old margins of the hymenal ring, and the scarred tissue at the mucocutaneous junction between them has been removed with scissors. The mucous membrane of the posterior vagina has been dissected laterally and posteriorly up to the point of coaptation of the uterosacral ligaments. Note the laceration of the fascia propria which is responsible for the rectocele.

S, A midline incision has been made in the posterior vaginal mucosa. It is held laterally. The dotted line shows excess mucosa to be removed. The rectocele repair has been started with continuous lock sutures of No. 0 chromic catgut.

T, Three interrupted sutures have been placed in the levator ani muscles but are not tied until the upper mucous membrane is closed.

U, The redundant mucosa has been trimmed and the posterior vaginal wall has been completely closed with a running lock suture. The three levator sutures were tied prior to completion of the closure of the mucous membrane. A crown stitch has been taken in the sphincter cunei. This suture has been tied and is being held upward. The diaphragmatic fascia is closed with a running stitch which is to be reversed as a continuous subcuticular stitch and will be tied to the crown stitch. This completes the operation.

the junction of the vaginal wall with the cervical mucosa. This incision extends only through the mucous membrane and is made as near the external os as is possible to prevent shortening of the vagina. Using both sharp and blunt dissection the mucosa is freed for about 3 cm. in all directions (Fig. 1, *A*). This reflection exposes the cervical ends of the uterosacral and the cardinal ligaments, the peritoneum of the cul-de-sac, and the vesicocervical fascia or ligament. The peritoneum of the cul-de-sac is opened from one uterosacral ligament to the other and the peritoneal edge is coapted to the mucosal edge with three interrupted sutures, the one in the midline being held with a double-strand ligature for exposure. This stops the considerable and troublesome loss of blood from the widely opened posterior parametrium. One or two fingers are now inserted into the cul-de-sac and the pelvis explored as completely as possible to assure that no unforeseen factors are present to complicate the operation.

The cervix is pulled upward and Heaney clamps are placed across the distal ends of the uterosacral ligaments (*B*). The ligaments are severed and ligated with a suture of No. 1 chromic catgut, leaving ample tissue distal to the tie. A second suture is placed distal to the first and after tying both strands are held for traction and identification (*C*).

The cervix is pulled downward and a transverse incision is made, severing the attachment of the pubocervical fascia to the cervix. The line where the incision was made is shown by the dots in *D*. The gauze-covered finger now pushes the bladder with its pillars upward to expose the underlying cardinal ligaments and just above them the uterine artery and veins with the knuckle made by the descending and ascending arms of the loops, and the uterovesical peritoneal fold. Heaney clamps are now placed at the same level on each side to grasp all of the uterine end of each cardinal ligament but just short of the vascular bundle (*E*). A posterior view of the same step is shown in *F*. The ligaments are severed, double tied, and one strand held for identification and traction.

The anterior peritoneal fold is opened and caught with a suture for exposure and identification. Heaney clamps are placed across both uterine arteries and veins, keeping fairly close to the sides of the corpus but leaving ample tissue distal to the clamp (*G*). The vessels are severed and double tied. This ligature is not held. The fingers of the left hand are inserted posteriorly into the peritoneal cavity, the cervix and corpus are pulled downward, and the fundus is delivered anteriorly. A clamp is placed from above downward to catch the round ligament, Fallopian tube, ovarian ligament, and the remnants of the broad ligament (*H*). This is repeated on the other side. If the amount of tissue seems too great for one clamp, only one-half the tissue is caught from above downward and a second clamp is applied from below upward on each side. The uterus is now cut free and removed (*I*). The adnexa are palpated and pulled down for visual inspection; surgical removal is carried out if indicated. Double ties are applied, the second being looped through the round ligament and held with two strands for traction and identification. Any enterocele sac is dissected out and excised.

One of the most important of all procedures in the repair to prevent prolapse of the vault or later recurrence of symptoms is to suture together the uterosacral ligaments, commencing as far back in the pelvis as is possible. Traction is made on each uterosacral ligament and a chromic No. 1 suture is placed as high as possible around each ligament including several small bites of the peritoneum of the lower cul-de-sac. This suture is not tied at this step but held for exposure (*J*). A purse-string suture of plain No. 1 catgut is inserted on the left commencing at the midline anteriorly and ending at the midline

posteriorly, catching frequent small bites of the peritoneum only. This suture is held, not tied, and a similar hemi-purse-string suture placed on the right side (*K*). The suture placed in the uterosacral ligaments is tied and cut, the left hemi-purse-string suture is tied and held (*L*). The right hemi-purse-string suture is tied and held. Now the two hemi-purse-string sutures are tied to each other and cut. If it is desirable to leave a drain in, one is placed in the peritoneal cavity just before the hemi-purse-string sutures are tied to each other. The peritoneal cavity is completely closed; the ends of all ligaments and tissue stumps lie in the extraperitoneal space. The distal portions of the uterosacral ligaments are now joined to each other from just anterior to the rectosigmoid to the posterior vaginal wall with three or four interrupted sutures, the distal one of which includes the mucosa in the midline (*M*). The latter tie is held for traction and to identify the midline.

The left cardinal ligament is sutured into the left lateral angle of the vaginal vault, the suture being tied on the mucosal side and held; the right is treated in a similar manner. Traction is made on all three of these mucosal sutures and a suture inserted midway between the midline and the lateral angle on each side (*N*). The amount of anterior wall redundancy is now evident. The anterior mucosa is freed by sharp and blunt dissection in a superficial plane so as to leave all of the vesicle fascia on the bladder. If there is relaxation of the anterior wall of any significance this dissection is continued to within about 5 mm. of the external urinary meatus. The dissection is also carried laterally to free the entire base of the bladder and both lateral walls of the urethra. The fascial defect under the urethra is next repaired with atraumatic chromic No. 00 catgut sutures, using an interrupted Lembert type of stitch. This repair continues up over the vesicle fascia as high as possible to give a long anterior wall (*O*). If the fascial defect is marked, a second row of similar sutures is placed over the first. If stress incontinence of urine was a complaint, two or three Kelly-type sutures are placed about the vesicourethral junction to restore the proper angulation there.

The traction sutures placed previously in the round ligaments and held are now tied together, joining the ends of the round ligaments to make a sling under the bladder fascia; two interrupted sutures are placed through the posterior edge of the repaired fascia into the round ligaments to close off completely the fascial platform on which the bladder now rests (*P*). The excess mucosa is trimmed off (dotted line *O*, usually more than is illustrated) and the anterior wall closed with interrupted chromic No. 00 sutures, every third one catching the underlying fascia. The apex of the vagina is closed with a Frank type suture (*Q*).

The posterior repair routinely extends the entire length of the vaginal wall as anything less than this predisposes to a recurrence of the prolapse. The ends of the hymenal ring are grasped with Allis forceps, the intervening scar tissue is excised at the mucocutaneous junction, and the mucosa is then freed by sharp and blunt dissection up to the point where the two ends of the uterosacral ligaments are sutured into the vaginal wall. This dissection is made immediately under the mucosa so that the pararectal fascia is preserved as a distinct layer over the anterior rectal wall; the dissection extends laterally far enough to expose intact pararectal fascia and the fascia covering the pubococcygeal portion of the levators (*R*). The fascial defect is now repaired with a running lock suture of chromic No. 00 catgut, which commences just below the ends of the uterosacral ligament and extends to the fascia of the urogenital diaphragm (*S*). All redundant mucosa is excised (*S*).

The pubococcygeal portions of the levator ani muscles are now caught with three chromic No. 1 sutures. These are held but not tied at this time. A run-

ning lock suture is placed to close the vaginal mucosa from above downward (*T*). As it approaches the levators it is held and the three interrupted levator ani sutures previously placed are tied without tension and cut. The suture of the posterior vaginal mucosa is now completed to the fourchette, tied, and cut. A running suture of chromic No. 0 catgut is started as a crown stitch, being placed with a wide sweep so as to catch the sphincter cunei and transverse perinei muscles on each side. It is tied and the end held while the suture continues as a running one to catch the diaphragmatic fascia. At the anal end the suture is locked and then continued back as a subcuticular stitch to its original end where it is tied and cut short (*U*).

During the operation whole blood is used in adequate amount to replace any significant loss, usually any over 250 c.c.

Postoperative Care

Careful and painstaking postoperative management is essential to the attainment of good operative results and to the avoidance of complications. Immediately upon completion of the operation a Foley catheter is inserted into the urinary bladder, to remain usually for seventy-two hours if complete anterior wall repair has been done. This step probably is unnecessary with an adequate and experienced nursing staff but it is a good preventive for overdistention. After removal of the catheter a daily postvoiding catheterization should be performed until the residual urine is less than 45 c.c. Immediately following insertion of the catheter the vagina is packed lightly but firmly with gauze which is removed twelve hours later. This pack obliterates dead space and helps to prevent hematoma formation.

The legs are removed from the straps and elastic bandages are applied from the toes to the groin before the limbs are lowered. This increases the circulation blood volume by about 500 c.c. and prevents the shock-like picture so often seen when the patient is moved from the lithotomy and Trendelenburg position to a level one. We also feel that this application helps to prevent venous stasis, an important prophylactic feature in the avoidance of thrombosis and embolism. These bandages are allowed to loosen themselves and are not removed until twenty-four hours later. Nothing is given by mouth until auscultation of the abdomen reveals the presence of active peristalsis, usually within twenty-four to thirty-six hours. During this period adequate intravenous glucose solution is administered to ensure a urinary output of 1,500 c.c. or more per twenty-four-hour period.

We have used routine postoperative antibiotics in an endeavor to reduce postoperative morbidity. Penicillin and streptomycin yielded only fair results. In more recent months patients have received 500 mg. of Terramycin intravenously every twelve hours in a glucose infusion. This is followed by 500 mg. by mouth every six hours as soon as the patient is placed on oral feedings. This type of prophylactic therapy definitely reduces morbidity and promotes healing; it thus adds to the patient's postoperative comfort and reduces the hospital stay. We feel that it is worth while although we have not used it on enough patients to have any statistically significant results; the one objectionable feature is a fairly high incidence of nausea and diarrhea.

Patients are encouraged to move freely and breathe deeply during the first twenty-four hours and to ambulate during the second twenty-four. Patients are observed closely in the immediate postoperative period as many postoperative complications can be prevented by frequent and accurate observations of the patient by the surgeon or one trained in the particular surgical technique employed. A warm oil retention enema is given on the evening of the third day and thereafter milk of magnesia or enema only as requested by the patient or specifically indicated.

From October, 1951 to May, 1953, there were 40 patients at the Tripler Army Hospital managed with the preoperative, operative, and postoperative measures herein described. Since May, 1953, 30 additional patients were operated upon at the United States Naval Hospital, Chelsea, Massachusetts. Nearly all of these patients presented the primary complaints and findings associated with genital prolapse of varying degrees; all of them had failed to respond to the usual conservative procedures. This number is too small to be significant statistically but we were impressed by the uniform excellence of the anatomical and functional results obtained. Symptomatic relief was achieved in nearly 100 per cent of the patients; those complaints not cured by the operation were much alleviated. There were no shortened vaginas and not a patient complained of dyspareunia.

Summary

An operative technique for vaginal hysterectomy has been presented in detail with the use of illustrations to clarify certain steps which often are obscure to the neophyte. The technique is based on that originally described by Heaney but certain modifications are presented in the belief that they should be applied to every case and not reserved for the occasional one. Emphasis should be placed on the following: (1) preservation of all vaginal mucosa possible; (2) reflection of the mucosa in a superficial plane for ease of dissection and to minimize blood loss; (3) postponement of the anterior dissection until the uterus has been removed and the vault partially closed; (4) suture of the peritoneum of the cul-de-sac to the posterior vaginal cuff; (5) free mobilization of involved tissues and exposure of anatomical planes; (6) placement of clamps so as to leave ample free tissue protruding beyond the ends (never use the first tie for traction but place a second pulley-type one); (7) avoidance of any traction on the vascular stumps; (8) coaptation of the uterosacral ligaments through their entire length; (9) closure of the peritoneum with two half-purse-string sutures; (10) joining together of the round ligaments to form a sling under the bladder; (11) closure of the anterior mucosa with interrupted sutures, every third one of which is anchored to the underlying fascia; and (12) dissection of the entire length of the posterior vaginal wall with an anatomical repair from the vault downward through the perineum.

Conclusions

When operative relief for relaxations of the pelvic floor is indicated, a vaginal hysterectomy with other indicated reparative procedures gives excellent anatomical and functional results. Where a choice is necessary between the vaginal and the abdominal approach for hysterectomy, the former offers many advantages. Better results are obtained with a properly performed vaginal hysterectomy with associated repairs than are possible with the so-called conservative procedures.

A careful preoperative preparation of the patient, the precise application of a painstaking operative technique, and careful postoperative management all are essential to the attainment of good results.

The routine prophylactic administration of certain antibiotics both by vein and by mouth as a postoperative measure seems to promote clean wound healing, lessen the incidence of complications, and lower morbidity.

The illustrations were prepared by Jacqueline Tobian Steinmann, Medical Artist, 4614 Sunset Boulevard, Los Angeles, California.

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