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Surgical Repair of the Posterior Compartment

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Introduction

The support anatomy of the posterior vaginal wall is a byproduct of complex interactions among the pelvic floor muscles, nerves, and connective tissue. Before a surgeon can successfully plan and perform an operation to correct a posterior compartment defect, he or she must understand not only the anatomic principles outlined in chapter 1 of this text, but the methods for assessing prolapse symptoms outlined in chapter 4 as well. Generally, surgical intervention is only considered when 1) a posterior compartment defect produces symptoms (such as pressure, heaviness, pain, incomplete rectal emptying, and so on) or 2) when other significant prolapse is present.

The connective tissue layer of the posterior vaginal wall, commonly referred to as the rectovaginal septum, runs laterally to the pelvic sidewall and fuses distally to the perineal body. A full description of the posterior wall anatomy is covered in chapter 1 of this text. For the purposes of this chapter, the term vaginal muscularis is used to refer to the "fascial" tissue that attaches to the pelvic sidewall. Stretching and/or tearing of this layer are generally considered the fundamental occurrence that results in posterior wall support defects. Although this chapter focuses on posterior wall surgery, it is important for the pelvic surgeon to recognize and address any other defects (especially apical descent) when planning surgery for a particular patient. In fact, some operations primarily aimed to correct apical prolapse—such as the sacral colpopexy (discussed in chapter 8)—can actually correct posterior wall prolapse at the same time. Nonetheless, this chapter strictly focuses on the various methods for surgically addressing the *posterior* compartment—focusing on the medical evidence supporting each operation.

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Posterior Colporrhaphy

Gynecologists have routinely performed this surgical approach for over a century, although there is not much evidence regarding its long-term functional and anatomic outcomes.

The technique is performed with the patient in the dorsal lithotomy position. A dilute vasopressin solution can be injected just underneath the vaginal epithelium to decrease blood loss during the dissection. The caliber of the introitus is evaluated and the width of the initial triangle or diamond-shaped incision is planned accordingly so as to avoid undue constriction of the vaginal opening. When removing vaginal epithelium during *any* of the repairs described in this chapter, it is generally wise to take the attitude that "you can always cut out more, but you cannot put it back once it is gone."

After the initial incision is made, Allis clamps are placed on the edges to be used for countertraction as the surgeon undermines the vaginal epithelium in the midline from the introitus to the vaginal apex using Metzenbaum scissors. A midline incision is then made through the vaginal epithelium, stopping several centimeters short of the vaginal apex to better facilitate eventual closure of this incision. Next, countertraction along the entire incision line is achieved either with serial Allis clamps or a self-retaining retractor (such as the Lone Star Retractor; Lone Star Medical Instruments, Stafford, TX). Sharp and blunt dissection is then performed to completely separate the vaginal epithelium from the underlying rectovaginal septum distally. As this dissection plane is advanced superiorly, loose areolar tissue is typically encountered, indicating the beginning of the rectovaginal space and/or preperitoneal adipose tissue surrounding the cul-de-sac and possible enterocele site. This dissection will expose the bulbocavernosus and transverse perineal muscles distally and the levator ani muscles laterally. It is important to carefully dissect the rectovaginal septum completely off of the epithelium so that it lies on the rectal side. Next, the lateral rectovaginal septum and more proximally the vaginal muscularis are plicated to the midline. A rectal examination during and/or after this portion of the surgery can be helpful to verify that no sutures have been placed through the rectal wall. Distally, a perineorrhaphy can be performed through the same incision by recreating the normal anatomic relationships of the rectovaginal septum and the muscles of the perineal body using interrupted sutures. Although there is no evidence as to the best suture material to use, most experts suggest using delayed-absorbable sutures for both the plication and the perineorrhaphy steps. Insertion of polygalactin 910 mesh (Vicryl mesh; Ethicon, Somerville, NJ) within the plication just proximal to the perineal body has been shown (in a randomized, controlled trial) to improve anatomic cure rates.[1]

Many authors also describe an anterior plication of the levator ani muscles at this point in the surgery. It is important to recognize that doing so can cause narrowing of the vagina and resultant dyspareunia.

Once adequate hemostasis is obtained, the vaginal epithelium is closed using a running delayed-absorbable suture. Many experts suggest placement of a vaginal pack for 12 to 24 hours to serve as a pressure dressing.

Although retrospective and prospective reports of posterior colporrhaphy demonstrate acceptable objective anatomic failure rates of 25% or less and success rates for improving defecatory dysfunction in the range of 75%, these same studies report unacceptably high dyspareunia rates ranging from 12% to 27%.[2–4] However, a significant portion of this reported is likely attributable to levator plication, which does not necessarily have to be performed in conjunction with a posterior colporrhaphy. Abramov et al[5] recently reported a retrospective comparison of standard colporrhaphy (without levator plication) to the site-specific technique among 307 patients who were each followed for at least 1 year postoperatively. Those

authors reported better objective anatomic failure rates (defined as prolapse beyond the hymeneal ring) in the colporrhaphy group (4% vs. 11%, $P = 0.02$). Interestingly, they found no differences between the 2 groups with respect to de novo dyspareunia (11% in each group). This important finding might be explained by their avoidance of levator plication in both groups.

Site-Specific Defect Repair

Compared with the traditional colporrhaphy, which assumes that the anatomic defect is the result of stretching of the rectovaginal septum or vaginal muscularis, the site-specific technique is based on the assumption that discrete tears of these layers result in posterior wall prolapse. Possibly as a result of the general idea that plication of tissue to the midline does not restore "normal anatomy," many surgeons have abandoned the colporrhaphy technique in favor of the site-specific defect repair. That assumption was first published by Richardson[6] in 1993 and since that time has become widely accepted in the urogynecologic community, despite a dearth of objective supporting evidence.

The technique for a site-specific repair begins exactly like the technique described here for a traditional colporrhaphy. After the rectovaginal septum is dissected away from the vaginal epithelium, however, the next step is to identify any specific tears in the septum. The surgeon can better identify these tears if he or she places a finger in the rectum and elevates the anterior rectal wall. These defects are reported to be found in one of several characteristic configurations, including a distal U-shaped lesion (Fig. 1), a transverse tear (Fig. 2), a "hockey stick" tear (Fig. 3), and a "double defect" (Fig. 4).

Once identified, the fascial defect is then reapproximated with interrupted sutures. Finally, a perineorrhaphy can be performed through the same incision by recreating the normal anatomic relationships of the rectovaginal septum and the muscles of the perineal body using interrupted sutures. Plication of the levator ani muscles is not described as part of this repair. The vaginal epithelium is then reapproximated using a running delayed-absorbable suture. It is not necessary to close the "dead space" between the vaginal epithelium and repaired rectovaginal septum. Again, there is no evidence as to the best suture material to use, but most experts suggest using delayed-absorbables for both the site-specific repair and the perineorrhaphy steps.

With reported anatomic failure rates between 8% and 18%,[7,8] (ie, very similar to those reported for the colporrhaphy technique), the perceived advantages of the site-specific technique are 2-fold: 1) it seeks to restore normal anatomy rather than plicate tissue to the midline; and 2) when the entire body of literature is examined, subjective symptoms such as dyspareunia, constipation, and defecation disorders seem to occur less frequently after the site-specific technique. Long-term objective data are needed to verify these beliefs.

TRANSANAL REPAIR

This procedure was first promoted by Marks[9] who believed that the rectal side of a rectocele is the "high-pressure" side. As such, he developed a procedure to correct the thinning of the circular and longitudinal muscular layers of the distal rectum.

The procedure is performed in the prone "jack-knife" position. The anterior rectal mucosa is incised transversely just proximal to the dentate line. Sharp dissection is used to separate the circular muscle from the anterior mucosa for a distance of approximately 10 cm. This dissection should extend laterally 180°. The circular muscle is then plicated to the midline with interrupted (usually permanent) sutures. Any excess rectal mucosa is then trimmed and the edges are closed with a running delayed-absorbable suture.

Colorectal surgeons primarily perform this operation, and as such, the published

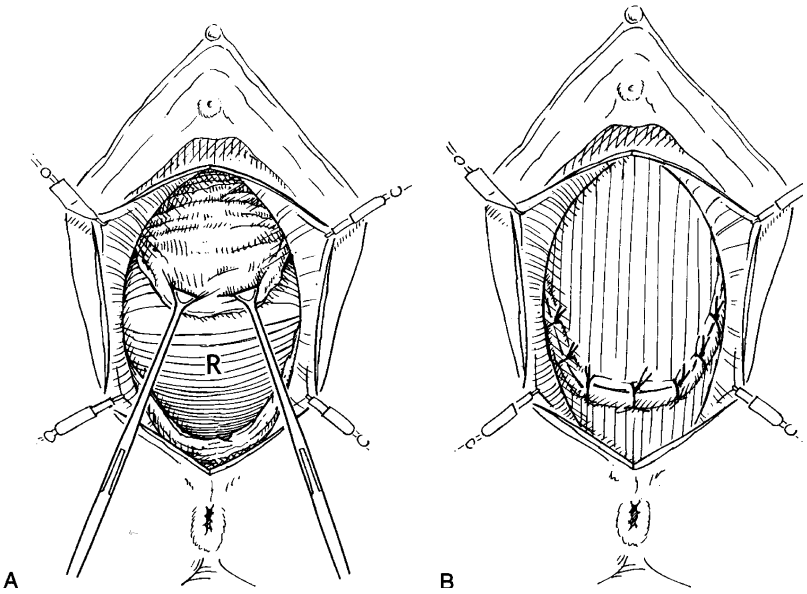

FIGURE 1. A distal U-shaped lesion allowing a rectocele (R) to bulge through a gap in the rectovaginal septum before (A) and after (B) repair. Used with permission from Rock, Jones, eds. *Telinde's Operative Gynecology*, 9th ed.

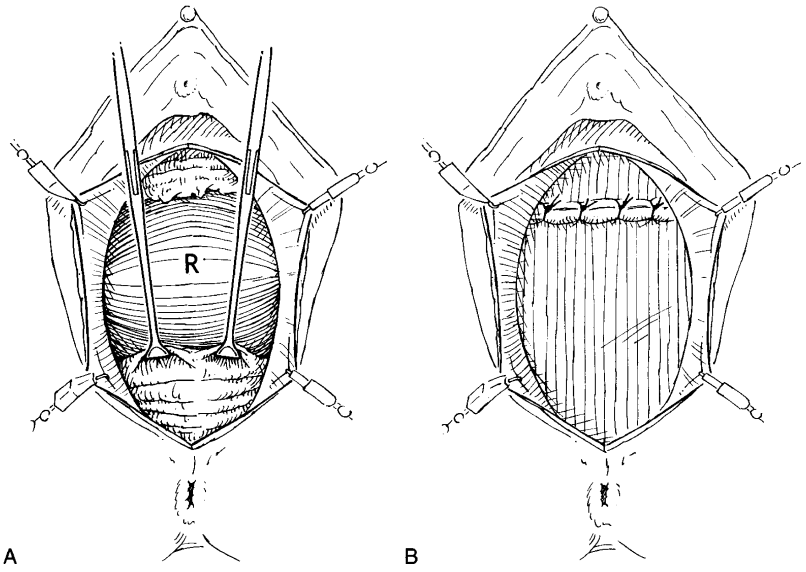

FIGURE 2. A transverse defect allowing a rectocele (R) to bulge through a gap in the rectovaginal septum before (A) and after (B) repair. Used with permission from Rock, Jones, eds. *Telinde's Operative Gynecology*, 9th ed.

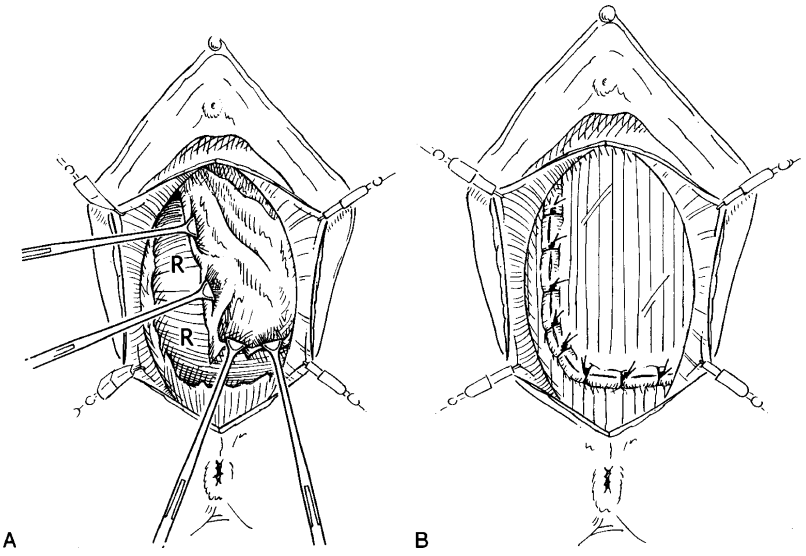

FIGURE 3. A "hockey stick" defect allowing a rectocele (R) to bulge through a gap in the rectovaginal septum before (A) and after (B) repair. Used with permission from Rock, Jones, eds. *Telinde's Operative Gynecology*, 9th ed.

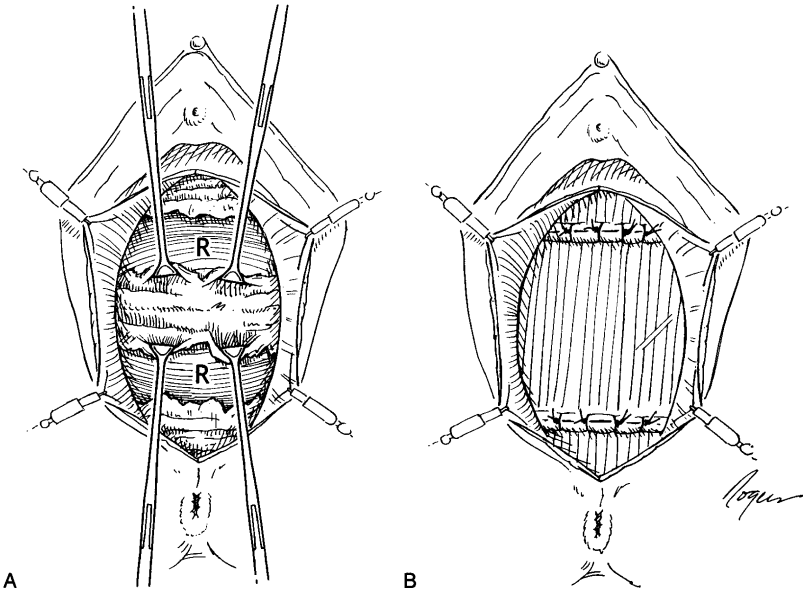

FIGURE 4. A "double defect" allowing a rectocele (R) to bulge through 2 gaps in the rectovaginal septum before (A) and after (B) repair. Used with permission from Rock, Jones, eds. *Telinde's Operative Gynecology*, 9th ed.

data focuses primarily on correction of constipation and defecation disorders. Janssen et al[10] followed 64 women prospectively for a mean of 12 months after transanal rectocele repairs performed primarily to relieve defecation disorders such as incomplete emptying and the need for digital splinting to defecate. Approximately 50% of these patients had no postoperative complaints of difficult defecation or constipation. Van Dam et al[11] reported on a combined transvaginal/transanal rectocele repair performed on 89 women with a median follow-up period of 52 months. Based on defecography, physical examination, and defecation diaries, 71% of these women had a successful outcome. The published literature is difficult to evaluate with regard to objective anatomic correction of posterior compartment prolapse or subjective prolapse symptoms.

ABDOMINAL APPROACHES

The primary method for repairing a posterior wall defect through the abdominal approach is to do so through a modification of the sacral colpopexy procedure. When placing the posterior graft material during a sacral colpopexy operation, the surgeon can typically create an avascular plane between the vagina and rectum (ie, the rectovaginal space) that extends to the rectovaginal septum and in some cases to the perineal body. Thus, a sacral colpopexy can create both apical and posterior defects—as long as the extent of the defect is appreciated and addressed through the posterior graft material. Cundiff et al[12] were the first to report on this modification, naming it the "colpoperineopexy." The specific techniques and results associated with this approach for the correction of posterior wall defects are addressed elsewhere in this text.

The Intravaginal Slingplasty Device

First reported by Petros and Ulmsten,[13] the intravaginal slingplasty (IVS) minimally invasive technique for providing posterior and apical support to the vaginal wall is gaining in popularity despite the paucity of long-term evidence supporting its use. The technique is performed with the patient in the dorsal lithotomy position. A 4- to 5-cm transverse incision is made in the posterior vaginal epithelium 1.5 cm below the vaginal apex, and the underlying fascia is dissected free from the edges of the incision. A rectal examination is performed to identify the limits of the prolapse. Bilateral 1-cm incisions are made 2 cm lateral and 2 cm below the anus at the 4 o'clock and 8 o'clock positions. The IVS Tunneller (Tyco Health Care, Norwalk, CT) device is inserted into one of these incisions and advanced approximately 4 to 6 cm through the ischiorectal fossa until it reaches the transverse apical vaginal incision. A rectal examination is performed before, during, and after this insertion to ensure that no perforation occurs through the rectum. The tip of the IVS Tunneller device is then turned medially to deliver a polypropylene tape into the apical incision. The same procedure is performed through the opposite perianal incision so that the tip of the IVS device can be placed into the other side of the apical incision. The IVS device is then used to pull the polypropylene mesh out through the perianal incision, thus creating a U-shape with the tape. The tape is then secured to the vaginal vault and (if identifiable) to the uterosacral remnants using interrupted sutures. The vaginal incision is closed with a running delayed-absorbable suture.

Farnsworth[14] reported the largest IVS case series to date in 2002. That article, which included 93 women with vaginal vault prolapse who underwent the procedure between 1998 and 2000, reported 91% prolapse "cure" at a median follow-up interval of 12 months. The definition of cure was based on a pelvic examination with the patient straining in the semirecumbent position, but was otherwise undefined. Although the primary defect in this group was apical prolapse, the author claimed that the IVS procedure also provides support to the posterior vaginal wall.

Tape erosion was recognized in 5.4% of the group, and another 2 patients experienced perforation of the rectal wall. These very serious complications may limit the use of this procedure. One additional concern is that the trocar is passed immediately adjacent to Alcock's canal in the ischioanal fossa. Damage in this area might injure the pudendal neurovascular bundle. Well-designed studies are required before this procedure can be recommended.

REINFORCEMENT THROUGH GRAFT PLACEMENT

Regardless of the surgical technique one chooses to correct pelvic organ prolapse, some surgical failures will occur, and these failures are difficult or impossible to predict for an individual patient. Dissatisfaction with the unpredictable nature of surgical failure has led many pelvic surgeons to incorporate various synthetic and biologic graft materials into their reconstructive pelvic operations. When such materials are used to reinforce repairs of posterior wall defects (other than with sacral colpopexy), they are typically placed through vaginal incisions as the last step of either a traditional colporrhaphy or site-specific defect repair.

Experts have several recommendations when placing a graft to reinforce a posterior wall repair. The first step is to make certain that hemostasis has been optimized. Hematoma formation above or below the graft may increase the risk of exposure/extrusion of the material into the vagina. The next important principal of graft placement is to avoid any tension on the graft itself. To achieve an appropriate tension-free graft reinforcement, it is helpful to start with a graft measuring approximately 6 × 8 cm or larger. For rectocele repair, the graft is attached to the levator ani muscles laterally, the perineal body distally, and to the uterosacral ligaments superiorly. Buller et al[15] described the area of the uterosacral ligament used in this repair as the "intermediate portion," located within 1 to 2 cm from the ischial spine. The sutures used to fasten the graft to the levator ani muscles bilaterally are placed 3 to 5 mm apart. As mentioned previously, very little (if any) vaginal epithelium should be removed before closing the vaginal incision, and there is no need to close the "dead space" between the graft material and the vaginal epithelium. Again, some experts recommend placement of a vaginal pack for 12 to 24 hours to serve as a pressure dressing.

Despite the widespread use of graft materials among urogynecologists, the medical evidence for doing so is limited to a relatively few case series. Kohli and Miklos[16] reported on 30 women followed for 8 to 17 months after site-specific rectocele augmented with cadaveric dermis. They reported 93% cure rates, with anatomic cure defined as POP-Q point Ap ≤ negative 0.5. An additional 13 patients in their series were lost to follow up and therefore removed from the analysis. More recently, Dell and O'Kelley[17] published their experience with a meshed porcine dermis material (PelviSoft BioMesh; CR Bard Inc., Covington, GA). They followed 35 patients for 6 to 18 months after surgery and found "good anatomic results." Both of these descriptive studies suggest that graft augmentation is feasible and safe. Hopefully, these authors' results could be used as pilot data to generate hypotheses for future randomized trials comparing augmented and nonaugmented repairs.

There is an urgent need for comparative trials regarding graft materials, because many new products are being introduced into the prolapse "marketplace." One of the most serious potential complications associated with graft augmentation is erosion or extrusion of the material itself. Whether organic or synthetic materials are preferable for use in prolapse repairs remains to be seen. Characteristics of an ideal graft material would include consistent durability and quality, reasonable cost, resistance to host absorption, minimal risk of erosion or infection, and restoration of normal functional anatomy. Synthetic meshes seem to meet

the first 3 of these criteria quite well, but might also result in greater erosion rates. Synthetic mesh erosion into the vagina may require more complicated treatments than organic mesh erosion. Drake et al[18] found vaginal extrusion of dermal allograft material in 7 of 64 cases (10.9%) in which grafts were placed vaginally to augment anterior, posterior, or combined defect repairs. Interestingly, all of these extrusions were managed conservatively with vaginal estrogen cream to promote epithelial closure over the graft. Median documented healing time in this group was 13 weeks (range, 5–40 weeks) and no serious morbidity was encountered. Extrusions of synthetic material are typically refractory to conservative management.

Synthetic mesh erosions through the vagina are difficult to predict but seem to be correlated with the amount of mesh placed, especially when a vaginal incision is used.

ENTEROCELE REPAIR

Richardson described an enterocele as a condition in which the peritoneum is in contact with the vaginal epithelium—with no intervening "fascia."[19] Such defects can occur anteriorly, but most are found at the vaginal apex or along the posterior compartment. Many experts believe that enteroceles typically occur after hysterectomy, possibly as a result of inadequate reattachment of the uterosacral ligaments to the anterior and posterior connective tissue of the vaginal cuff. At the time of vaginal hysterectomy, a traditional McCall culdeplasty[20] has been shown to be useful for prolapse prevention[21] and even prolapse treatment.[22,23] The technique involves placement of 1 to 3 pursestring nonabsorbable sutures into the peritoneal surface of the cul-de-sac near the level of the rectal reflection, taking care to incorporate the uterosacral ligaments on either side. These sutures are then fastened to the vaginal epithelium of the cuff. A similar technique can be used after an abdominal hysterectomy. Intraoperative cystoscopy is often helpful to make sure that the ureters have not been compromised during the technique.

When operating abdominally, many surgeons will perform a simple Moschcowitz[24] or Halban[25] culdoplasty when they appreciate an especially "deep" cul-de-sac. These procedures, which involve approximation of peritoneum only, were originally designed to correct rectal prolapse and have never been shown to actually prevent enteroceles.

The surgical correction (as opposed to prevention) of enteroceles typically involves repair of other support defects at the same time. In fact, assuming that the common goal of all prolapse surgeries involves the restoration of normal anatomic support, any of the operations described in this text should correct an enterocele. On the other hand, simply closing a peritoneal sac—or enterocele—will not (in and of itself) correct pelvic organ prolapse in most cases.

Conclusions

The surgical correction of posterior compartment prolapse is characterized by a wide array of results. The small amount of level 1 medical evidence on this subject represents an urgent challenge to clinical researchers in the field of urogynecology. Nevertheless, gynecologic surgeons regularly see patients in need of posterior prolapse repairs. When deciding which operative techniques to use, the surgeon must rely on his or her training and experience. New techniques for repair should not be borne out of industry alone. In other words, new products and techniques should arise because of a therapeutic gap rather than a marketing niche. Although the techniques described in this chapter have similar reported success rates, one cannot assume the operations are equivalent. That is because of the widely varied outcome measures used in these studies and the paucity of comparative trials. Like with many surgical conditions, the most important preoperative goal should be to help each patient to have realistic preoperative expectations.

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