

# MANAGEMENT OF VAGINAL VAULT PROLAPSE: SURGICAL OPTIONS

## Posterior intravaginal slingplasty: A new technique for apical prolapse

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The vaginal support system includes apical (level 1) support, which is provided by the cardinal-uterosacral complex, and lateral (level 2) support, which is provided by the pubo-cervical and rectovaginal fascia.<sup>1</sup> The cardinal-uterosacral complex suspends the upper third of the vagina as well as the uterus from the bony sacrum. Collagen fibers arising from the uterosacral ligaments fuse distally with the visceral fascia over the cervix, lower uterine segment, and upper vagina to form the pericervical ring.

Disruption of the cardinal-uterosacral complex may result in uterine descensus or vaginal vault (apical) prolapse (Figure 1). Pregnancy, childbirth, and even the aging process can initiate weakening and stretching or tearing of the pelvic ligaments and related connective tissues, ultimately leading to uterine and/or vaginal vault prolapse.

### IATROGENIC CAUSES

Hysterectomy without reattachment of the cardinal-uterosacral ligaments to the reapproximated

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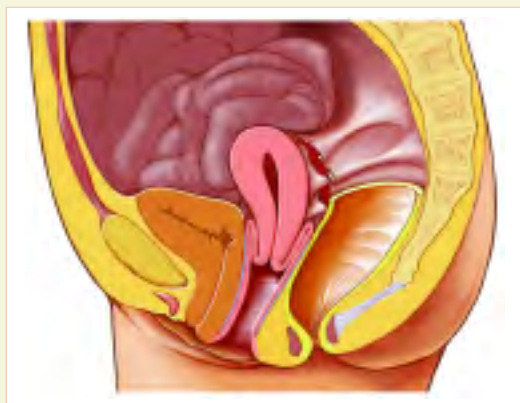
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FIGURE 1

## The anatomy of pelvic floor defects



Apical prolapse following relaxation or severing of the cardinal-uterosacral ligaments



Apical prolapse following hysterectomy



Enterocele and associated vault prolapse



Rectocele with disrupted rectovaginal fascia

vaginal cuff (ie, pubocervical fascia anteriorly and rectovaginal fascia posteriorly) is a common cause of vaginal vault prolapse.<sup>2,3</sup> Unfortunately, many surgeons do not take the time to restore this anatomic support intraoperatively, thereby increasing the risk of prolapse. Should prolapse occur and remain untreated, chronic downward pressure may lead to loss of lateral attachment (ie, level 2 support) and formation of cystocele and/or rectocele.

Similarly, enterocele may form in conjunction with vault prolapse when hysterectomy is performed without regard to precise closure of

the vaginal cuff. An enterocele is a pelvic floor hernia in which the parietal peritoneum has direct contact with the vaginal epithelium (ie, no intervening fascia).<sup>4</sup> Cuff closure should incorporate not only the epithelium but also the supporting anterior (pubocervical) and posterior (rectovaginal) fascia.<sup>5</sup> If the fascia and uterosacral complex are not incorporated into the closure or already were lax before hysterectomy, the vaginal apex becomes an area of weakness where a true pelvic hernia (ie, enterocele) can develop.

Vault prolapse may occur months or years

after a hysterectomy and usually presents in conjunction with other pelvic floor defects such as cystocele, rectocele, or enterocele. In many such cases, vault prolapse is not diagnosed even though it makes up the majority of the defect. Indeed, most cases of prolapse (ie, cystocele and/or rectocele) also involve some degree of vault prolapse that is either overlooked or misdiagnosed as isolated cystocele or rectocele.<sup>6</sup> Traditional anterior and posterior repair without vault suspension in such cases often leads to a shortened vagina if the apex is not suspended in its normal position.

Therefore, an assessment for vault prolapse should be made in every patient who presents with a pelvic floor defect. An incomplete diagnosis may lead to improper or inadequate repair, persistent symptoms, and failure of prolapse surgery. Apical suspension is the anchor of any pelvic floor support, and the high failure rate seen with many prolapse surgeries is most likely a result of improper suspension.

#### SYMPTOMS

Signs and symptoms of vault prolapse vary according to its severity but are similar to those seen with other forms of prolapse. Patients may feel bulging or pressure in and around the vagina, as well as a sensation of heaviness or pain in the vagina, pelvis, or lower back. Dyspareunia is a frequent complaint. When prolapse impinges on pelvic floor visceral function, the result may be urinary urgency and frequency, nocturia, or incomplete bladder emptying, which collectively have been called the posterior fornix syndrome.<sup>7</sup> Symptoms of bowel involvement include constipation, straining or digitating during movements, and incomplete rectal emptying.

Severe prolapse (ie, extravaginal) may lead to such serious complications as urinary retention, urinary tract infection, ureteral reflux or dilation, hydronephrosis, and vaginal ulceration. Persistent symptoms after cystocele/rectocele repair suggest that the vault may not have been suspended properly. On examination, such patients should be asked to strain or bear down in the standing posi-

tion; otherwise, vault prolapse may be missed or its severity not fully appreciated.

#### MANAGEMENT

Mild vault prolapse may be managed with pelvic floor exercises or pessaries and topical vaginal estrogen. Surgery is an option in patients with more severe symptoms and prolapse.

The surgical method and approach (ie, vaginal, abdominal, or laparoscopic) depends on many factors including experience and preference of the surgeon, age and health of the patient, severity of prolapse, and associated defects. For example, in a 70-year-old woman who also has heart and lung disease, the vaginal approach under regional anesthesia makes more

### Posterior IVS is a 15- to 20-minute outpatient procedure performed under local or regional anesthesia

sense than the abdominal approach under general anesthesia. It is noteworthy, however, that my colleagues and I have not yet encountered a vaginal technique that produced satisfactory anatomic results and cure rates and was not fraught with the risk of significant complications (eg, pudendal nerve injury and bleeding).

#### POSTERIOR IVS

The respective merits of the numerous surgical techniques that have been devised for the correction of vaginal vault prolapse are discussed by Francis on page S6. I will focus on posterior intravaginal slingplasty (IVS), a minimally invasive technique for vault suspension that is based on the tension-free vaginal tape technique for the correction of stress urinary incontinence. The procedure was first described by Petros<sup>8</sup> in 1997 and later expanded on by Farnsworth who in 2002 reported one of the first prospective observational studies of its efficacy and safety.<sup>9</sup>

Also known as posterior infracoccygeal sacropexy, posterior IVS is a 15- to 20-minute

## PERFORMING THE PROCEDURE

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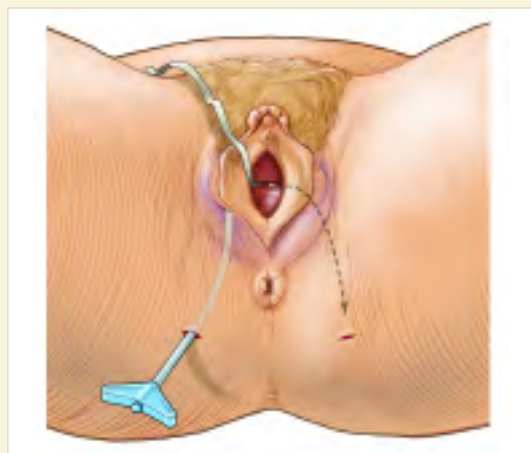
**B**ecause most patients have rectocele and/or enterocele as well as vault prolapse, I begin posterior IVS just as I would a posterior repair with dermal graft. A 3- to 4-cm vertical incision is made in the vaginal epithelium of the posterior wall and the epithelium is dissected off the underlying rectovaginal fascia. The dissection is taken laterally to the levators and then tunneled under the vaginal epithelium up to the apex of the vagina; thus, the tape is not exposed to the vaginal incision. The rectovaginal fascia and rectocele are repaired and may be augmented with a dermal or mesh graft.

**Enterocoele, if present**, is reduced and repaired with a graft as well. The rectovaginal fascia, or graft, is taken up to the pubocervical fascia superiorly and attached to restore the integrity of the pelvic floor unit. The initial dissection is continued superiorly and laterally on the levators and pelvic side walls until the ischial spine is palpated on each side. As mentioned, the sacrospinous ligament does not have to be isolated, thereby obviating a potentially difficult and complex dissection.

**For the next step**, a 5-mm stab incision is made on each buttock 3 cm lateral and 3 cm inferior to the anal verge. After placing a finger into the vagina and

palpating the ischial spine and pelvic sidewall just distal to the spine (levator or iliococcygeal muscle), the tunneller is advanced through the stab incision, into the ischiorectal fossa and up towards the apex of the vagina lateral to the levator ani muscles. (The finger in the vaginal incision is palpating the tunneller on the other side of the levators to help guide it towards the ischial spine.) It is then brought into the vagina with finger guidance through the iliococcygeal fascia approximately 1 cm distal to the ischial spine. The blue, blunt-tipped stylet is reversed in the tunneller. The 8-mm mesh tape is threaded through the stylet's eyelet and pulled out with the tunneller; excess tape is left at the vaginal apex.

**The procedure is repeated on the other side.** Taking care to keep the tape flat, it is sutured to the apex and/or graft across the entire width of the vagina. This provides increased surface area for attachment and avoids relying on 1 or 2 sutures placed through thin vaginal skin to provide suspension. Before closing the vaginal incision with delayed absorbable sutures, the rectum should be examined to ensure that it has not been injured and there is no undue tension of the tape across the rectum. Excess tape at the buttock incisions is cut at the skin surface, and the incisions are closed with 3M™ Steri-Strips™.



Tunneller in place prior to withdrawal and pulling mesh tape down through the incision



Side view of mesh tape encircling the rectum and attached to the top of the vagina

outpatient procedure that is performed under local or regional anesthesia. It can be used in combination with other procedures to simultaneously treat associated pelvic floor defects such as cystocele, rectocele, and/or enterocele, with or without graft or support materials.

Posterior IVS requires a special tool called the IVS Tunneller\* device to place mesh tape at the apex of the vagina through 2 small buttock incisions. The device's path does not approach major vessels or nerves near the pudendal complex or sacrospinous ligament—areas known to be at risk during other prolapse surgeries.

The tape serves as a sling to suspend the vaginal vault in its natural position; the surgery in effect creates artificial uterosacral neoligaments. A fibrous reaction around the tape further strengthens its capacity to act as a support (or replacement) for weakened (or severed) uterosacral ligaments. The vault retains its normal pliability and mobility and is not subjected to undue tension that pulls it to one side, as may occur with sacrospinous ligament suspension.

Patients typically are discharged home the day after the procedure with instructions to follow standard postoperative restrictions on activities and lifting. Postoperative pain and discomfort are comparable to that after standard repairs; indeed, most patients experience less pain than those who undergo other vault suspensions.

## OUTCOMES

The literature on posterior IVS is reviewed by Francis; I will summarize the experience of Miklos and I. We have completed more than 40 posterior IVS procedures for vaginal vault and/or uterine prolapse, many in patients who had had prior prolapse surgery. Average operative time was less than 15 minutes. In more than 90% of cases, we combined vault repair with a graft-augmented rectocele repair; the posterior IVS mesh tape was attached to the top of the graft (porcine dermal or polypropylene mesh), which was fixed to the top of the vagina.

Our cure rates have been greater than 90%

with follow-ups of more than 1 year. Average blood loss has been less than 75 cc; no patients had intra- or postoperative bleeding severe enough to require transfusion or reoperation. There has been no postoperative pain syndrome, dyspareunia, mesh erosion, or tape extrusion. We have had 1 objective failure to date; however, the patient remains asymptomatic (on straining, her prolapse does not come beyond the introitus) and has not required further treatment.

**We have had 1 failure; however, this patient remains asymptomatic and has not required treatment**

Our experience has been included in a database of cases completed in the United States.<sup>10</sup> As of March 2004, results of 321 cases included 1 apical failure, 9 prolapse recurrences or failures in compartments other than the apex, 5 erosions (2 in combination with other graft material, all 5 healed after excision of exposed mesh), 4 cases of pain (resolved with NSAIDs, physical therapy, and/or observation), 1 infection (left perirectal cellulitis in a diabetic patient, treated successfully), and no rectal injuries. ■

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\*TM pending.

## Posterior IVS and other apical prolapse surgeries

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**T**he quest for the ideal vaginal apical prolapse surgery has intensified recently for a number of reasons: The surgery is performed frequently (~226,000 annually in the United States); interest in women's health has increased; urogynecology is a relatively young subspecialty; and, of course, there still is no "perfect" procedure.<sup>1</sup>

Prolapse affects almost 50% of women over 50 years of age.<sup>2</sup> Numerous surgical options have been devised, which employ 1 of 3 approaches—vaginal, abdominal, or laparoscopic. Indeed, the great variations in technique as well as the difficulty and expense of performing long-term, randomized comparison trials have prevented urogynecologic surgeons from making informed choices about which operation best suits the patient at hand. In consequence, most surgeons rely on a few procedures, and often the only choice to be made is which approach is most appropriate for the patient's condition and associated risks.

Granted, we all agree that the more frequently a surgery is performed, the better the surgeon's skill and the better the outcome. However, many of us are unaware of available comparison studies unless they include a procedure that we or our colleagues perform with a degree of frequency. On occasion, there are reports of new or adaptations of old procedures that are deserving of our attention and perhaps adoption—hence, this literature review of commonly performed prolapse surgeries. The main focus is on vaginal apex suspension procedures (Table 1), including a new technique called posterior intravaginal slingplasty (IVS).

### ABDOMINAL APPROACH

Abdominal sacral colpopexy has become the gold standard of vaginal apex fixation, mainly because of reported success rates and its ability to restore the vagina to its normal anatomy. However, few of the numerous studies that demonstrate its efficacy are truly long-term, randomized, controlled comparison trials.<sup>3-12</sup> Moreover, abdominal sacral colpopexy is not the ideal operation for every patient with vault prolapse. Most urogynecologic surgeons reserve the procedure for relatively young patients who are excellent surgical candidates and who have failed prior, well-performed prolapse surgery. This group is better able to tolerate associated operative morbidity.

In this procedure, a permanent polypropylene mesh is sutured to the anterior and posterior vaginal walls; Addison et al were among the first to note that numerous points of attachment are required.<sup>3</sup> The graft is then sutured (without tension) to the fascial layer immediately over the sacrum, thereby returning the vagina to its natural position and maintaining its length.

Potential complications include difficult-to-control hemorrhage from the sacral vessels, ureter damage, postoperative stress incontinence, and mesh erosion and/or rejection. Reported hemorrhage rates range from 1.2% to 2.6%.<sup>9,13,14</sup> and of erosion from 5% to 9%.<sup>15,16</sup> Visco et al reported that the frequency of erosion varies significantly depending on which modification of the original procedure is used; in fact, the incidence was lowest with the original procedure.<sup>17</sup> Urinary incontinence occurred in 11% of 162 patients followed by Timmons et al.<sup>9</sup>

Among the modifications that have been made to abdominal sacral colpopexy are different graft materials (to decrease risk of erosion), stapling or otherwise securing the graft to the sacrum (to reduce surgical time), and making a smaller incision (to decrease morbidity). All have met with varying degrees of success and associated complications.

#### LAPAROSCOPIC APPROACH

Laparoscopic sacral colpopexy was intended to resolve problems associated with the abdominal approach. Although a few highly skilled surgeons have been able to make this an efficient and effective operation, most find it to be unacceptably difficult and time consuming.

To date, the literature on laparoscopic sacral colpopexy has been limited to several case series of 10 to 77 patients with relatively short follow-ups.<sup>18-21</sup> Operative times ranged from 90 to 320 minutes and cure rates from 80% to 100%, which were generally based on follow-ups of about 1 year. Complications included bleeding, cystotomy, seroma, and urinary tract infection.

As with the abdominal technique, laparoscopic sacral colpopexy has undergone modifications. Variation in technique impedes completion of well-designed, randomized comparison trials, thereby delaying accumulation of acceptable, reproducible data. Moreover, as experience with the laparoscopic Burch colposuspension has demonstrated, even seemingly minor changes, such as replacing sutures with staples, can have an impact on efficacy. It was ultimately shown that when laparoscopic Burch colposuspension is performed in the same manner as the abdominal procedure, it is just as effective.<sup>22</sup>

Hence, laparoscopic sacral colpopexy should be performed with as few modifications of its abdominal predecessor as possible. Patient selection criteria also should be the same.

Uterosacral ligament suspension is a popular method for laparoscopic repair of the vaginal vault. The procedure can be accomplished with

technical ease, and the vagina is returned to its normal position without compromising its functional length.

This operation restores anatomic support by suturing the uterosacral ligaments to the pubocervical and rectovaginal fascia at the vaginal apex. In addition to providing minimally invasive access to the relatively high uterosacral ligaments, the technique permits visualization and repair (under magnification) of vaginal cuff fascial defects. The surgeon must be able to suture laparoscopically, however, and as with most uterosacral suspension methods, the ureters are at increased risk of injury.

The literature on laparoscopic uterosacral suspension is sparse and lacks randomized comparison trials. Ostrzenski<sup>23</sup> reported cures of 69% to 91% and no intra- or postoperative complications in 27 patients followed for 36 to 42 months; Carter et al<sup>24</sup> reported 100% success in 8 patients followed for 6 months; and Seman et al<sup>25</sup> reported 90% success and major complication rates in 4.1% of 73 women followed for 2 years.

Indications for uterosacral suspension include patients in whom vaginal access is limited (ie, those with impaired hip mobility after previous surgery) and those with isolated enterocele that restricts access to the vaginal apex.

#### VAGINAL APPROACH

When uterosacral ligament suspension is performed vaginally, it is also known as the modified McCall's culdoplasty, Mayo modified McCall's culdoplasty, or uterosacral vaginal suspension—an indication that the procedure has undergone several modifications. In general, surgeons use delayed absorbable sutures to approximate the vaginal apex to the uterosacral ligaments. Concern that the procedure incorporates previously failed uterosacral ligaments can be allayed if one includes the base of the ligament and near-by pararectal fascia.

Beneficial features include a correctly positioned vaginal apex, adequate vaginal length, and if necessary, the opportunity to reconstruct

the vagina with reinforcing grafts. The greatest drawback is the risk of ureteral injury, which may require intraoperative cystoscopy and protract an operating time that, at 2 to 4 hours, is already long. In addition, patients often experience significant postoperative pain.

As with the other procedures described thus far, well-constructed randomized comparison trials are lacking; however, existing data are somewhat reassuring. In 6 studies that included more than 1,200 patients followed for up to 10 years, cure rates ranged from 82% to 100%.<sup>26-31</sup> My colleagues and I have performed about 100 Mayo modified McCall's procedures in the past 2 years; 2 of these were deemed to be surgical failures (ie, apical prolapse recurred).

Sacrospinous suspension, in which one or both of the sacrospinous ligaments are sutured to the vaginal apex, is one of the few vault prolapse repairs that has been compared with abdominal sacral colpopexy in a clinical trial. Benson et al<sup>13</sup> randomized 48 women to the vaginal technique and 40 to the abdominal technique. At follow-up of 1 to 5 years (mean, 2.5), 33% of the vaginal

group and 16% of the abdominal group had needed reoperation. Length of hospital stay and incidence of postoperative pain and dyspareunia were similar in the 2 groups. Operative times were longer in the abdominal group while the vaginal group had longer catheterization times and more frequently had incontinence (12% vs 2%) and urinary tract infection.

Although sacrospinous suspension is the vaginal procedure most familiar to general gynecologists, it is not the ideal procedure. It relies on only 1 or 2 sutures to hold the vagina in place until scarring occurs; it creates a small amount of dead space at the attached end of the vagina; and when performed unilaterally, it causes deviation of the apex toward the ligament of attachment. Despite these imperfections, acceptable results have on occasion been reported,<sup>32-40</sup> thus it remains the vaginal procedure of choice for many skilled surgeons.

Posterior IVS is a minimally invasive technique for vaginal apex fixation that fills a significant void in the surgical armamentarium—it allows one to suspend the vaginal vault with minimal dissection and in less than 30 minutes. The pro-

TABLE 1

Selected surgical techniques for vaginal vault prolapse

	ABDOMINAL	LAPAROSCOPIC	
	Sacral colpopexy	Sacral colpopexy	Uterosacral ligament suspension
Procedure complexity	High	High to very high	Moderate to high
Anesthesia	General	General	General
Operative time	2-4 hours	2.5-5 hours	1-2 hours
Potential intraoperative complications	Sacral hemorrhage Ureter injury	Sacral hemorrhage Ureter injury Cystotomy	Ureter injury Sidewall hematoma Colon/rectal suture injury
Length of hospital stay	2-5 days	1-2 days	1-3 days
Postoperative pain	Requires PCA	Requires IV narcotics	Requires PCA
Potential postoperative complications	Mesh erosion Mesh infection Stress incontinence	Mesh erosion Mesh infection Urinary tract infection	Suture erosion Sphincteric deficiency Dyspareunia Buttock pain/levator myalgia Shortened vagina
Cure rate (%)	95-100 (≤18 yr)	80-100 (≤3.3 yr)	68-91 (≤3.5 yr)

PCA = patient-controlled anesthesia (with intravenous morphine or other high-level analgesic)

cedure is described by Miklos on page S4.

I have performed IVS in 20 patients with vaginal prolapse who had failed treatment with pessaries and were not ideal surgical candidates. They have been followed for less than 1 year, and to date, there have been no failures.

Reported success rates of posterior IVS approximate 90%. In a prospective observational study of 93 patients with severe posthysterectomy vault prolapse, Farnsworth cited 1-year symptomatic cure rates of 91% for prolapse, 79% for urgency, 82% for nocturia, and 78% for pelvic pain. All patients were discharged within 24 hours.<sup>41</sup> Only minor complications occurred; no blood transfusions were required.

Petros reported successful treatment of vault prolapse in 94% of 75 women who were followed for 1 to 4.5 years.<sup>42</sup> Mean blood loss was 120 cc. Patients were sent home within 24 hours, with minimal pain and no indwelling catheters. Most resumed normal activities within 7 to 10 days.

Rane et al used magnetic resonance imaging to delineate vaginal configuration in 21 women who underwent posterior IVS, sacrospinous ligament suspension, or sacral colpopexy.<sup>43</sup> Posterior

IVS and sacral colpopexy restored normal vaginal configuration to a significant degree while sacrospinous suspension appeared to exacerbate preoperative distortion.

Because posterior IVS is performed under almost constant tactile guidance, major complications are rare. The simple dissection does not approach the major blood vessels and nerves near the sacrospinous ligament, thereby avoiding potential complications in that area. The tunneler also passes a safe distance (3-4 cm) from the pudendal complex and the major rectal blood vessels.

Potential complications include pain, bleeding, infection, tape rejection or erosion, bowel or rectal injury, and vaginal scar tissue formation. In more than 1,500 IVS procedures performed by different surgeons at various institutions, there have been 2 rectal perforations, which were recognized and repaired intraoperatively and did not cause significant morbidity. Lim and Rane reported a case of suburethral tape erosion and pyogenic granuloma formation that was diagnosed 14 months after anterior IVS for recurrent stress incontinence.<sup>44</sup>

**Selected surgical techniques for vaginal vault prolapse ... continued**

	VAGINAL		
	Uterosacral ligament suspension	Sacrospinous ligament suspension	Posterior IVS
<b>Procedure complexity</b>	Moderate to high	High	Low
<b>Anesthesia</b>	General	General; sometimes epidural	Local/regional
<b>Operative time</b>	2-4 hours	2-4 hours	15-20 minutes
<b>Potential intraoperative complications</b>	Ureter injury Bladder perforation Rectal perforation	Pudendal nerve injury Pudendal/sacral vessel hemorrhage Vaginal deviation	Rectal perforation Mesh erosion
<b>Length of hospital stay</b>	1-3 days	1-3 days	≤1 day
<b>Postoperative pain</b>	Requires PCA	Requires PCA Buttock/leg pain	Requires oral analgesics
<b>Potential postoperative complications</b>	Suture erosion	Stress incontinence Dyspareunia	Mesh erosion Mesh infection
<b>Cure rate (%)</b>	80-100 (≤10 yr)	73-98 (≤5 yr)	91-94 (≤4 yr)

Overall, approximately 1% of patients experience significant complications such as mesh erosion. Most tape erosions can be treated with simple excision in the office (see the case history described by Vardy on page S11). There have been no reports of infected or rejected tape that had to be completely removed.

**CONCLUSION**

We are far from having a standardized surgery that suits all patients with vaginal vault prolapse. Indeed, because every operation should be individualized to meet the patient's needs and risks, it is helpful to have as many surgical options as we do. But in addition to anecdotal reports of success, our choices should be supported by clinical trial results—ideally, from trials that are well-designed, long-term, randomized comparison studies. Therefore, when considering a new surgical technique or device, it behooves us to assess the patient's needs, consider our surgical expertise, and familiarize ourselves with the available clinical data. ■

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## Combined anterior and posterior IVS: A case history

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**Case presentation.** A 46-year-old woman presented with multiple genitourinary complaints. Chief among them were vaginal bulge and urinary hesitancy.

**History.** The patient was premenopausal; she had had 3 pregnancies and 1 birth. In addition to her primary complaints, she described a sensation of vaginal heaviness and bulging, urinary frequency, and nocturia (3 voidings per night). She had had stress incontinence (1 tablespoon on coughing or laughing) since the birth of her child 12 years ago; however, both frequency and volume had decreased (just a few drops when her bladder was full) during the last year as the size of her vaginal bulge had increased. She had been sexually active and denied dyspareunia, but lately she had abstained from intercourse because of "the bulge." Her bowel habits were normal.

The patient had tried 2 different pessaries (a ring with support and the Gellhorn), and both of them had resulted in discomfort, discharge, and a large increase in the volume of stress incontinence. She did not want to try a third pessary and asked for definitive treatment with surgery.

**Physical examination.** The abdomen was soft,

without tenderness or distention. Vaginal examination revealed a stage 3 cystocele that extended 2 cm beyond the hymenal ring and included a bilateral paravaginal defect, a stage 2 uterine prolapse with mild cervical elongation to 1 cm past the introitus, and a stage 2 rectocele that extended to the hymenal ring.

An empty cough urinary stress test in the supine position was negative when the prolapse was extended but positive when the cystocele and uterus were reduced. The volume of postvoid residual (PVR) urine was 140 cc.

**Selection of surgery.** Surgical options were outlined. The patient rejected sacrospinous ligament fixation on the basis of published failure rates. Abdominal sacral colpopexy was declined after a review of its risks, including operative hemorrhage, postoperative pain, prolonged hospitalization, and vaginal mesh erosion.

The patient was scheduled for total vaginal hysterectomy with bilateral salpingo-oophorectomy, posterior apical IVS, anterior-posterior repair, and anterior suburethral IVS with cystoscopy.

**Bowel prep.** Fleet® Phospho-soda® and 3 doses of neomycin (500 mg) were given for the preopera-

tive bowel prep. Considering that the risk of bowel perforation in this patient was extremely small (0.1% to 0.2%), not everyone will agree that the bowel prep was necessary. Even so, I have made it routine in cases such as this.

**Surgery.** Operative times and external blood loss volumes were as follows: hysterectomy, 45 minutes, 200 cc; posterior IVS, 15 minutes, 25 cc; anterior IVS with cystoscopy, 15 minutes, 25 cc; and anterior-posterior repair, 25 minutes, 75 cc. On completion of the procedures, the vagina was packed with 1-inch iodoform gauze strips.

**Tape around the urethra should be loosened, if necessary, before tissue ingrowth occurs**

**Postoperative course.** The patient was ambulatory on day 0; at that time, she rated her pain at 3 on a scale of 0 to 10. The vaginal packing was removed on day 1; PVR volume was 70 cc after a voiding trial. The patient was discharged that day with instructions to avoid heavy lifting (nothing > 10 lb), to place nothing in her vagina for 6 weeks, and to call the office in the event of excessive coughing, vomiting, pain, bleeding, or temperature > 100.8°F.

When seen in the office on day 3, the patient reported that acetaminophen had been sufficient to alleviate her pain. She had not had fever, and vaginal spotting had been minimal. The surgical incisions were dry and clean on inspection. PVR volume was 30 cc.

If PVR volume had been more than 100 cc on the third postoperative day, I would have loosened the tape around the urethra by inserting a

Hegar dilator in the urethra and pulling down with a quick motion and moderate force (1-2 lb). This adjustment can be made for up to a week after surgery, but I recommend doing it on day 3, if necessary, before significant tissue ingrowth has occurred. The polypropylene multifilament tape used with the IVS Tunneller\* device is more amenable to these adjustments than are other tension-free vaginal tapes.

**Six-week follow-up.** The patient had resumed sexual activity without pain and a mild exercise regimen without leakage or other symptoms of stress or urge incontinence.

On speculum examination, the vaginal cuff appeared to be well-healed, and there was no evidence of tape erosion. This complication, which occurs in about 2% to 3% of cases, may be spontaneous or result from excessive tension at the vaginal closure or a too-thin dissection of the vaginal mucosa. Here again, the tape used with the IVS Tunneller\* device allows easy correction in the office. If a patient reports vaginal discharge or spotting bleeding, a careful inspection for erosion should be performed, including between vaginal rugae folds. Should an area of mesh be detected, it can be grasped with a hemostat, pulled gently, and just cut below the level of the mucosa, after which the tape should retract beneath the mucosa. Patients report that trimming is painless. Small defects can be left to heal without closure (I prescribe topical estrogen in such cases); defects greater than 1 cm can be sutured with 4.0 Vicryl™, using local lidocaine if necessary.

**Six-month follow-up.** The patient reported that she had not experienced incontinence, dyspareunia, or symptoms of prolapse. ■

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