



When performing high uterosacral suspension, it is possible to pass sutures through the coccygeus muscle-sacrospinous ligament complex (arrow) because a segment of the uterosacral ligament inserts into that structure.

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STEP BY STEP

High uterosacral vaginal vault suspension to repair enterocele and apical prolapse

📌 You can provide good apical support without significantly distorting the vaginal axis, and passing sutures intraperitoneally can be cleaner, and simpler, than passage through retroperitoneal structures

Mickey Karram, MD, and Christine Vaccaro, DO

The concept of utilizing the uterosacral ligaments to support the vaginal cuff and correct an enterocele is nothing new: As early as 1957, Milton McCall described what became known as the McCall culdoplasty, in which sutures incorporated the uterosacral ligaments into the posterior vaginal vault to obliterate the cul-de-sac and

suspend or support the vaginal apex at the time of vaginal hysterectomy.¹

Later, in the 1990s, Richardson promoted the concept that, in patients who have pelvic organ prolapse, **the uterosacral ligaments do not become attenuated, instead, they break at specific points.**

Shull and colleagues took this idea and described how utilizing uterosacral ligaments to support the vaginal cuff can be performed vaginally—by passing sutures bilaterally through the uterosacral ligaments near the level of the ischial spine.²

Since Shull described this procedure, numerous published studies have demonstrated outcomes similar to other vaginal suspension procedures, such as sacrospinous ligament suspension.³⁻⁵

Potential **advantages** of a high uterosacral vaginal vault suspension are that:

- it provides good apical support without significantly distorting the vaginal axis, making it applicable to all types of vaginal prolapse
- intraperitoneal passage of sutures can be a lot cleaner and simpler than passing sutures, or anchors, through retroperitoneal structures, such as the sacrospinous ligament (**FIGURE 1**, page 36).



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The authors report no financial relationships relevant to this article.

This article, with accompanying video footage, is presented with the support of the International Academy of Pelvic Surgery.

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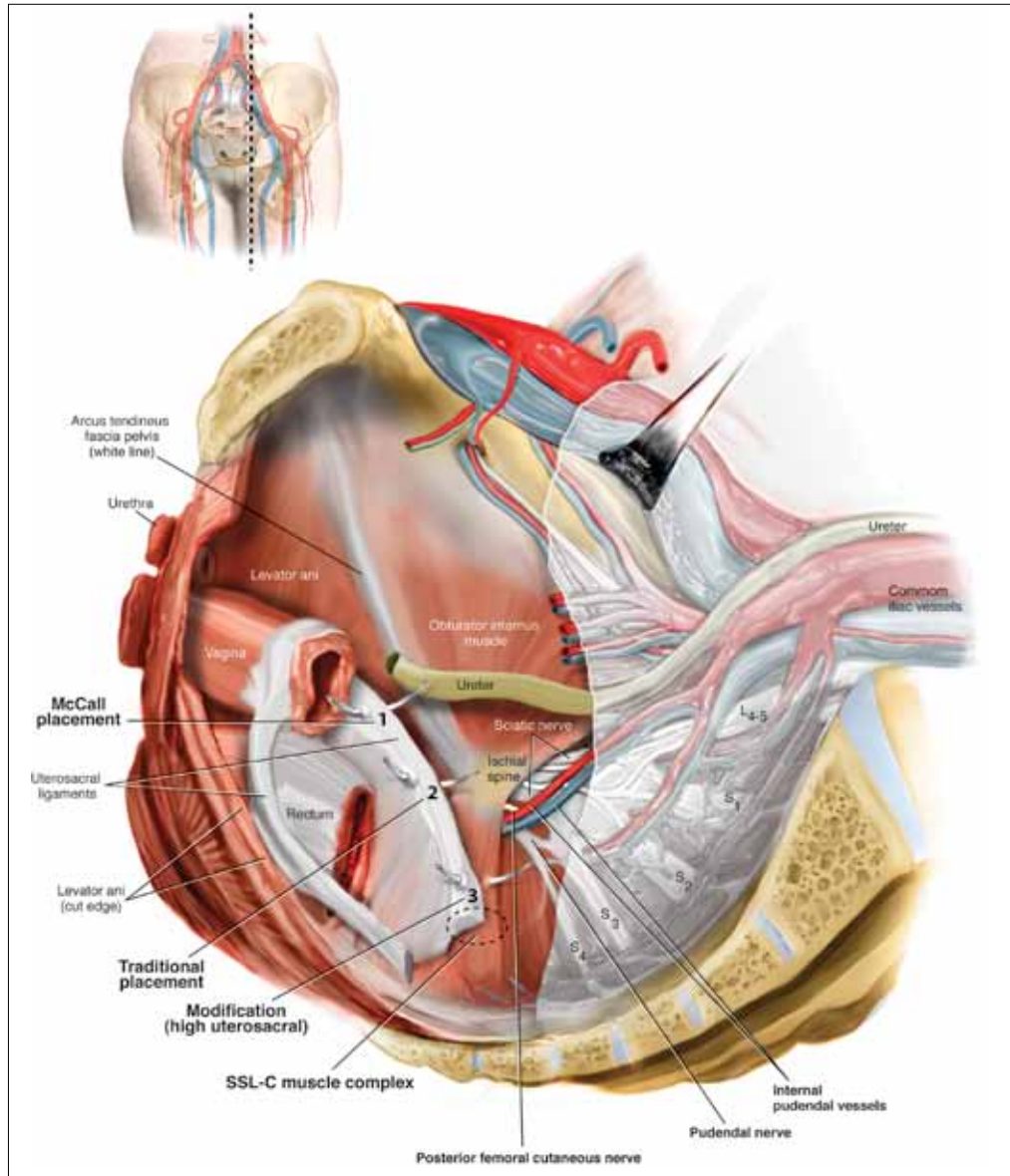
ON THE WEB

▶ Hear Dr. Karram discuss how to avoid surgical hazards during suspension, at obgmanagement.com

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FIGURE 1 Locating intraperitoneal sutures during uterosacral suspension



FAST TRACK

The ureter can become kinked when sutures in this procedure are passed too far laterally

Cross-section of the pelvic floor shows where sutures are placed as part of McCall culdoplasty (1), traditional uterosacral suspension (2), and modified high uterosacral suspension (3). Note: High uterosacral suspension may involve passing the suture through the sacrospinous ligament–coccygeus (SSL-C) muscle complex (dashed oval) because a segment of the uterosacral ligament inserts into that structure.

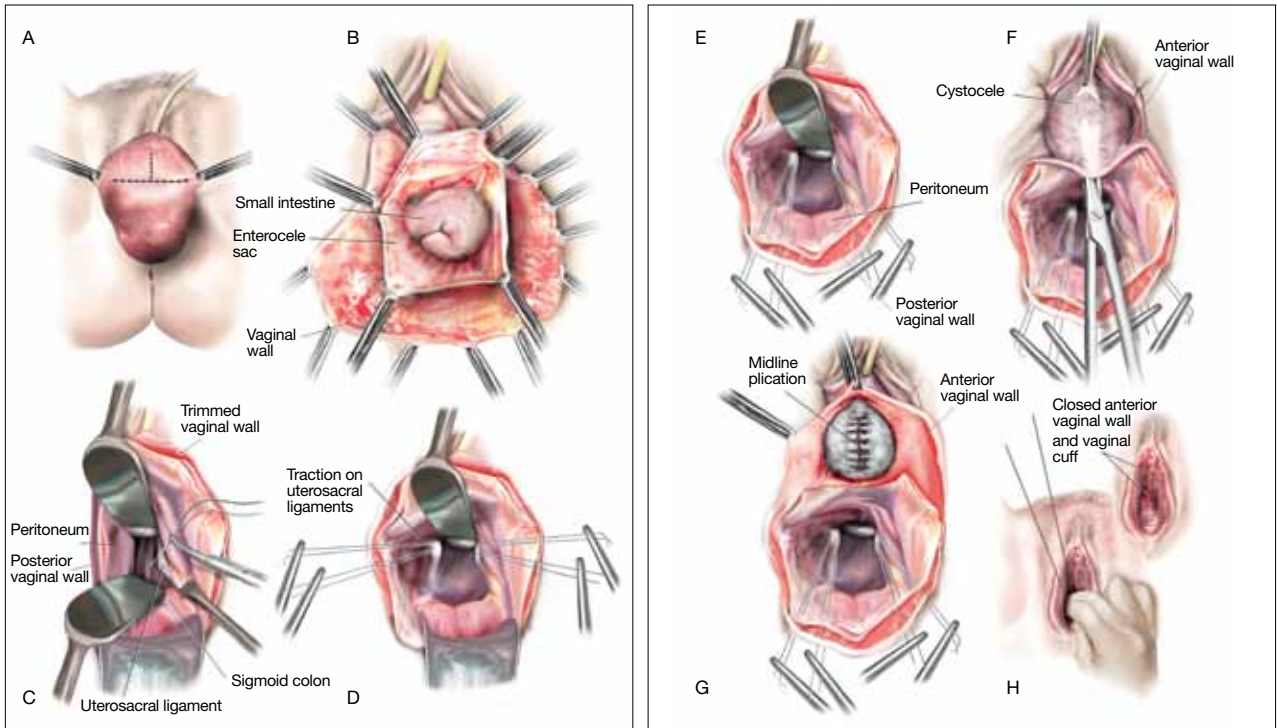
A **disadvantage** of the procedure is that the uterosacral ligament may, at times, lie in close proximity to the ureter. Studies have shown that the ureter can become kinked when sutures in this procedure are passed too far laterally.²⁻⁵

High uterosacral suspension has been

our operation of choice for 11 years for patients who have pelvic organ prolapse in which the peritoneum is accessible (see “How this procedure evolved in our hands,” page 38). In this article, we provide a step-by-step description of the procedure. Four accompanying videos that further illuminate

ILLUSTRATIONS, FIGURES 1-5: JOE CHOVAN, REPRINTED, WITH CAPTIONS, FROM ATLAS OF PELVIC ANATOMY AND GYNECOLOGIC SURGERY (3RD EDITION, 2011); SAUNDERS/ELSEVIER) WITH PERMISSION OF THE PUBLISHER

FIGURE 2 Step by step: High uterosacral vaginal vault suspension



A The most prominent portion of the prolapsed vaginal vault is grasped with two Allis clamps. **B** The vaginal wall is opened up and the enterocele sac is identified and entered. **C** The bowel is packed high into the pelvis using large laparotomy sponges. The retractor lifts the sponges out of the lower pelvis, thus completely exposing the cul-de-sac. When appropriate traction is placed downward on the uterosacral ligaments with an Allis clamp, the uterosacral ligaments are easily palpated bilaterally. **D** Delayed absorbable sutures have been passed through the uppermost portion of the uterosacral ligaments on each side, and have been individually tagged.

E Each end of the previously passed sutures is brought out through the posterior peritoneum and the posterior vaginal wall. (A free needle is used to pass both ends of these delayed absorbable sutures through the full thickness of the vaginal wall.) **F** Anterior colporrhaphy is begun by initiating dissection between the prolapsed bladder and the anterior vaginal wall. **G** Anterior colporrhaphy is complete. **H** The vagina has been appropriately trimmed and closed with interrupted or continuous delayed absorbable sutures. Delayed absorbable sutures that were previously brought out through the full thickness of the posterior vaginal wall are then tied; doing so elevates the prolapsed vaginal vault high up into the hollow of the sacrum.

those steps can be viewed at www.obgmanagement.com; they are noted in the text here at appropriate places. (For example, **VIDEO #1**, immediately below, sets the stage for the step-by-step discussion by reviewing pertinent pelvic anatomy.)

Details of the procedure

#1 ENTER THE PERITONEUM

It's our opinion that, even though extra-peritoneal uterosacral suspension procedures have been described, the pertinent

anatomic structures (again, see **VIDEO #1**) are *not* easily identifiable unless suspension is undertaken **intra**peritoneally. Entering the peritoneum is, obviously, not a concern if the patient is undergoing vaginal hysterectomy. If the patient has post-hysterectomy prolapse, however, you must be able to isolate an enterocele and enter the peritoneum (follow **FIGURE 2**, beginning here and through subsequent steps of the procedure).

Once you have entered the peritoneum, the cul-de-sac must be relatively free of adhesive disease if you are to be able to



How this procedure evolved in our hands

- When we first performed high uterosacral vaginal vault suspension as described by Shull and colleagues,¹ we mobilized vaginal muscularis off the epithelium and suspended the epithelium and muscularis separately, making sure that sutures were passed through the anterior and posterior vaginal walls.

Over time, we realized that this practice led to a shorter vagina—one that, in some cases, was less than ideal for the patient. We began, therefore, to pass sutures through the posterior vaginal wall only. (VIDEO #2 shows high uterosacral suspension in a patient who has post-hysterectomy vaginal vault prolapse.)

With this change in technique, we have been able to create a longer vagina—and *not* at the expense of any increase in the incidence of cystocele or anterior rectocele. Our experience directly contradicts the notion that fascial continuity is necessary for prolapse repair to be successful over the long term.

- Initially, we thought that a large cul-de-sac needed to be obliterated in the midline with internal McCall-type stitches that were separate and distinct from the uterosacral suspension sutures. We no longer do this routinely because we believe that the numerous sutures that are passed through the full thickness of the posterior vaginal wall, including the peritoneum, effectively obliterate the enterocele and keep down the incidence of recurrent enterocele and high rectocele.
- We have come to realize that sutures placed medial and cephalad to the ischial spine are often passed through a portion of the coccygeus muscle-sacrospinous ligament complex. At times, a small window can be made in the peritoneum that provides direct access to this complex (FIGURE 1; FIGURE 3, page 39).

Reference

1. Shull BL, Bachofen C, Coates KW, Kuehl TJ. A transvaginal approach to repair of apical and other associated sites of pelvic organ prolapse with uterosacral ligaments. *Am J Obstet Gynecol.* 2000;183(6):1365-1374.

continue with this procedure. (See “5 surgical pearls for high ureterosacral vaginal vault suspension,” page 42.)

#2 PACK THE BOWEL; EXPOSE THE UTEROSACRAL LIGAMENTS

Next, pack the small bowel out of the cul-de-sac to allow easy access and visualization of the uppermost portions of the uterosacral ligament. This is best accomplished by passing large, moistened laparotomy sponges intraperitoneally and elevating them with a large retractor (e.g., Deaver, Breisky-Navrital, Sweetheart).

When the bowel is appropriately packed, the retractor lifts the intestinal contents out of the pelvis, usually allowing easy access to the proximal or uppermost portion of the uterosacral ligaments (see VIDEO #3, which focuses on the anatomy of the uterosacral ligament).

#3 PALPATE THE ISCHIAL SPINES BILATERALLY

It’s important that you palpate the ischial spines. Often, the ureter can be palpated against the pelvic sidewall. If you palpate the ischial spines and continue to palpate medially and cephalad, you can usually palpate the coccygeus muscle-sacrospinous ligament complex transperitoneally because a portion of the uterosacral ligament inserts into the sacrospinous ligament.⁶

If sutures can be passed at this level, the result will (usually) be a vagina that is, at minimum, approximately 9 cm long.

#4 PASS THE SUTURES

We prefer to pass two or three sutures on each side, utilizing a long, straight needle holder. Because we eventually pass the

WATCH THE VIDEO

High uterosacral suspension (post-hysterectomy vaginal vault prolapse)



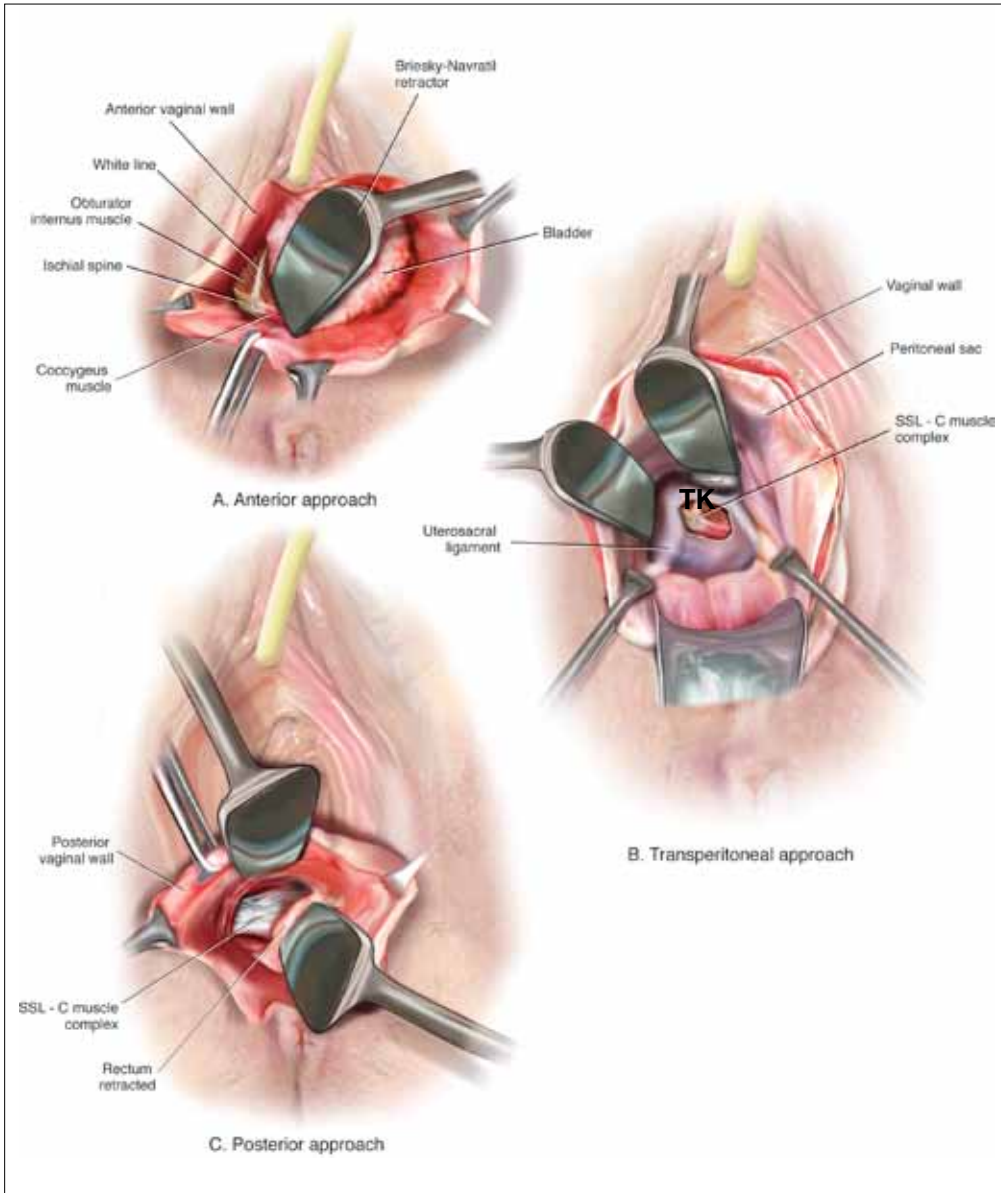
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FIGURE 3 Access to the sacrospinous ligament



FAST TRACK

After the sutures are tied, perform cystoscopy to ensure ureteral patency

The sacrospinous ligament can be palpated and exposed along any one of three approaches: anterior paravaginally (A), transperitoneally (B), and posterior pararectally (C).

sutures through the full thickness of the posterior vaginal wall, we've opted for a delayed absorbable suture—preferably, 0 Vicryl on a CT-2 needle.

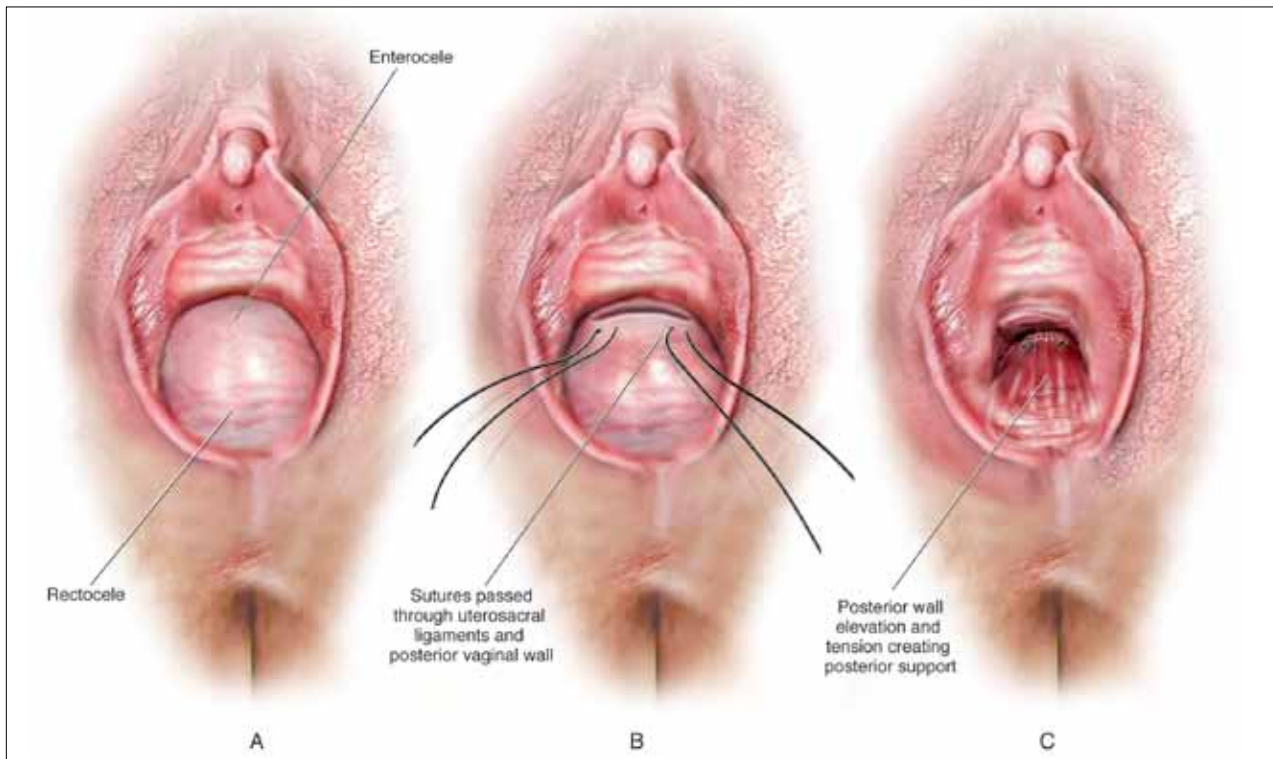
A Briesky-Navrtil retractor is utilized to retract the sigmoid colon in the opposite direction of the ligament in which the sutures are being passed. At times, attaching a light

to a suction device or a retractor is also helpful to visualize this area.

Use an Allis clamp to elevate and apply traction on the distal uterosacral ligament; this facilitates palpation and visualization of the appropriate site for placement of the sutures. The exact area of suture passage is best identified by palpation.



FIGURE 4 Providing support for the posterior vaginal wall



A View of a posterior vaginal wall defect secondary to an enterocele and rectocele. **B** After entry into the enterocele sac, intraperitoneal suspension sutures are brought out through the full thickness of the vaginal wall at the level of the apex. **C** Tying these sutures after the vaginal incision is closed at the apex not only results in greater vaginal length but also contributes to overall support of the entire posterior vaginal wall.

(Note: In early descriptions of this procedure, permanent sutures were utilized; again, we use delayed absorbable sutures because all sutures are brought out through the full thickness of the posterior vaginal wall. Permanent suture in our approach would be unacceptable because the sutures are tied in the lumen of the vagina. In some other modifications of this procedure, sutures are passed through the muscular layer of the vagina to exclude epithelium; under those circumstances, permanent sutures *can* be utilized.)

Once the sutures are brought through the full thickness of the posterior vaginal wall—including the peritoneum, if possible—tag them individually. If the anterior segment is well-supported, close the vaginal incision with a continuous delayed absorbable suture.

Tie the suspension sutures, elevating the apex into the hollow of the sacrum.

If anterior colporrhaphy is needed, perform that repair. Close the anterior vaginal wall as well as the vaginal cuff before tying off the suspension sutures.

#5 ENSURE THAT THE URETERS ARE PATENT

After the sutures are tied, instruct the anesthesiologist to administer 5 cc of indigo carmine dye intravenously. Assuming no renal compromise, you should see dye in the bladder 5 to 10 minutes later. If the patient is elderly or if you want to expedite this step, furosemide, 5 to 10 mg, can be given by IV push.

Next, perform cystoscopy to ensure ureteral patency. You should observe a spill of dye-colored urine out of both ureteral orifices. If dye does *not* spill from either orifice

ILLUSTRATIONS: JOE CHOVAN

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5 surgical pearls for high uterosacral vaginal vault suspension

- Be prepared to **convert to a sacrospinous fixation** if you cannot enter the enterocele sac or if the posterior cul-de-sac is obliterated with adhesions
- **Pass the sutures through durable tissue** so that, when traction is placed on the sutures, there is minimal movement of peritoneum. Doing so might avoid kinking of the ureter.
- **Pass the sutures through the full thickness of the posterior vaginal wall**, including the peritoneum. Doing so not only suspends the apex but tremendously facilitates support for the posterior vaginal wall (**FIGURE 4**, page 40).
- When prolapse is very large, **excise redundant portions of the upper part of the posterior vaginal wall and peritoneum**—making sure, however, that you keep all layers together for performing the suspension. (See **VIDEO #4**, showing high uterosacral suspension in a patient who has complete uterine procidentia.)
- **Do not try to pass a ureteral stent** if you do not see indigo carmine dye spill from the ureteral orifices; to do so can be difficult after repair of prolapse, even in the hands of a skilled urologist. It is best instead to:
 1. identify the offending suture
 2. cut it
 3. visualize the spill of dye-colored urine
 4. proceed with either replacing the cut suture or maintaining the suspension with other, remaining sutures.In our experience, when we have also performed an anterior repair, the ureter is kinked in at least 50% of cases because of one of the sutures that was used to correct the cystocele.

FAST TRACK

Reserve placement of a synthetic midurethral sling, if one is needed, until after the vault procedure is complete

after a reasonable wait (usually, 20 minutes), assume that the ureter on that side is obstructed.

#6 COMPLETELY RECONSTRUCT THE VAGINA

The remainder of steps required to complete the procedure usually involve posterior colporrhaphy and perineoplasty. We also reserve placement of a synthetic midurethral sling (if one is needed) until after the vault procedure is complete.

Refer to **FIGURE 2** for a step-by-step guide to how best to perform high uterosacral vaginal vault suspension.

Questions often asked about this procedure

What do I do if I can't isolate an enterocele sac and enter it?

Perform a unilateral or bilateral sacrospinous ligament colpopexy.

Is it always possible to identify a usable uterosacral ligament in patients who have advanced prolapse?

We've found it extremely rare *not* to be able to identify a usable and durable structure.

The trick to identifying the ligament is to pass an Allis clamp so that one end is positioned intraperitoneally, as high up as possible, and the other end is on the vaginal mucosa side. Elevating the clamp puts the ligament on tension. These clamps are usually placed between 4 and 5 o'clock on the left side and between 7 and 8 o'clock on the right side.

With appropriate traction, the ligament can usually be easily palpated.

If I don't see indigo carmine dye spilling from one side during cystoscopy, what sequence of events should I undertake?

If the only sutures placed on that side were the uterosacral ligament sutures, cut them individually. If the ureter spills dye after a suture is cut, decide whether you think it is

appropriate to replace that suture. Sometimes, unilateral suspension or a suspension with one remaining suture on the side where you cut a suture or two is sufficient.

If you do want to replace a cut suture, ureteral patency must be confirmed again after it is replaced.

No further management of the ureter is required—that is, it isn't necessary to catheterize the ureter or perform postoperative imaging studies. If anterior colporrhaphy has also been performed, however, apply your highest index of suspicion to determine the source of the offending suture: the uterosacral suspension or the anterior repair.*

If the patient has severe hip or leg pain postoperatively, what should I suspect is wrong? How should I manage this complication?

The nerve to the levator ani runs within the coccygeus muscle. In a thin patient, in whom deep bites are taken, the nerve is often injured or trapped. Such trauma can cause hip pain that is fairly severe but that is almost always self-limiting and requires only

nonsteroidal anti-inflammatory medication. Usually, this complication resolves within 2 weeks after surgery.

Significant postoperative pain that radiates down the back of the thigh or down the leg all the way to the foot is of greater concern because one of the sacral nerve segments has most likely been injured or stretched. Obtain a neurology consult; rarely, it becomes necessary to take the patient back to surgery to cut the offending suture. ❌

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*For detailed discussion of this subject, see the International Academy of Pelvic Surgery's August 2010 "Case of the month" at www.academyofpelvicsurgery.com.



Don't miss the videos that accompany this article in the Video Library at obgmanagement.com

VIDEO 1 Pelvic anatomy of high intraperitoneal vaginal vault suspension

VIDEO 2 High uterosacral suspension (post-hysterectomy vaginal vault prolapse)

VIDEO 3 Anatomy of the uterosacral ligament

VIDEO 4 High uterosacral suspension (complete uterine procidentia)

These videos have been selected by the authors and are presented courtesy of the International Academy of Pelvic Surgery (IAPS).