Pelvic Organ Prolapse

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Abstract: Pelvic organ prolapse, including anterior and posterior vaginal prolapse, uterine prolapse, and enterocele, is a common group of clinical conditions affecting millions of American women. This article, designed for the practicing clinician, highlights the clinical importance of prolapse, its pathophysiology, and approaches to diagnosis and therapy. Prolapse encompasses a range of disorders, from asymptomatic altered vaginal anatomy to complete vaginal eversion associated with severe urinary, defecatory, and sexual dysfunction. The pathophysiology of prolapse is multifactorial and may operate under a “multiple-hit” process in which genetically susceptible women are exposed to life events that ultimately result in the development of clinically important prolapse. The evaluation of women with prolapse requires a comprehensive approach, with attention to function in all pelvic compartments based on a detailed patient history, physical examination, and limited testing. Although prolapse is associated with many symptoms, few are specific for prolapse; it is often challenging for the clinician to determine which symptoms are attributable to the prolapse itself and will therefore improve or resolve once the prolapse is treated. When treatment is warranted based on specific symptoms, prolapse management choices fall into 2 broad categories: nonsurgical, which includes pelvic floor muscle training and pessary use; and surgical, which can be reconstructive (eg, sacral colpopexy) or obliterator (eg, colpocleisis). Concomitant symptoms require additional management. Virtually all women with prolapse can be treated and their symptoms improved, even if not completely resolved.


CLINICAL IMPORTANCE

Because the prevalence of pelvic organ prolapse increases with age, the changing demographics of the world’s population will result in even more affected women. Based on projections from the United States Census Bureau, the number of American women aged 65 years and over will double in the next 25 years, to more than 40 million women by 2030.1 By one estimate, the demand for health care services related to pelvic floor disorders will increase at twice the rate of the population itself.2 The lifetime risk that a woman in the United States will have surgery for prolapse or urinary incontinence is 11%, with up to one third of surgeries representing repeat procedures.3 Although the overall rate of prolapse surgery has dropped, this represents a substantial drop in the rate of surgery for women less than 50 years old and a moderate increase for women aged 50 years and greater (Fig. 1).4 Perioperative death is uncommon (3 per 10,000 surgeries), although that figure underestimates mortality occurring outside of the index hospitalization for surgery. The direct cost of prolapse surgery is greater than $1 billion per year.5

Surgically treated prolapse represents the severe end of the clinical spectrum. Where is the cutoff between early prolapse and “normal” pelvic support? Two factors make this question difficult to answer. Changes in vaginal anatomy are exceedingly common, especially in parous women; and beyond the sensation of protruding tissue with advanced prolapse, symptoms of prolapse are notoriously nonspecific. Prolapse is commonly found on physical examination in women without pelvic symptoms.6,7 For the vast majority of asymptomatic women with physical
findings of prolapse, no treatment is indicated. In contrast to traditional concepts that predict inevitable progression of prolapse with time, prolapse is a dynamic condition; regression of prolapse occurs at the same or higher rate as incidence. Factors related to progression and remission need further study. This review will outline our recommendations, combined with an evidence-based approach when available, for the evaluation and treatment of the postreproductive woman with pelvic organ prolapse.

PATHOPHYSIOLOGY

A useful approach to understanding the pathophysiology of prolapse is to consider risk factors as predisposing, inciting, promoting, or decompensating events (Table 1). Depending on the combination of risk factors in an individual, prolapse may or may not develop over her lifetime. As a hypothetical example, imagine a woman who is genetically predisposed to prolapse. She has a family history of prolapse, and unknown to her, she carries a subclinical defect in connective tissue remodeling. She experienced an inciting event in the birth of her 9-pound postterm son, with prolonged second stage followed by forceps delivery over midline episiotomy that extended to disrupt the anal sphincter. Over the next 10 years, she gained 60 pounds. She has chronic excessive straining at defecation. At menopause, she had a simple hysterectomy for atypical endometrial hyperplasia, with no attention given to reattaching the uterosacral ligaments to the vaginal cuff. At age 55, she is diagnosed with stage III vaginal prolapse.

Now let’s give this woman an identical twin sister, who carries the same genetic predisposition but who experiences different life events. She never experienced pregnancy or delivery. She maintained normal weight and an active lifestyle. She never developed an indication for hysterectomy. At age 55, her pelvic support is excellent. Although hypothetical, these 2 cases emphasize the multifactorial nature of prolapse. Risk factors have been and will continue to be identified; with progress such as the Human Genome Project, eventually we may be able to predict those at highest risk of developing prolapse. Modifiable risk factors can be altered to decrease the likelihood of subsequent prolapse.

Risk factors for prolapse include increasing age, higher gravidity and parity (especially the number of vaginal births), and history of hysterectomy, especially hysterectomy for prolapse or other prolapse or incontinence operations. Obesity is one of the few modifiable risk factors identified so far. In the Women’s Health Initiative, one fifth of nulliparous women had some degree of prolapse. These data should give pause to enthusiasts promoting cesarean delivery for all women to prevent prolapse. Obesity is one of the few modifiable risk factors identified so far. In the Women’s Health Initiative,

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body mass index greater than 30 kg/m² conferred a 40–75% increased risk of prolapse.⁷

**DIAGNOSTIC APPROACH**

**Symptoms**
Symptoms are not specific to different compartments of prolapse but may reflect the overall stage of prolapse at its most advanced site.¹¹ With descent of the cervix into the vagina, women may find they can no longer wear tampons. Women are usually not aware of an actual protrusion while prolapse is above the hymen, but they may have pelvic pressure or heaviness. Although pelvic pain and low back pain have classically been considered symptoms of prolapse, a recent study found pelvic pain was not associated with prolapse, and women with more advanced prolapse actually had less back pain than women with mild prolapse.¹²

Women with prolapse often have urinary symptoms, although the mechanism responsible for these symptoms can be markedly different. Some women have stress incontinence symptoms due to urethral incompetence, but many women, particularly those with advanced anterior vaginal prolapse, are continent. In some women, this reflects normal urethral sphincter competence despite lack of support. In other cases, women with urethral incompetence are continent only because the prolapse causes urethral kinking and obstruction.¹³ This is called potential, masked, latent, or occult stress incontinence because women do not have symptoms of incontinence as long as the prolapse is untreated. In one study, urethral obstruction occurred in 58% of women with grade 3 and 4 anterior vaginal prolapse, compared with 4% in women with grade 1 and 2 prolapse.¹⁴ As prolapse advances, women are less likely to have stress incontinence and more likely to manually reduce prolapse to void. Women may have a remote history of stress incontinence that resolved as the prolapse became more advanced. Women with urethral obstruction commonly have voiding dysfunction, manifested by symptoms of urinary hesitancy, frequency, or incomplete emptying.

Defecatory symptoms such as excessive straining, incomplete rectal emptying, or the need for perineal or vaginal pressure to accomplish defecation should be sought in all women with prolapse. In addition, the influence of prolapse on sexual functioning should be addressed in women of all ages.¹⁵ Some women with prolapse avoid vaginal intercourse out of concern or embarrassment. Other women experience urinary or fecal incontinence (or the fear of incontinence) that interferes with sexual activity. Assessing sexual function is particularly important before and after surgery, so that any potentially adverse effects can be recognized and addressed.¹⁶

**Physical Examination**
Physical examination focuses on the pelvic examination, beginning with a careful inspection of the vulva and vagina to identify erosions, ulcerations, or other lesions. Suspicious lesions should be biopsied immediately. Benign-appearing ulcers should be closely observed and biopsied if they do not resolve with treatment.

The extent of prolapse should be systematically assessed. With advanced prolapse, determining the extent of prolapse and its constituents (anterior and posterior vagina; cervix or vaginal apex) is usually not difficult. Paradoxically, with less advanced prolapse, it can be more difficult to identify its components, particularly by inspection alone. The use of vaginal speculums (eg, the posterior blade of a Graves speculum) or retractors is very helpful in determining what vaginal sites are affected by prolapse. An unidentified vaginal bulge (Fig. 2) can be clearly identified as the vaginal apex, once the anterior and posterior vagina are retracted (Fig. 3). Similarly, anterior vaginal prolapse can be seen more clearly after retracting the posterior vagina. At times, posterior vaginal prolapse

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(rectocele) will be easily identified by vaginal examination. At other times, rectovaginal examination is invaluable in distinguishing between posterior vaginal prolapse alone, high apical prolapse (possible enterocele), or a combination of these.

Although many systems for staging prolapse have been described, the standard is the system approved by the International Continence Society, the Pelvic Organ Prolapse Quantification system.17 This system measures 9 locations on the vagina and vulva in centimeters relative to the hymen. These 9 locations are used to assign a stage (from 0 to IV) of prolapse at its most advanced site (Fig. 4). The pelvic organ prolapse quantification system is probably more detailed than necessary for clinical care, but clinicians should be familiar with it because most studies now use the Pelvic Organ Prolapse Quantification system to report research results. Its 2 most important advantages over previous grading systems are 1) the standardized technique with quantitative measurements at straining relative to a constant landmark, the hymen, and 2) prolapse assessment at multiple vaginal sites (not just the most advanced). In lieu of using the full pelvic organ prolapse quantification system of 9 measurements, clinicians are encouraged to record at least 3 measurements: the most advanced extent of prolapse in centimeters relative to the hymen that affects the anterior vagina, the cervix or vaginal apex, and the posterior vagina.

The maximal extent of prolapse is demonstrated with a standing straining examination when the bladder is empty.18 Standing examinations are not always practical, and small differences may not be clinically meaningful. However, if the initial examination does not reproduce the patient’s symptoms or description of her prolapse, a standing straining examination should be performed. Assessing paravaginal or lateral anterior vaginal support is not included in the pelvic organ prolapse quantification system. Indeed, whether examination can reliably differentiate specific defects of anterior vaginal support has been questioned.19 Until the existence of specific defects is confirmed and better systems of measurement developed, prolapse assessment relative to the hymen seems to be the most reliable way to describe prolapse.

Pelvic muscle function should be assessed in all women.20 After the bimanual examination while the patient is in lithotomy position, the examiner can palpate the pelvic muscles a few centimeters inside...
The hymen, along the pelvic sidewalls at the 4 and 8 o’clock positions. Baseline muscle tone and increased tone with voluntary contraction should be assessed, along with the strength, duration, and symmetry of contraction. This serves as a baseline measure for comparison with subsequent examinations. It also identifies women who may benefit from focused intervention to strengthen the pelvic muscles. If a woman has no awareness of her pelvic muscles and cannot perform a voluntary contraction, one would expect little or no benefit from an unsupervised program of pelvic muscle exercise. She will need to be taught to locate and contract her pelvic muscles by an experienced clinician, whether a physical therapist, nurse or nurse practitioner, or physician.

In addition, resting tone and voluntary contraction of the anal sphincters should be assessed during rectovaginal examination. With normal resting tone of the anal sphincters, the examiner will feel the ring of muscle snugly around the examining finger; during voluntary contraction, the ring of muscle should tighten circumferentially. Abnormalities should be noted, such as low resting tone (looseness of the ring of muscle), weak or absent voluntary contraction, anal sphincter defect (usually at the 12 o’clock position, as a result of obstetric injury), hemorrhoids, or rectal prolapse.

Testing

Bladder Testing

At a minimum, for all patients with prolapse, 3 pieces of information should be obtained: 1) screening for urinary tract infection; 2) postvoid residual urine volume; and 3) presence or absence of bladder sensation (by voided volume with sensation of fullness, by voiding diary, or by bladder filling). Although there is no consensus on a postvoid residual urine volume, provided the initial voided volume was more than 150 mL, postvoid residual volume less than 100 mL indicates acceptable bladder emptying. Postvoid residual volume over 100 mL indicates impaired bladder emptying, which may or may not be caused by prolapse.

Women with prolapse and urinary incontinence should have stress testing performed with the prolapse reduced because this will mimic bladder and urethral function when the prolapse is treated. Prolapse reduction with bladder testing has not been standardized. Different techniques include using the posterior blade of a speculum, ring forceps, pessary, vaginal packing, or large cotton swabs. Regardless of technique, avoid overcorrection of anterior vaginal prolapse and ensure that the urethra is not obstructed with prolapse reduction to avoid falsely negative stress testing. In the setting of a positive reduction stress test, we recommend that an incontinence procedure should be performed at the time of prolapse surgery. However, little evidence is available from controlled trials for patients with and those without preoperative symptoms of stress incontinence combined with prolapse warranting surgery. We need to counsel patients extensively about the risks and benefits of performing or withholding an incontinence procedure in this clinical situation. When an incontinence procedure is added to prolapse repair, at worst, the patient may receive overtreatment and risk voiding dysfunction. Conversely, when the incontinence procedure is not performed at the same time as the prolapse repair, the patient may need a second surgery to treat new (unmasked) or persistent stress incontinence. With effective minimally invasive procedures that can be performed with local anesthesia, this situation is less problematic than in the recent past. The key is open communication with the patient about her options and expected outcomes, so that she can participate in making an informed decision.

Imaging

Imaging is not usually necessary in women with prolapse unless the information obtained would be critical in formulating recommendations for management. Imaging tests in women with prolapse, such as magnetic resonance imaging and cystoproctography, are primarily for research at this point; they are not recommended routinely for clinical care.

THERAPEUTIC APPROACH

Management for prolapse includes observation, pelvic floor rehabilitation, pessary use, and surgery. Unfortunately, there is little evidence-based information with which to counsel our patients. There is a dearth of rigorously conducted trials that compare management approaches. In most cases, clinicians must rely on their best judgment and the patient’s preferences to select a management plan.

Indications for Treatment

Choice of treatment for prolapse usually depends on symptom severity and severity of prolapse, in line with the patient’s general health and activity. Importantly, the correlation between many pelvic symptoms and the extent of prolapse is weak. Symptoms associated with stage I or stage II prolapse require careful evaluation, especially if surgery is being considered. Many women with stress urinary incontinence have stage I or II prolapse, although stress incontinence is not a symptom of prolapse; it is simply a coincident symptom. Factors that determine

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how clinicians make recommendations and how patients make decisions have not been well studied. Patient and clinician goals of treatment may differ considerably and lead to dissatisfaction if expectations (that may be unrealistic) are not met. In symptomatic women choosing treatment, patients were more likely to choose surgery, compared with expectant management or pessary use, with more advanced prolapse, with increasing age, and with prior prolapse surgery.28

Observation
Observation is appropriate for women whose symptoms are not sufficiently bothersome to warrant active intervention. When first learning of prolapse, many women require only information and reassurance that treatment is available when and if they become symptomatic. As outlined in the section “Diagnostic Approach,” a careful evaluation will serve as a baseline with which subsequent examinations can be compared. For an otherwise healthy woman, repeat assessment can be conveniently performed at her yearly health maintenance visit. The patient should be instructed to call for an interval visit if she experiences any symptoms that concern her. She can be counseled that acute changes rarely occur in the setting of early prolapse. There is virtually no indication for treatment, particularly surgery, for women with asymptomatic prolapse “before the problem gets any worse.” The old adage “You can’t make an asymptomatic patient better; you can only make her worse” was never more true than it is for prolapse.

Occasionally, a patient will present with advanced prolapse, yet she will say that she is asymptomatic. Is observation still appropriate? An important consideration is her efficiency of bladder emptying. If she has partial urinary retention, she is at risk for persistent or recurrent urinary tract infections and possibly urosepsis, depending on her overall medical status. The exposed vaginal epithelium is at risk for erosion, which rarely can become secondarily infected and serve as a source for sepsis. Even more rare is the risk of evisceration, an event of high morbidity and mortality. After considering these risks and discussing them with the patient (and family members, as appropriate), if she still prefers observation, we recommend close follow-up, such as every 3 months, to reassess potential risks and the decision for observation versus active management.

Nonsurgical Management
Nonsurgical management of prolapse includes adjunct therapy to address concomitant symptoms, pelvic floor muscle training, and pessaries. Ideally, nonsurgical management will decrease the frequency and severity of symptoms, delay or avoid surgery, and potentially prevent worsening the prolapse. We recommend nonsurgical management if observation is not (or is no longer) suitable, when surgery presents higher-than-average risks, or in women who do not want surgery. Pessaries may also be used before prolapse surgery to estimate whether symptom relief will be obtained with surgery. This strategy is particularly useful in patients whose symptoms do not match their physical findings (such as severe symptoms with mild prolapse) or in patients with nonspecific symptoms, such as back pain, that are not definitely caused by prolapse. We recommend discussing nonsurgical management with most, if not all, women before surgery. In addition, some components of nonsurgical management can be effectively added to surgery to maximize outcomes.

Adjunct Therapy
Adjunct therapy addresses symptoms of urinary, defecatory, and sexual dysfunction as appropriate to each individual. As one example of a commonly encountered clinical problem, patients will often present with defecatory symptoms, such as excessive straining at stool and a feeling of incomplete evacuation, and physical examination reveals stage II or early stage III posterior vaginal prolapse (rectocele). It is usually not possible to determine whether the symptoms predated the physical findings, or vice versa. In fact, from a clinical standpoint, it is probably irrelevant. First and foremost, the patient’s symptoms need to be addressed. The patient should have a thorough evaluation from the gastrointestinal (GI) perspective, either by referral or by the interested obstetrician-gynecologist. Age-appropriate screening for colorectal cancer should be obtained. Begin with a focused diet history (including fiber and fluid intake), exercise history, review of medications for GI adverse effects, and bowel history, including frequency and consistency of bowel movements. Physical examination should focus on anorectal examination, prolapse staging (if present), and pelvic muscle assessment.

Provided no GI pathology is diagnosed, we recommend treatment to regulate her bowel habit and prevent straining. Based on the patient’s history, she should alter her fluid and fiber intake (to a total of 6–8 glasses of fluid and at least 20 grams of fiber per day) and her exercise level. She should arrange a regular schedule to allow time for defecation after meals. Add osmotic (eg, polyethylene glycol) or cathartic laxatives (eg, bisacodyl), as necessary. In selected cases, use suppositories or enemas on a daily or as-needed basis. For women who contract (instead of relax) their pelvic muscles at attempted defecation, consider adding biofeedback.29 If her symptoms are relieved, we recommend no further treatment. Mon-
for prolapse. In our experience, pelvic muscle urinary and fecal incontinence and may be beneficial in preventing or treating prolapse, it is effective for strengthening and endurance of the pelvic muscles, thereby preventing alterations, weight loss, and a general exercise program. Although data are lacking to support these recommendations specifically for prolapse, many fit into general guidelines for a healthy lifestyle.

**Pelvic Floor Muscle Training**

Pelvic floor muscle training is designed to increase the strength and endurance of the pelvic muscles, thereby improving support to the pelvic organs. Although no direct evidence proves that pelvic floor muscle training prevents or treats prolapse, it is effective for urinary and fecal incontinence and may be beneficial for prolapse. In our experience, pelvic muscle strengthening often relieves symptoms of pelvic pressure that commonly accompany prolapse. Although it seems unlikely that advanced prolapse will resolve with pelvic floor muscle training, women may still experience a beneficial effect on their symptoms. Therefore, we do not use any cutoff as to extent of prolapse in recommending or not recommending pelvic floor muscle training. With virtually no adverse effects, its only negative is the cost of providing instruction and follow-up for patients and the investment that patients must make, as in any exercise program, for its potential success.

Most women recognize what “Kegel” exercises are; some have performed them on their own. But few women perform pelvic floor muscle exercises correctly or with the necessary intensity (frequency, duration) to obtain maximum benefit. In our experience, having the patient work with an experienced physical therapist or dedicated nurse practitioner gives her the best chance of achieving benefit, usually starting with a program of up to 2 visits per week for 8–12 weeks, with ongoing maintenance exercises after that. A detailed discussion of pelvic floor muscle training is beyond the scope of this article, but it is probably underused as a nonsurgical therapy for prolapse, either alone or in combination with pessary use and other adjunct therapies. Interested readers are referred to recent review articles for more details. Professional organizations (such as the American Physical Therapy Association, www.apta.org, under Women’s Health) can often assist in locating practitioners in your geographic area.

**Pessaries**

As for all types of nonsurgical management of prolapse, we recommend pessaries to decrease symptom frequency and severity, delay or avoid surgery, and potentially prevent worsening of prolapse. The most important relative contraindication for pessary use occurs when the patient cannot comply with follow-up. Particularly concerning is the setting of dementia or other medical or social conditions that may result in pessary neglect, with the resultant risk of the most serious complications of pessaries, rectovaginal or vesicovaginal fistulae. The clinician providing the pessary must ensure that appropriate follow-up care is provided, especially because the woman may transition from her own home to an assisted living or skilled nursing facility.

Another relative contraindication to pessary use is persistent vaginal erosions. Some women with advanced prolapse will have extensive vaginal erosions at initial evaluation. If immediate surgery is not planned, an attempt to heal the erosions will usually require pessary use. Erosions with advanced prolapse will almost always persist if the prolapse remains unreduced, the vagina being unable to heal under the continuous pressure of gravity and friction on the woman’s underclothes. A different situation occurs when a woman develops persistent vaginal erosions in the setting of longstanding pessary use. This may indicate that local estrogen should be added or increased, that a smaller pessary may now be necessary, or, rarely, that a vaginal neoplasm has developed. Pessary use must be discontinued occasionally for persistent vaginal erosions.

Pessary use for prolapse is widespread in the clinical practices of gynecologists and urogynecologists in the United States. The most commonly used
Pessaries are ring (with or without support), doughnut, and Gellhorn pessaries, although there are many other types (Fig. 5). Up to three quarters of women with prolapse can be successfully fitted with a pessary. Although many clinicians have biases about who can and who cannot be fitted with pessaries, few characteristics have been identified consistently in research. Unsuccessful fitting is associated with short vaginal length (less than 7 cm) and wide introitus (4 fingerbreadths). However, this should not preclude fitting attempts in women with those characteristics, because some women can still be successfully fitted. After 2 months, 92% of women who were successfully fitted were satisfied, with resolution of nearly all prolapse symptoms. Urinary symptoms improved in about half the women, but stress incontinence occurred as a new symptom in about one fifth. Women who are sexually active accept pessary use, with 60% continuing long-term use (up to 2.5 years).

Pessaries can be separated into 2 broad categories: support and space-filling. The ring pessary (with diaphragm) and other support pessaries are commonly recommended for stage II and early stage III prolapse, whereas the space-filling pessaries such as the Gellhorn are usually used for more advanced prolapse. Most pessaries are silicone, plastic, or medical grade rubber. Silicone has many advantages: it is nonallergenic, does not absorb odors or secretions, is resistant to repeat cleaning, and is pliable and soft. Before using a pessary that contains rubber, be sure that the patient does not have a latex allergy.

If some perineal support is preserved, a ring pessary (without support when the cervix is present, with support after hysterectomy) is a good first choice. Many clinicians start with size 4 and then move to a larger or smaller pessary, depending on fit. The ring pessary is designed to sit with one end in the posterior vaginal fornix and the other end behind the symphysis pubis (Fig. 6). A well-fitted pessary should fill the vagina from side to side, with the clinician's finger able to easily pass between the pessary and the pelvic sidewall. When the pessary is properly placed in the upper vagina, the patient should be unaware of its presence. The patient should be asked to stand and move about to see if the pessary remains in place. If the patient becomes aware of the pessary at the introitus, the next larger size should be tried. If the patient is aware of tightness, pressure, or any other discomfort, fitting with the next smaller size pessary should be attempted. It sometimes occurs that one size is too large and the next smaller size fails to adequately hold the prolapse in place. In that case, a different type of pessary can be chosen. In some women, such as those who have had previous vaginal surgery, an oval pessary may fit when a ring does not. Gellhorn pessaries are useful for women with more advanced prolapse and less perineal support because they sometimes stay in place when ring pessaries do not. Gellhorn pessaries are sized based...
on the diameter of the disk. The stem and knob differ only slightly in different brands of pessaries, some with a string attached to the stem to aid in removal. The Gellhorn is fitted so that the disk is centered in the upper vagina and the stem points downward behind the perineal body (Figure 7). As with the ring pessary, when well fitted, the disk should fill the upper vagina yet still allow the examiner’s finger to pass easily between the disk and the pelvic sidewall. For removal, it is necessary to insert an examining finger behind the disk to break the suction between the disk and the vagina, and then gently maneuver the disk out. If removal is difficult in a Gellhorn without a string, it is sometimes helpful to pull on the stem using a tenaculum or ring forceps to help in bringing the pessary closer to reach behind the disk to break the suction.

When initiating pessary use, ideally the physician can teach the patient to remove and replace the pessary herself. This will put control of the pessary in the patient’s hands, allowing her to use it as needed. Ring pessaries are usually easy for patients to remove and replace, especially for women who have used diaphragms in the past. Gellhorn pessaries are more challenging for patients to handle, but some women will find it possible. The goal of changing the pessary at frequent intervals is to prevent vaginal irritation that leads to discharge, infection, and erosion.

Women can remove the pessary at bedtime and replace it in the morning. If daily changing is too bothersome, a schedule of weekly or twice-weekly removal can be used. In this setting, after an early follow-up visit (such as 2–4 weeks later) to assess whether the pessary is adequately relieving the patient’s symptoms and to review pessary maintenance, women can be returned to annual care unless new symptoms develop in the meantime.

Some patients will not be able or willing to manage pessary care themselves and thus require more frequent office visits. After an early follow-up visit to check the pessary’s effectiveness at relieving symptoms, office care can be arranged, usually at intervals of 3 months. At these visits, the pessary is removed, rinsed, and replaced after carefully inspecting the vagina for irritation or erosions. Vaginal discharge is commonly present, but unless the patient expresses bother, treatment is not required. In some practice settings, visits related to pessary maintenance can be efficiently accomplished by a nurse practitioner, physician’s assistant, or other staff. The patient should be counseled to call if vaginal odor, discharge, or bleeding occurs because these symptoms warrant investigation for infection or erosion.

Vaginal estrogen is commonly employed with pessaries, although this should be individualized to each patient. Some patients will have sufficient endogenous estrogen that atrophy does not occur and pessary use does not cause irritation. Some women use nonhormonal lubricants effectively with pessaries. However, in women with vaginal atrophy at pessary initiation, local estrogen is important to prevent vaginal erosions, even if women are already taking systemic estrogen. Vaginal estrogen can be used in any form: cream, tablets, or sustained-release ring (Estring silicone ring with slow-release estradiol; Pharmacia & Upjohn, Kalamazoo, MI). It is particularly convenient to use Estring in women with a Gellhorn pessary; the Estring is placed behind the Gellhorn and is changed during office visits at 3-month intervals.

Pessary use in some previously continent women will reveal or unmask latent stress incontinence. In selected cases, periurethral injection of bulking agents (such as collagen) can be used to treat the stress incontinence while pessary use is maintained for prolapse treatment. However, in most situations, pessary use will be discontinued and plans made to proceed with surgery.

In some patients with long-term pessary use, it is necessary to switch to smaller pessaries over time. A recent study has provided evidence that supports clinical observations of improved prolapse status with pessary use in some patients. In 19 women with
Surgical Management

The primary aim of surgery is to relieve or improve prolapse symptoms and, if possible, symptoms associated with the lower urinary and gastrointestinal tracts. In some women, this means an attempt to restore normal vaginal anatomy and maintain or improve sexual function. In others, an obliterator approach is more appropriate and still yields the desired result of symptom relief.

Approach

Approaches to prolapse surgery include vaginal, abdominal, and laparoscopic routes or a combination of approaches. Depending on the extent and location of prolapse, surgery usually involves a combination of repairs addressing the anterior vagina, vaginal apex, posterior vagina, and perineum; concomitant surgery may be planned for the bladder neck or anal sphincters. Procedures for posterior vaginal prolapse most commonly use a transvaginal approach, or less commonly, a transanal approach. Apical and anterior vaginal prolapse can be approached by either vaginal or abdominal routes. There is clear benefit when comparing the vaginal approach with the abdominal approach (ie, laparotomy), from the perspective of complications and short-term effects on recovery. By avoiding laparotomy, the vaginal approach results in fewer wound complications, less postoperative pain, shorter hospital stay, and less cost than abdominal surgery. Whether prolapse repaired abdominally is more effective or durable than vaginally repaired prolapse is controversial; the evidence supporting both sides of this argument will be reviewed in a later section. Adding to the debate is the potential benefit of the laparoscopic approach compared with the abdominal or vaginal route for prolapse surgery. In laparoscopic surgery for stress incontinence, the perceived cost advantage of reduced hospital time is often offset and even exceeded by increased operative time and expense of laparoscopic instruments. There are no comparable data for prolapse operations.

Surgical route is chosen based on the type and severity of prolapse, the surgeon’s training and experience, the patient’s preference, and the expected or desired surgical outcome. Procedures for prolapse can be broadly categorized into 3 groups: 1) restorative, which use the patient’s endogenous support structures; 2) compensatory, which attempt to replace deficient support with some type of graft, including synthetic, allogenic, xenogenic, or autologous materials; and 3) obliterator, which close the vagina. These groupings are somewhat arbitrary and not entirely exclusive. Grafts may be used to reinforce repairs, such as colporrhaphy, or to replace support that is deficient or lacking. For example, graft use in abdominal sacral colpopexy substitutes for the connective tissue attachments (DeLancey’s level I) that would normally support the vaginal apex. In addition to the primary goal of relieving symptoms related to prolapse, urinary, defecatory, and sexual function must be considered as well in choosing the appropriate prolapse procedures. The types of procedures will be briefly reviewed. Detailed discussion of technique is beyond the scope of this article and interested readers are referred to surgical atlases, videos, and textbooks.

Prolapse Procedures

Anterior Vaginal Repair

Recurrence anterior vaginal prolapse continues to be the Achilles’ heel of reconstructive pelvic surgery. Anterior vaginal prolapse has traditionally been repaired with anterior colporrhaphy, where the vaginal epithelium is separated from the underlying fibromuscular connective tissue, followed by midline plication of the vaginal muscularis with a series of interrupted stitches, usually of absorbable suture, excision of excess epithelium, and closure. Variations include placing graft material on top of or instead of the midline plication. The results of 2 randomized trials suggest modest improvement in success, adding 12–18% to the “cure” rates after 1 year, when polyglactin mesh (Vicryl; Ethicon, Somerville, NJ) was placed over the midline plication compared with standard repair. Until there is evidence showing long-term benefit from the use of graft material with anterior colporrhaphy, we recommend the use of delayed absorbable sutures such as Vicryl or No. 1 polydioxanone (PDS; Ethicon, Somerville, NJ), with midline plication.

Richardson reintroduced the concept of paravaginal repair, which reattaches the anterior lateral vaginal sulcus to the obturator internus muscle and fascia at the level of the arcus tendineus fascia pelvis (“white line”), usually performed as a bilateral procedure, via transvaginal or retropubic (abdominal or laparoscopic) access. With advanced anterior vaginal prolapse, midline excision of redundant tissue may be necessary in addition to paravaginal repair. The anterior vaginal apex can be supported by placing stitches to the level of the ischial spine on each side, although this procedure should not be used as the sole treatment for vaginal vault prolapse. The long-term effectiveness of paravaginal repair is unknown. Furthermore, performance of the vaginal paravaginal...
repair requires specific expertise to perform correctly. There are no randomized trials that compare outcomes after anterior colporrhaphy versus paravaginal repair.

When prolapse repair is approached vaginally, we recommend anterior colporrhaphy when indicated for anterior vaginal prolapse. If the surgeon has the clinical experience and expertise and feels that lateral detachment is causing the anterior vaginal prolapse, a vaginal paravaginal repair is performed, but robust apical vaginal support should also be present or added with a specific apical suspension. When abdominal sacral colpopexy for prolapse repair is planned, retropubic paravaginal repair can be performed when the surgeon judges that support of the anterior vagina would be insufficient without it. In our experience, this happens infrequently. We recommend that retropubic paravaginal repair be added to Burch colposuspension when necessary to provide additional support to the mid-vagina (DeLancey level II).47

**Posterior Vaginal Repair**

Traditional posterior colporrhaphy involves separation of the vaginal epithelium from the underlying fibromuscular connective tissue (which includes the rectovaginal septum, in between the vaginal muscularis and the rectovaginal adventitia), followed by midline plication with interrupted stitches, excision of excess epithelium, and closure.53 As with anterior colporrhaphy, variations include placing graft material on top of or instead of the midline plication. Other procedures can be combined with posterior colporrhaphy, such as levator ani plication and perineorrhaphy, although the indications for these additions are controversial.

Dyspareunia after posterior repair has been blamed on levator ani plication if a band or narrowing is formed inside the vagina.54 Narrowing can also occur with overzealous perineorrhaphy or combinations of procedures that alter normal vaginal contours. For example, the vaginal configuration is altered by the Burch procedure, where the upward displacement of the anterior vaginal tube creates a transverse ridge in the posterior vagina. A similar vaginal configuration may be created by other incontinence procedures that elevate the anterior vagina. Dyspareunia is especially likely to occur when Burch is combined with posterior repair, when the altered vaginal contour and posterior transverse ridge is overlaid with the plication of the posterior repair. Despite careful attention to ensure adequate introital caliber after posterior repair, 38% of women after Burch and posterior repair had persistent dyspareunia 1 year or more after surgery.16

According to Richardson, isolated defects of the rectovaginal “fascia” (layers that include the vaginal muscularis, rectovaginal septum, and adventitia) occur in some women with posterior vaginal prolapse.55 The site-specific repair is approached by dissecting the vaginal epithelium from the underlying layers to expose the defect and close it with interrupted stitches of usually absorbable suture, followed by closing the vaginal epithelium. Initial retrospective and prospective uncontrolled case series reported short-term results similar to or better than posterior colporrhaphy. However, with longer follow-up, one series has reported recurrent prolapse after site-specific repair at higher rates than after traditional posterior colporrhaphy.58 No randomized clinical trials exist comparing these techniques.

We recommend reattachment of the rectovaginal connective tissue to the perineal body in all repairs when separation is identified. Until data demonstrate superior or equivalent long-term outcomes with site-specific defect repairs, we recommend traditional posterior colporrhaphy, with careful attention to prevent narrowing of the vagina or introitus, when indicated to relieve symptomatic posterior vaginal prolapse. Lateral rectovaginal connective tissue is plicated in the midline using a delayed absorbable suture, such as Vicryl or PDS, taking care not to create strictures in the vagina with initiation of the plication too far laterally. A finger in the rectum helps identify the integrity of the supportive layer formed with plication.

In many cases, mild-to-moderate posterior vaginal prolapse is identified as one component of prolapse in women with more advanced apical or anterior prolapse. In those situations, clinicians and patients must carefully weigh the risks (particularly of dyspareunia) and benefits in deciding whether to repair otherwise asymptomatic posterior vaginal prolapse. Although traditional teaching has held that all “defects” should be repaired at one surgical setting, this may be the exception, where the patient is better served in avoiding or delaying surgery of the posterior vagina until specific symptoms need to be addressed. In this way, many women will avoid dyspareunia for the few women who will ultimately require a separate posterior repair.

Perineorrhaphy should be performed with any repair where there is separation of the perineal muscles. This also facilitates the natural posterior deflection of the vagina in the pelvis. After dissection to free the ends of the superficial perineal and bulbocavernosus muscles, they are reapproximated in the midline without tension. Levator ani plication is associated with postoperative dyspareunia, and we recommend that this not be performed in sexually active women.
In non–sexually active women, levator ani plication can be performed to reinforce the repair and intentionally narrow the mid and lower vagina; high perineorrhaphy can be added to further close the introitus.

**Vaginal Apical Repair**

Apical vaginal prolapse includes uterine prolapse with or without enterocele and vaginal vault prolapse, typically with enterocele. Some cases of uterine prolapse present with marked elongation of the cervix as well. In other cases, despite what appears to be normal uterine support, the elongated cervix protrudes to or past the hymen. This occurs particularly when the uterus is restricted to the abdomen, as in uterine enlargement greater than the equivalent of 12–14 weeks of gestation. The standard treatment for symptomatic uterine prolapse is hysterectomy with procedure(s) to suspend the vaginal apex, address enterocele when indicated, repair coexisting anterior and posterior vaginal prolapse, and perform anti-incontinence procedures as needed. It is particularly important to emphasize that, when hysterectomy is performed for prolapse, hysterectomy alone (or hysterectomy with colporrhaphy) is inadequate; a specific vaginal vault suspension procedure must be performed in addition to hysterectomy.

**Enterocele Repair.** Enterocele repair is usually performed in the setting of concomitant procedures for prolapse, in which case the approach is based on the combination of procedures required. Whether by vaginal, abdominal, or laparoscopic access, enterocele repair is traditionally performed by sharply dissecting the peritoneal sac from the rectum and bladder. A purse-string suture can be used to close the peritoneum as high (cephalad) as possible. Whether excision of the peritoneum itself is necessary has not been determined. In addition to closing the enterocele sac, we recommend approximation of the anterior to the posterior fibromuscular connective tissue of the vagina. Suspension of the vaginal apex is almost always necessary, except in rare cases when the enterocele occurs in the presence of adequate apical support.

**Sacropinous Ligament Suspension.** Sacropinous ligament fixation entails attachment of the vaginal apex to the sacropinous ligament, the tendinous component of the coccygeus muscle. Initially described as a unilateral procedure, later series reported bilateral fixation. Access is traditionally extraperitoneal via the posterior vagina, although variations have been described using the anterior vagina or even laparoscopic access. Although initial case series reported high success rates for correcting apical prolapse, subsequent reports described high rates of anterior vaginal prolapse, attributed to the exaggerated posterior deflection of the vaginal axis with sacropinous ligament fixation. However, whether this is unique to sacropinous ligament fixation or simply represents the predilection of anterior support to fail remains unknown. When a decision has been made to perform this procedure, we recommend the use of delayed absorbable suture material such as PDS.

**Iliococcygeal Vaginal Suspension.** Iliococcygeal vaginal suspension involves attachment of the vaginal apex to the iliococcygeus muscle and fascia, usually bilaterally. The extraperitoneal dissection to the area of the ischial spine is approached from a midline posterior vaginal incision. Using the ischial spine as the landmark for identifying the sacropinous ligament medially and posteriorly and the iliococcygeus fascia anteriorly and caudally, a No. 1 polydioxanone (PDS) suture is placed and attached to the vaginal apex with a pulley stitch. We perform the procedure bilaterally. Compared with other vaginal suspension procedures, the iliococcygeal suspension has the fewest case series in the literature, but cure rates appear comparable to the sacropinous suspension technique. We consider the iliococcygeal approach to apical suspension mainly to avoid peritoneal entry or as a fall-back procedure when uterosacral ligament suspension was planned but peritoneal entry is not feasible. In addition, iliococcygeal suspension works well in the case of a foreshortened vagina when a vaginal approach is planned.

**Uterosacral Ligament Suspension.** Originally described by McCall in 1938, surgical variations of the uterosacral ligament suspension can be used prophylactically at hysterectomy or therapeutically for vaginal apical suspension. Once access to the posterior cul-de-sac has been attained, the uterosacral ligament remnant can be found with the use of Allis clamps placed at the posterior medial aspect of the ischial spine. Up to 3 sutures are placed in each ligament and incorporated into the anterior and posterior fibromuscular layer of the vagina as well as the vaginal epithelium (Fig. 8). Some surgeons approximate the ligaments in the midline, as described by McCall, to close the cul-de-sac with the intention of treating or preventing enterocele formation. We recommend this in the presence of an unduly enlarged or redundant cul-de-sac. However, we usually prefer to suspend the right and left vaginal apex to the ipsilateral uterosacral ligament, leaving the cul-de-sac open to avoid impinging on the rectum and adversely affecting bowel function. If permanent sutures are used, the knots should be tied to the peritoneal side of the repair. Absorbable sutures can be tied in the
vaginal lumen with the expectation that they will dissolve over time.

**Comparison of Vaginal Approaches to Apical Repair**

In a review by Sze and Karram\(^4^2\) of vaginal surgeries for apical prolapse, recurrent prolapse was reported in 8–18%, with variable follow-up in mostly retrospective case series. Until controlled trials are available, clinicians should counsel patients that the vaginal approaches to apical suspension are probably similar in outcomes related to prolapse repair. In choosing which procedure to recommend for individual patients, clinicians should consider their own training and experience, as well as technical aspects and risks of complications specific to each procedure.

Sacropinous ligament suspension may leave the anterior vagina at greater risk for subsequent failure,\(^6^1\) because of the pronounced posterior deviation of the vaginal axis, although the risk of recurrent anterior vaginal prolapse seems high regardless of which vaginal suspension procedure is used. Because the procedure is extraperitoneal, there should be little if any risk of ureteral injury; rectal injury is a rare complication of posterior dissection. Because sutures are passed through the sacropinous ligament, risks unique to this procedure include pudendal or inferior gluteal vessel injury with intraoperative hemorrhage, or sciatic or pudendal nerve injury, manifested as severe buttocks pain (that may radiate down the back of the thigh) postoperatively. The pain may resolve spontaneously when absorbable sutures are used, but suture removal may be necessary for permanent sutures. The sacropinous ligament may be atrophied and less surgically useful in patients of advanced age and debility. In addition, sacropinous ligament suspension may be more difficult to teach, a factor to consider for those involved in resident education.

The iliococcygeal suspension is a straightforward procedure to learn and teach. It carries virtually no risk of ureteral or small bowel injury, and in contrast to sacropinous ligament fixation, there are no vital structures nearby at risk for surgical injury. In addition, the iliococcygeus muscle and fascia are uniformly present regardless of patient age, prolapse status, or general debility. Some surgeons are concerned that the iliococcygeal suspension leaves the vagina shorter than other procedures, although this has not been described in the literature. It is possible that the iliococcygeal suspension has been underused as a vaginal apical suspension procedure.

Uterosacral ligament suspension traditionally requires peritoneal entry, which may be challenging in posthysterectomy prolapse, especially in the setting of bowel adhesions, engendering the rare occurrence of bowel injury. Bowel packing may delay the return of bowel function in occasional patients. Uterosacral ligament suspension carries a risk of ureteral injury (usually kinking due to medial displacement or suture ligation that impedes urinary flow, rather than transection) as high as 11%.\(^6^8\) As long as ureteral injury is recognized and addressed intraoperatively, most patients will not incur morbidity. However, if ureteral injury is not identified at the index surgery and recognition is delayed, a second surgery is usually necessary and subsequent morbidi-
ity can be severe, at worst irretrievable loss of kidney function on the affected side. Cystoscopy should always be performed after the uterosacral sutures are tied to confirm ureteral patency. Some surgeons question whether the uterosacral ligaments are appropriate sources of support in women with advanced prolapse, although other surgeons maintain that the ligaments can virtually always be identified as surgically useful structures. No trials compare outcomes after different procedures for vaginal apical suspension.

**Abdominal Apical Repair**

**Abdominal Sacral Colpopexy.** Abdominal sacral colpopexy uses graft material attached to the anterior and posterior vaginal apex and suspended to the anterior longitudinal ligament of the sacrum for repair of apical prolapse.\(^6^9\) Surgical variations are legion, including graft configurations on the vagina, the extent to which the anterior and posterior vagina are attached to the graft, different graft and suture materials, peritoneal closure over the graft, and obliteration of the cul-de-sac for treatment or prevention of enterocele. In case series, cure rates range from 78% to 100% for apical prolapse. When cure is defined as no postoperative prolapse, the range widens, from 56% to 100%, although subsequent anterior or posterior vaginal prolapse has not been as consistently reported as apical prolapse.\(^7^0\)

We recommend the use of 2 permanent sutures in the anterior sacral ligament. The peritoneum overlying the vaginal apex is removed and polypropylene mesh, fashioned in a Y configuration, is affixed to the vaginal apex posteriorly from the rectovaginal junction to the bladder reflection anteriorly. No overt tension is placed on the vagina while attaching the third arm of the mesh to the anterior sacral ligament. We reperitonealize over the mesh. In the setting of a deep cul-de-sac, we place Halban culdoplasty sutures with No. 1 polydioxanone (PDS). We perform cystoscopy at the end of the procedure.

When abdominal sacral colpopexy is planned for apical prolapse and concomitant high rectocele is present, some advocate extending the graft down the posterior vagina to address this.\(^6^9\) Cundiff et al\(^7^1\) described the technique of sacral colpoperineopexy to reconstruct the normal vaginal suspensory ligaments and “fascial sheet” that runs from the sacrum to the perineal body. Because mesh erosion occurred frequently when the vagina was opened (16% for vaginally placed sutures and 40% for vaginally placed mesh\(^7^2\)), we recommend avoiding opening the vagina whenever possible.

Complications associated with to abdominal sacral colpopexy fall into 3 major categories: 1) intraoperative hemorrhage, 2) laparotomy, and 3) graft infection or erosion. Intraoperative hemorrhage that occurs when lacerated sacral veins retract into the sacrum can be difficult to control. The consequences can be as severe as intraoperative death from exsanguination. Complications due to laparotomy are usually related to adhesions and small bowel obstruction. Although the risk seems highest in the immediate postoperative period, the risk is lifelong. Synthetic graft material holds the highest risk of infection or erosion, although these complications have been reported with all types of graft material. As with small bowel obstruction, mesh erosion or infection has been reported years after the index surgery. Although mesh erosion can usually be successfully treated with a relatively minor excision of the exposed mesh, occasionally the entire graft must be removed, with high levels of surgical morbidity.

**Laparoscopic Approach to Apical Prolapse Repair.** Virtually all procedures for apical prolapse repair have been approached by the laparoscopic route, although it is sacral colpopexy that seems most likely to offer patient benefit, provided effectiveness is equivalent.\(^7^3\) The potential applicability of these procedures is limited by the relatively high level of technical skill required for advanced laparoscopic techniques.

**Comparison of Abdominal and Vaginal Approaches to Apical Repair**

Few randomized trials compare abdominal and vaginal approaches for the treatment of apical prolapse (Table 2).\(^7^4–7^7\) Success rates appear to favor the abdominal approach to apical vaginal prolapse. Randomized trials are important to compare outcomes in an unbiased rigorous fashion, but the data obtained may not always be generalizable. In the Benson study,\(^7^4\) the external validity is reduced because needle urethropexy is no longer regarded as effective treatment for stress incontinence. Again, use of the needle suspension technique for subjects with urinary incontinence predisposed to increased failure. In the trial by Roovers et al\(^7^6\) the 2 treatment groups were unequal as to the performance of hysterectomy. Again, use of the needle suspension technique for subjects with urinary incontinence predisposed to increased failure. In the trial by Maher et al,\(^7^7\) the colposuspension for stress incontinence in the sacrospinous group may have protected the anterior vaginal compartment. In addition, open colposuspension combined with a vaginal approach for prolapse would be less generalizable today with the increased use of midurethral sling procedures. Furthermore, history of previous hysterectomy type was not equal between groups, introducing bias, and the vaginal group had more loss to follow-up.

Despite the shortcomings of uncontrolled series and the few randomized trials, clinicians can be
Table 2. Randomized Trials for the Management of Apical Vaginal Prolapse

<table>
<thead>
<tr>
<th>Study</th>
<th>N</th>
<th>Follow-up</th>
<th>Success Rate</th>
<th>Criteria for Success Rate</th>
<th>Development Other Prolapse/ Incontinence</th>
<th>Complications</th>
</tr>
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<tbody>
<tr>
<td>Benson et al, 199674</td>
<td>80/88</td>
<td>Mean 2.5 years</td>
<td>Physical 29% vaginal group; 58% abdominal group; satisfaction 33% vaginal</td>
<td>Apex above levator plate, no protrusion beyond hymen (standing physical examination); satisfaction</td>
<td>Majority failure in vaginal group anterior compartment</td>
<td>No significant differences; more severe in abdominal group</td>
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<td>(range 1–5.5</td>
<td>group, 16% abdominal group</td>
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<td>years)</td>
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<td>Lo and Wang, 199875</td>
<td>118/138</td>
<td>Mean 2.1 years</td>
<td>80.3% (53.66) vaginal group; 94.2% (49/52) abdominal group (P = .029)</td>
<td>No protrusion vaginal wall greater than stage II</td>
<td>Incontinence: 2 ASC, none SSS</td>
<td>10.6% vs 7.7%, SSS vs ASC, respectively, requiring reoperation (P = .75). Dyspareunia: ASC 1; SSS 7, apareunia: ASC 0, SSS 4.</td>
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<td>years)</td>
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<td>Roovers et al, 200476</td>
<td>82</td>
<td>12 months</td>
<td>Scores on 3/6 domains significantly higher in abdominal group vs vaginal</td>
<td>Based on Dutch UDI scores 6 domains</td>
<td>Reoperation in 9/41 patients abdominal group. At one year: 5% vaginal and</td>
<td>No significant differences</td>
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<td>group; no difference PE</td>
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<td>abdominal group stage II vault prolapse; 39% vaginal group, 30% abdominal</td>
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<td>group min stage II cystoceles; 15% vaginal group, 5% abdominal group at</td>
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<td>stage II rectoceles. Abdominal group increased subsequent surgery</td>
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<tr>
<td>Maher et al, 200477</td>
<td>82/95</td>
<td>Mean 22 months</td>
<td>Subjective: 94% (43/46) abdominal, 91% (39/43) vaginal, P = .19; satisfaction</td>
<td>Objective: no prolapse greater than or equal to grade 2 at any vaginal site;</td>
<td>Cumulative anterior vaginal wall and apex: 13% (6/46) abdominal group, 45%</td>
<td>Significant difference in operating time, P = .01; return to activities of</td>
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<td>vaginal, 24</td>
<td>85% (39/46) abdominal, 81% (35/43) vaginal, P = .78; objective: 70% (35/46)</td>
<td>subjective: no symptoms of prolapse, satisfaction</td>
<td>45% (19/42) vaginal group, P = .01; cumulative posterior wall: 33% (15/46)</td>
<td>daily living, P = .01</td>
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<td></td>
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<td>months abdominal</td>
<td>46) abdominal, 69% (29/42) vaginal, P = .46.</td>
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<td>19% (8/42) vaginal, P = .22</td>
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<td>(range 6–60</td>
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<td>months)</td>
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SSS, sacrospinous suspension; VPV, vaginal paravaginal repair; ASC, abdominal sacral colpopexy; APV, anterior paravaginal repair; TVH, total vaginal hysterectomy; US, uterosacral; UDI, Urogenital Distress Inventory; A/P, anterior and posterior colporrhaphy; PE, physical examination.
guided by the literature and their own clinical experience in offering abdominal versus vaginal surgery to patients with apical prolapse. It seems likely that abdominal sacral colpopexy is more durable in providing apical support, but at the cost of increased complications, both immediate and long term. Therefore, patients for abdominal sacral colpopexy should be those most likely to benefit from its durability and at lowest risk for complications or those most likely to recover from complications that might occur. Age is often used as an important determining factor; for example, we usually recommend abdominal sacral colpopexy to younger women with prolapse for 2 reasons. Younger women benefit more from durability, with the reduced chance they will need prolapse surgery in the future. Younger women are also likely to be more active and subject their prolapse repair to greater stress than older women who may be more sedentary. Women who develop prolapse requiring surgery at a young age may be intrinsically at higher risk for prolapse recurrence. Therefore, they may have better outcomes with abdominal sacral colpopexy that provides extrinsic apical support through synthetic graft material, compared with vaginal apical repairs that rely on the patient’s own tissues for support. (Vaginal colporrhaphies augmented with grafts would not and should not be expected to have any effect on apical support unless the graft is incorporated into the uterosacral ligaments. No data exist regarding outcomes in this clinical situation.)

We do not use an upper age limit for recommending abdominal sacral colpopexy. For older women who are medically healthy and physically active, an abdominal approach to apical repair may be appropriate with careful counseling. Chronological age is not always the most important determinant of benefit versus risk. Health status, ie, the presence of comorbid conditions, is often a better predictor of risk than age. A clinical dilemma often arises as a woman with prolapse ages—when is the best time to intervene surgically, if ever? Say a woman has chosen pessary management for her prolapse and this has worked well for her from ages 65 to 70. But now her cognitive function is declining and she may not be able to provide ongoing care for her pessary as she has in the past. Or she has developed hypertension, and although it is well controlled currently, she worries that her risk of surgery will increase with time. Perhaps her prolapse is progressing despite pessary use, and only a cube pessary effectively relieves her symptoms now. It seems likely that there is a window of time, in choosing between nonsurgical and surgical management of prolapse as a woman ages, that favors surgery. In cases such as these, we recommend vaginal apical repairs or colpocleisis, when minimizing morbidity, rather than enhancing durability, is the most important goal.

These are not absolute indications for the different apical procedures and every woman’s management should be individualized, based in large part on her own preferences once she has been informed of the choices. Ideally, surgeons would be equally skilled and experienced in both abdominal and vaginal approaches to apical prolapse to provide care that is truly individualized, rather than emphasizing one approach to the exclusion of the other.

**Colpocleisis**

Reconstructive procedures may last several hours and are associated with potentially higher blood loss and increasing morbidity with longer anesthesia. For older patients who do not desire vaginal function, colpocleisis may be an appropriate choice. Many variations exist, from partial colpocleisis (where some portion of the vaginal epithelium is left, providing drainage tracts for cervical or other upper genital discharge) to total colpectomy (where all the vaginal epithelium is removed from the hymen posteriorly to within 0.5–2.0 cm of the external urethral meatus anteriorly). If hysterectomy is performed, blood loss is greater and operative time is longer than procedures without hysterectomy. The technique often includes a levator plication and high perineorrhaphy to reinforce posterior support and reduce the genital hiatus, with the goal of reducing the chance of recurrent prolapse. Case series have reported success rates ranging from 91% to 100%, although the patient population, by its nature of relatively short life expectancy and limited activity level, is probably at low risk for recurrence. We typically perform a partial LeFort-type colpocleisis with the use of delayed absorbable suture. This leaves the potential for egress of blood associated with the procedure and cervicovaginal secretions postoperatively. We recommend levator plication using permanent sutures and high perineorrhaphy to further reinforce vaginal closure.

The prevention or treatment of stress incontinence in the context of colpocleisis is problematic. Some surgeons treat stress incontinence with sling procedures, although elderly patients are at high risk for postoperative urinary retention requiring sling takedown. Other surgeons minimize the risk of retention by performing suburethral Kelly plication to provide differential support to the urethra and then treat persistent or recurrent postoperative stress incontinence with perurethral injection. The impact of colpocleisis on bowel function is unknown, as well as its overall impact on quality of life. The issue of regret after colpocleisis has not been well studied. A cohort study is currently underway through the Pelvic Floor...
Disorders Network to collect data prospectively on incontinence, other pelvic symptoms, and life impact after colpocleisis.

**Diagnosis and Treatment of Stress Incontinence with Pelvic Organ Prolapse**

In patients with stress incontinence symptoms confirmed by stress testing, it seems straightforward to recommend anti-incontinence surgery in the setting of prolapse repair. However, as discussed previously, how to treat the finding of latent stress incontinence in symptomatically continent women with prolapse is less clear. Positive stress testing with prolapse reduction is not the equivalent of confirming stress incontinence in a symptomatic woman. The false positive rate of such testing is unknown. Postoperative stress incontinence develops in up to one quarter of previously stress-continent women who did not receive a continence procedure with prolapse repair. 

However, concern has been raised that “prophylactic” continence procedures in women with latent stress incontinence may represent overtreatment and result in new voiding dysfunction, including urgency, urge incontinence, and urinary retention. Nevertheless, some studies report that patients benefit when anti-incontinence procedures are added to prolapse repair to treat latent incontinence, with low rates of both stress incontinence (8–10% at one year) and new urge incontinence (8–16%). Tension-free vaginal tape procedure is more effective in preventing stress incontinence than suburethral plication.

The Pelvic Floor Disorders Network is currently conducting a randomized trial for symptomatically stress-continent women with advanced prolapse who are undergoing abdominal sacral colpopexy, with randomization to the addition of Burch colposuspension versus no Burch. The objectives are to determine whether a trade-off exists in reducing stress incontinence versus worsening voiding dysfunction, and whether preoperative prolapse reduction testing accurately predicts who benefits from the Burch procedure. Enrollment in the trial was halted early (at approximately 350 subjects) based on interim results showing less stress incontinence in the Burch group, with no significant difference in voiding dysfunction, at 3 months after surgery. The data will be analyzed to determine whether the results of prolapse reduction testing (or any aspect of urodynamic testing, the results of which were masked to the surgeons) predicted outcomes. Follow-up is planned for at least 2 years after surgery.

**Adjunctive Materials**

The use of adjunctive materials in prolapse surgery is an attempt to improve outcomes obtained by using the patient’s own tissue. Surgeons, frustrated by recurrent prolapse, actively seek means to reduce the risk of recurrence, but in their enthusiasm, they may misjudge the risk presented by new materials that have not been well studied in the vaginal environment. Currently, the most common prolapse procedures using adjunctive materials are abdominal sacral colpopexy and anterior and posterior vaginal repairs. The ideal adjunctive material should be biocompatible yet inert, nonallergenic and noninflammatory, noninfec- tious, resistant to mechanical stress or shrinkage, and conveniently available. Several reviews have evaluated the various types of synthetic and biologic materials used in prolapse surgery, although their widespread use has leapfrogged ahead of scientific evidence of their safety and effectiveness. The impact of adjunctive materials on sexual function and long-term outcomes is unknown. Different grafts have different complication rates, depending on where and how they are used. Unlike graft material used in abdominal sacral colpopexy, typical graft use in vaginal repairs involves a much greater area of contact between the graft and the vagina after the vaginal wall has been split by surgical dissection. It is critically important for surgeons to discuss the use of adjunctive materials with their patients before surgery so patients are well-informed of the unknown risks and benefits and can participate in the decision to use such materials. It cannot be assumed that graft use is automatically the same or better than existing procedures. The likelihood that outcomes will actually be worse must be considered by the clinician and the patient considering the use of graft materials. Until we have evidence that graft materials are beneficial, we recommend that their use be restricted to subjects in research protocols. This will ensure that evidence supporting or refuting their use actually becomes available over the next several years.

**REFERENCES**


