

# Trends in the treatment of genital prolapse: a review of apical suspension techniques

## Tratamento cirúrgico do prolapso urogenital: revisão das técnicas de suspensão apical

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### Abstract

Genital prolapse is a highly prevalent disorder in women with negative impact in quality of life and sexual function. For uterovaginal prolapse, surgical repair may or may not include a hysterectomy, but the reestablishment of the vaginal apical support is always mandatory to ensure long-term effectiveness. Choosing the most appropriate surgical procedure should take into consideration many factors, such as the location of the anatomical defects, the severity of symptoms, the woman's level of activity or concerns regarding the treatment's durability. In this article we review data that can help to guide decisions when treating women with apical genital prolapse.

**Keywords:** Posthysterectomy vaginal vault prolapse; Uterine prolapse; Sacrospinous fixation; Sacrocolpopexy; Apical sling procedure

### INTRODUÇÃO

Genital or pelvic organ prolapse (POP) is a highly prevalent pelvic floor disorder in the female population, adversely affecting women's quality of life and sexual function.

Prolapse can be defined as a descent of the vaginal walls and/or uterus towards or through the vaginal opening, resulting from the protusion of pelvic organs from their normal anatomic positions. Pelvic support defects include multiple categories, which can occur in isolated or combined forms, including anterior vaginal wall prolapse, posterior vaginal wall prolapse, uterine prolapse or posthysterectomy vaginal vault prolapse.

Based on physical examination, the prevalence of POP varies between 30 and 40%<sup>1,2</sup>, and according to large epidemiologic studies, 6% to 8% of women report a sensation of a mass bulging into the vagina<sup>3,4</sup>.

Despite its high prevalence, there is limited know-

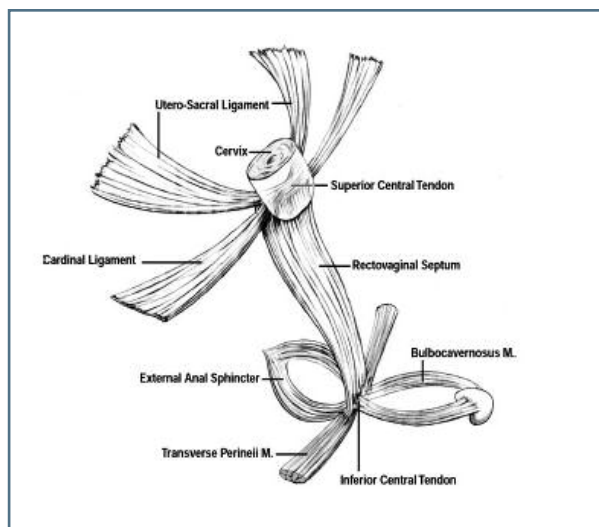
ledge about POP pathophysiology. Prolapse may result from defective supportive structures submitted to normal levels of intra-abdominal pressure or from a normal pelvic support system subjected to chronically high levels of intra-abdominal pressure. Although loss of support can occur as a result of damage to any of the pelvic floor supportive structures, including the bony pelvis, the different components of the endopelvic fascia, the pelvic diaphragm or the perineal body, an increased interest in the role of levator ani muscle injuries has been developed over the last years<sup>5,6</sup>. (Figure 1)

Different cross-sectional epidemiologic studies have linked numerous factors to the risk of developing genital prolapse. Among them, demographic factors like age or menopausal status, obstetric factors like parity or number of vaginal deliveries, lifestyle factors like obesity, smoking or high-impact exercise, surgical factors like previous hysterectomy or POP repair surgery, and medical factors like chronic constipation or connective tissue disorders<sup>2,7,8</sup>.

Managing pelvic organ prolapse can be a challenge. Since there are multiple treatment options for symptomatic POP, including expectant management, con-

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**FIGURE 1.** The pelvic floor anatomic levels of support

servative measures and surgery, decisions on treatment selection should be based on the magnitude of symptoms and their impact in women's daily life activities.

The goal of prolapse surgery is not only to restore anatomy but also to maintain or improve function of all affected organs. Since several support defects often coexist, it is important for pelvic surgeons to acknowledge that single compartment corrections don't always restore normal function to all the pelvic floor organs.

The role of apical compartment defects in combined POP has been addressed in different clinical studies, emphasizing why apical prolapse procedures can be critical to achieve the best outcome with vaginal prolapse surgery<sup>9,10</sup>.

In this article we discuss established options and new trends in the surgical treatment of mid compartment defects, reviewing data that can help guide decisions whenever treating women with isolated apical and/or combined pelvic organ prolapse.

## INITIAL EVALUATION

Accurate diagnosis is crucial for proper design of a comprehensive treatment plan, and obtaining a patient history is the key for understanding patient's symptoms and expectations.

The diagnosis of POP lies on the combination of symptoms and pelvic examination findings. As most parous women, especially those of higher parity, usually show some degree of pelvic relaxation, it is crucial to

understand if women who have genital prolapse are actually symptomatic.

Symptoms of POP typically include a vaginal bulge, pelvic pressure or heaviness, abnormal voiding or defecation and sexual dysfunction. Although there is no obvious anatomic threshold correlated to the presence of symptoms, the hymen appears to be an important landmark, as prolapse symptoms usually increase with descent through this anatomic level<sup>11,12</sup>.

Besides clarifying symptoms, it is also important to address how those symptoms interfere with the patient's daily activities. Since prolapse treatment aims at improving quality of life (QOL), knowing exactly what issues are more bothersome for the patient can be of great help when deciding on a treatment plan or evaluating the outcome of an intervention. For that purpose several quality of life questionnaires have been developed and validated in different languages. The most commonly used include: the Pelvic Floor Distress Inventory (PFDI), the Pelvic Floor Impact Questionnaire (PFIQ), the Incontinence Severity Index (ISI) or the Urogenital Distress Inventory Form (UDI)<sup>13</sup>.

A careful pelvic examination with Valsalva maneuver is mandatory to establish specific site defects, as apical compartment defects frequently coexist with anterior and/or posterior vaginal wall prolapse.

Mapping and grading the prolapse using a validated tool such as the Pelvic Organ Prolapse Quantitative System (POP-Q) is needed, as well as evaluating vaginal mucosal status and the presence of urinary or fecal incontinence. According to the POP-Q system, uterine or vaginal vault prolapse can be identified by descent of point C with Valsalva maneuver (with C marking the cervix or vaginal cuff scar) from its normal position, which is usually at the total vaginal length minus 2 cm.

Preoperative urodynamic evaluation should also be considered in order to clarify bladder symptoms and exclude occult urinary incontinence.

Although asymptomatic women do not require treatment and may continue under observation, women who are symptomatic should initially be offered conservative interventions. Conservative measures may improve symptoms and withhold progression of the prolapse, but they will not be able to cure the underlying anatomical defects. The options include physical therapy to improve function and support to the pelvic floor structures, such as kegel exercises or biofeedback guided pelvic floor muscle training. Mechanical interventions, such as the placement of a vaginal pessary, are

a type of treatment often offered to women with lower degrees of POP or to those unwilling or unfit for surgery. Pessaries require regular care by the patient herself or a clinician.

### SELECTING A SURGICAL PROCEDURE

For women with prolapse requiring surgical treatment, one of the biggest challenges is to choose which surgery to perform, which route to use and whether a native-tissue or a graft-augmented repair is preferable.

If an apical support defect is noted on physical examination, it is crucial to include correction of the apex at the time of surgery, since it can be highly associated with the surgical repair durability and risk of recurrence<sup>10</sup>.

In addition to the anatomic location and severity of the prolapse, factors such as patient's overall health and activity level, patient's desire for uterine preservation or the presence of other concurrent pelvic floor symptoms, should all contribute to the decision of which surgery to perform.

Regarding the surgical treatment of apical defects, different approaches can be chosen and several reconstructive techniques have been described in the literature<sup>14</sup>. Surgery can be performed vaginally or abdominally, including (or not) a hysterectomy in the overall procedure, if the uterus is still in situ. Since there are benefits and risks to either approaches, surgical counseling requires extended knowledge on the type of pro-

cedures available, as well as the rates of prolapse recurrence and potential complications for each one of them.

### TRANSVAGINAL PROCEDURES

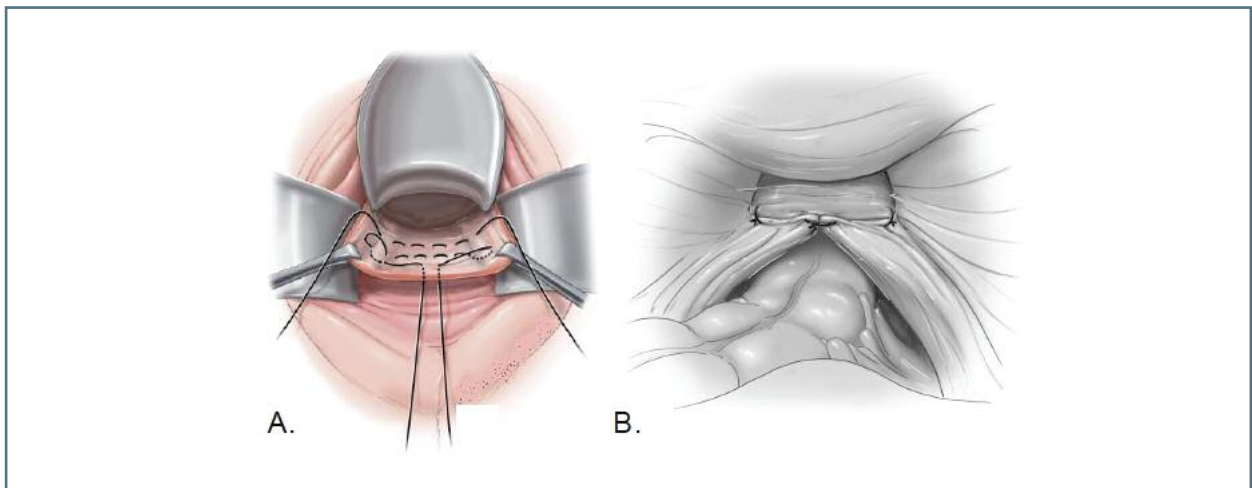
#### Native-tissue reconstructive surgery

All transvaginal surgeries should be performed in a supine lithotomy position with the patient's legs elevated in Allen stirrups and hips not flexed beyond 90° in order to prevent nerve compression injuries.

Which native-tissue support procedure to use depends on the surgeon's training and expertise, since the available data comparing the various transvaginal native-tissue reconstructive repairs didn't show significant differences among them in terms of efficacy or safety<sup>15,16</sup>. The concurrent use of vaginal hysterectomy, the shape and length of the vagina and the severity of the prolapse may also influence decision-making.

#### MCCALL CULDOPLASTY

For uterovaginal prolapse, when there is no desire for uterine preservation, vaginal hysterectomy followed by a McCall culdoplasty and appropriate anterior and posterior vaginal wall repairs, can be an effective option to relieve symptoms, restore normal anatomy and function to the pelvic floor organs, and also to prevent future vaginal apical prolapse<sup>15</sup>. While suturing the uterosacral ligaments more proximally, the procedure also incorporates the proximal posterior vaginal wall. (Figure 2) McCall culdoplasty allows not only for the



**FIGURE 2.** McCall culdoplasty. A. Passage of the sutures; B. Final vaginal suspension

closure of the redundant cul-de-sac preventing potential bowel herniation, but also provides apical support and lengthening of the vagina.

The outcomes of this procedure were reviewed by Sze and Karram<sup>16</sup>; in an early study reporting 367 patients, 88% received postoperative follow-up from 1 to 12 years, reporting a cure rate of 88-93% and a recurrence rate of 11%. As for complications, the most worrisome risk reported is ureteral injury or kinking, occurring in approximately 2-4% of cases. For this reason, it is imperative to perform intraoperative cystoscopy after tying the suspension sutures in order to ensure ureteral patency<sup>17</sup>.

Being a simple, effective and safe procedure to perform, many specialists agree to consider McCall culdoplasty as part of every vaginal hysterectomy, even in the absence of prolapse, in order to minimize the risks of future mid-compartment defects.

### SACROSPINOUS LIGAMENT FIXATION

Sacrospinous ligament fixation (SSLF) is usually an option for moderate to severe posthysterectomy vaginal vault prolapse, although it can also be performed with a simultaneous vaginal hysterectomy or even as a form of hysteropexy, if there is a desire for uterine preservation. Usually this operation requires simultaneous correction of the anterior and posterior vaginal walls as well as an enterocele repair, if these defects are also present.

To safely and correctly perform this procedure, surgeons must have sustained knowledge of pelvic floor anatomy. Sacrospinous ligaments extend from the ischial spines on each side of the pelvis to the inferior portion of the sacrum and coccyx, and can be identified by palpating the ischial spine and tracing the triangular thickening towards the sacral bone.

For SSLF, delayed absorbable and/or permanent sutures are used to anchor the vaginal apex to the sacrospinous ligament, in an extraperitoneal approach. Reaching the ligament(s) for sutures placement can be achieved by an anterior or posterior vaginal approach, carefully dissecting the vaginal mucosa from the anterior or posterior wall in order to develop the vesicovaginal or the pararectal space, respectively. Although SSLF can be done bilaterally, the stitches are usually placed unilaterally to one side of the pelvis, resulting in a slight deviation of the vaginal axis laterally and downward to the sacrospinous ligament of choice<sup>17</sup>. (Figure 3) We prefer a bilateral approach for symmetrical support, although it can be related to a transi-

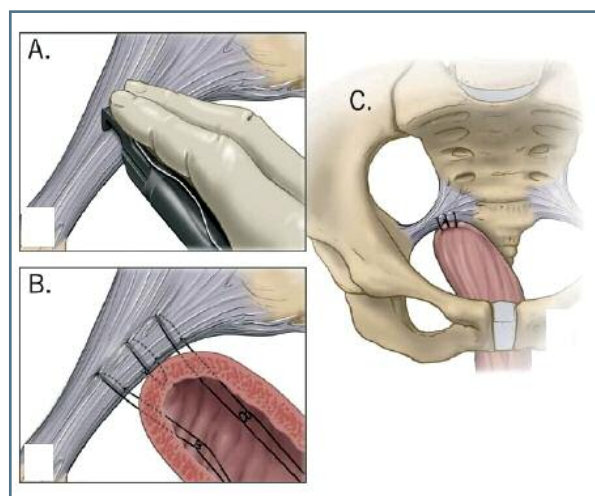
tional increase in dyspareunia and obstipation.

While sacrospinous fixation has shown to be effective for vaginal apex support in early cohort studies, uterovaginal prolapse tends to recur with time, most commonly in the anterior compartment. In a study of 243 women, who underwent sacrospinous ligament fixation and vaginal repairs with a 73-months follow-up, prolapse recurrence rate in the anterior, posterior and apical segments were 37.4%, 13.6% and 8.2%, respectively<sup>18</sup>. The same study showed prolapse-free survival rates at 1, 5 and 10 years of 88.3%, 79.7% and 51.9%, respectively. Although recurrence rates may vary according to outcome definitions, they can reach up to 27% of women<sup>19</sup>.

Rare but serious intraoperative complications can occur with SSLF, and they include: hemorrhage from overzealous dissection involving the hipogastric venous plexus and the gluteal and pudendal vessels, which can be difficult to control; nerve injury and rectal perforation<sup>17</sup>.

### HIGH UTEROSACRAL LIGAMENT SUSPENSION

An alternative approach to correct apical prolapse is the bilateral high uterosacral ligament suspension (HUSLS). As a transperitoneal technique, it is often performed vaginally after a hysterectomy, although it can also be accomplished abdominally or by laparoscopy. Suspending the vaginal apex to the endopelvic fascia of the uterosacral ligaments, it directs the vaginal axis in the midline to the hollow of the



**FIGURE 3.** Sacrospinous ligament fixation. A. Passage of the suture-capture device; B. Sutures placement; C. Final attachment of the vagina to the ligament complex



sacrum, not creating any significant distortion of alignment, contrary to SSLF, and without involving any permanent mesh implant. Usually two to three delayed absorbable sutures are passed through the uterosacral ligament on each side of the pelvis and then through the full thickness of the anterior and posterior vaginal walls at the apex. After closing the vaginal cuff, tying the apical suspension sutures elevates the apex high up into its normal anatomical position. The major difference between the McCall culdoplasty and the HUSLS lies on the number of sutures and their level of placement along the uterosacral ligaments. While the first HUSLS suture is usually placed at the same level of the McCall culdoplasty, the second usually reaches the ligament higher in its midportion near the ischial spines, and the third is placed even higher, at the level of the sacrospinous ligament-coccygeus muscle complex, where a segment of the uterosacral ligament inserts.

According to published data, prolapse may recur in 25–30% of women who undergo HUSLS<sup>20,21</sup>. Margulies and colleagues showed that, in the anterior, apical and posterior vagina, the pooled rates for successful anatomic outcome were 81.2%, 98.3% and 87.4%, respectively, and that patients with more severe POP (stages III and IV) had significantly worse cure rates<sup>20</sup>. The most common complication reported after a HUSLS is sciatic-type pain, as a result of compression or entrapment of sacral nerve roots with the stitches, occurring in up to 7% of women<sup>22,23</sup>. Although ureteral injury should also be a concern, the actual risk is much lower than initially reported, staying at 1–2% in recent large series<sup>20,21</sup>.

### Obliterative surgery

Obliterative surgery corrects apical prolapse by removing and/or closing off all (colpectomy) or a portion of the vaginal canal (colpocleisis), reducing the pelvic organs present back into the pelvis. These procedures may be suitable for women with posthysterectomy vaginal vault prolapse or for women with uterovaginal prolapse who desire uterine preservation or in whom hysterectomy may be too risky<sup>16</sup>.

Obliterative procedures are less invasive and better tolerated by frail, older women, and are usually reserved for patients who are not candidates for more extensive surgery or do not plan future vaginal intercourse.

When performed in the appropriate population such procedures typically have shorter operative time, de-

creased perioperative morbidity, extremely low risk of prolapse recurrence and high patient satisfaction<sup>24–27</sup>. The obvious disadvantages lie in the elimination of the potential for vaginal intercourse, as well as the inability to evaluate the cervix or uterus via a vaginal route, the last in cases of uterovaginal prolapse when a Le Fort colpocleisis is performed.

All colpocleisis procedures remove vaginal epithelium and then appose the anterior and posterior vaginal muscularis. By apposing the anterior and posterior vaginal walls the prolapsed apex becomes inverted and the sutured tissue forms a column of pelvic support. Whether performing a partial or total colpocleisis, 3 to 4cm of distal vaginal epithelium should be left in place to avoid placing traction on the posterior urethra when suturing the anterior and posterior vaginal muscularis<sup>28</sup>. In order to narrow the introitus and build up the perineum, a distal levator plication followed by and aggressive perineorrhaphy should always be performed as the final step of the procedure<sup>27</sup>.

Concomitant hysterectomy can be performed with an obliterative procedure, although case series data suggest that performing hysterectomy at the time of colpocleisis increases operative duration and morbidity<sup>29,30</sup>. Nevertheless, hysterectomy may be advisable in women with risk factors for cervical or endometrial cancer even though there are no studies evaluating obliterative procedures in these sub-populations.

### Transvaginal mesh surgery

Transvaginal mesh procedures were developed in an effort to combine the benefits of mesh-augmented repairs with a less invasive approach such as the vaginal route, in order to decrease the rate of recurrent prolapse seen with native tissue repairs and minimize potential surgical complications of intra-abdominal surgery.

Since the early 2000's many different brands and types of prepackaged mesh kits were introduced in the market. The initial kits used long transcutaneously placed needles to attach mesh to the arcus tendinous fasciae pelvis or the sacrospinous ligaments, creating a hammock that supports the apex along with the anterior or posterior vaginal wall, depending on mesh placement.

Although total vaginal mesh procedures have shown to be superior to native tissue reconstructive surgery for apical and anterior wall repairs, with lower recurrence rates over time, new and unique complications related to the mesh itself and needle placements rose

with time, creating a specific concern about the safety of these procedures<sup>31</sup>. Vaginal reconstruction can now be performed through the primary dissection incisions, using internal fixation fasteners and soft tissue anchoring systems or tissue fixation systems for internal anterior, apical and posterior repairs. The implementation of these techniques reduces the current avoidable technical problems of total mesh kits reducing the volume of mesh required for reconstruction and increasing the accuracy of anchoring to the supportive ligaments avoiding the blind passage of needles through long distances in the pelvis.

Mesh-related complications extend from functional complications, such as chronic pelvic pain, leg and groin pain, vaginal pain or dyspareunia, to anatomical distortions due to mesh exposure through the vaginal epithelium, erosion into adjacent organs or mesh contraction. According to a recent Cochrane Review on pelvic organ prolapse surgery, mesh exposure is one of the most common complications seen with total vaginal mesh procedures, with an overall exposure rate of 11.4% and at least half being symptomatic and requiring reoperation for treatment<sup>31</sup>.

In face of the potential hazards of total vaginal mesh surgery, the US Food and Drug Administration (FDA) has issued a Public Health Notice in 2008 and a Safety Communication in 2011 stating that “serious complications associated with surgical mesh for transvaginal repair of POP are not rare” and that “physicians should obtain specialized training for each mesh placement technique and be aware of the risks of surgical mesh”. As a result of these statements some mesh prolapse kits were voluntarily withdrawn from the market, with the current available prepackaged mesh kits being mainly to attach mesh to the sacrospinous ligaments.

Surgeons and researchers recognize that there may be a role for transvaginal mesh in POP surgery, given the risk of prolapse recurrence after native tissue repairs. New efforts in developing optimal materials and placement techniques for vaginal mesh procedures have taken place, in order to minimize the risk of mesh-related complications while maintaining a long-lasting surgical repair<sup>32</sup>. Recommendations regarding which patients may be appropriate candidates for mesh use have also been published<sup>33</sup>.

Biological graft materials are not associated with the material-related issues synthetic mesh involves, minimizing postoperative pain, general morbidity, mesh erosion or contraction<sup>34</sup>.

## ABDOMINAL PROCEDURES

### Abdominal sacrocolpopexy

Given the relatively high rates of prolapse recurrence with vaginal native-tissue reconstructive surgery, surgeons looked into other options that could afford more durability when correcting apical prolapse.

Abdominal sacrocolpopexy (ASC) is performed by securing the anterior and posterior vaginal walls, via a mesh bridge, to the anterior longitudinal sacral ligament overlying the sacral promontory, reestablishing a nearly horizontal axis to the vaginal canal<sup>35</sup>. Grafts available for this procedure include synthetic materials like polypropylene mesh and biologic materials such as xenografts or allografts.

In the usual technique, a permanent mesh is attached to the posterior vaginal wall from the level of the rectal reflection and another piece to the anterior vaginal wall just above the bladder trigone, being acceptable to use a mesh fashioned into a Y shape or to use two separate strips of mesh. The mesh strips are then sutured to the sacral promontory anterior longitudinal ligament (Figure 4).

Although abdominal sacrocolpopexy (attachment between the sacral promontory and the vaginal vault in women who underwent total hysterectomy) is the most commonly performed procedure, uterine (sacral hys-



FIGURE 4. Abdominal sacrocolpopexy

teropexy) or cervix (sacral cervicopexy) sparing procedures can also be performed.

When compared to native-tissue vaginal repairs, ASC has demonstrated more durability in multiple randomized trials<sup>31</sup>. In a systematic review of studies from 1996 to 2004, Nygaard and colleagues reported anatomic success rates after abdominal sacrocolpopexy ranging from 76 to 100% with a 4% reoperation rate for recurrent prolapse<sup>36</sup>. Nevertheless, these benefits should always be weighed against longer operating times, longer recovery and potential major complications. Being one of the major concerns of synthetic mesh-augmented surgery, erosion rates are estimated to range from 3.4% to 10.5% for ASC<sup>31,36,37</sup>. Erosion rates may vary depending on the type of mesh used, with type I polypropylene mesh showing the lower rate of erosion<sup>36</sup>.

Other potential complications of ASC are similar to those of major abdominal surgery, including hemorrhage, ureteral damage, bowel, bladder or rectum perforation and extrafascial wound infection.

Since the purpose of POP surgery is to improve quality of life, it is important to acknowledge that although ASC may be a more durable approach, it may also require repeat surgery for mesh issues in up to 5% to 10% of patients and although intraoperative complications are uncommon, they can be life threatening.

### Minimally invasive sacrocolpopexy

Though classic sacrocolpopexy is typically performed through a lower abdominal incision, minimally invasive approaches such as conventional and robot-assisted laparoscopic sacrocolpopexy have gained popularity over the last decade.

Observational studies suggest that conventional laparoscopic and robot-assisted routes result in shorter hospital stays, faster recovery periods and less postoperative pain than abdominal sacrocolpopexy, with comparative short-term efficacy<sup>38-40</sup>. A important disadvantage to consider in these minimally invasive procedures is extended operative time, usually one to two hours longer, in addition to the higher costs involved, specially with robotic-assisted laparoscopy<sup>41</sup>.

Since performing a sacrocolpopexy requires suturing, some surgeons may prefer robotic-assisted laparoscopy in order to overcome technical limitations. Nevertheless, two randomized trials have found that robotic compared with conventional laparoscopic sacrocolpopexy has an even longer operative duration

(24 to 67 minutes longer), with similar complication rates and short-term outcomes<sup>42,43</sup>.

## UTERINE PRESERVATION OUTCOMES IN UTEROVAGINAL PROLAPSE

Traditionally all surgical repairs for uterine or uterovaginal prolapse begin by performing a vaginal hysterectomy, and for clinical purposes, uterine preservation is usually only considered whenever future fertility is in question. However, women are increasingly requesting uterine preservation for reasons other than fertility, including body image, sexuality or cultural preferences.

In a review on this topic, Ridgeway and colleagues concluded that uterine preservation might be a valid option in an appropriately selected group of patients<sup>44</sup>. Moreover, reassuring results with laparoscopic suture hysteropexy and sacrospinous hysteropexy, have also been reported<sup>45,46</sup>.

Preserving the uterus while addressing uterovaginal prolapse may have additional advantages over maintaining reproductive function. Operative morbidity and hospital stays are reduced compared to when hysterectomy is performed<sup>47,48</sup>, and uterine preservation is also related to lower rates of mesh erosion in procedures that involve the use of synthetic mesh<sup>49,50</sup>.

Though almost all the suspension techniques described in the previous sections can be performed as a hysteropexy procedure, some important modifications are necessary. Nevertheless, it is important to remember that uterine-sparing procedures are not appropriate in the set of cervical dysplasia, abnormal uterine bleeding or high risk for uterine malignancy, since evaluation and management of these problems may be more difficult to address after a utero-sparing prolapse repair.

## SUMMARY

Vaginal apical support contributes significantly to the reinforcement of all pelvic floor compartments. Thus, surgeons who perform surgical repairs for POP must be comfortable and proficient in choosing and executing the appropriate apical suspension for each particular patient. In women with advanced exteriorized POP, vault prolapse must be suspected until proven otherwise.

The standard use of McCall culdoplasty or uterosacral ligament suspension at the time of vaginal hysterectomy, in order to provide adequate support to the vaginal apex, is of paramount importance and decreases the incidence of late enterocele and posthysterectomy vaginal vault prolapse.

Transvaginal native-tissue apical repairs are probably the best option for older women who are sexually active, who have less severe prolapse or who have higher surgical risks. Older women with more severe degrees of POP, who are not interested in maintaining sexual function, may specifically benefit from an obliterative procedure. In younger active women and those with more severe or recurrent prolapse, sacrocolpopexy using a polypropylene graft, either by open or laparoscopic assisted routes, would be a first line option. Recently developed minimally invasive vaginal graft-augmented techniques have a role as an equivalent effective option for combined forms of POP involving the apex, however with concerns regarding mesh related complications.

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