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Review

Sacrocolpopexy for pelvic organ prolapse: evidence-based review and recommendations

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ABSTRACT

Sacrocolpopexy is considered a reference operation for pelvic organ prolapse repair but its indications and technical aspects are not standardized. A faculty of urogynecology surgeons critically evaluated the peer-reviewed literature published until September 2015 aiming to produce evidence-based recommendations. PubMed, MEDLINE, and the Cochrane Library were searched for randomized controlled trials published in English language. The modified Oxford data grading system was used to access quality of evidence and grade recommendations. The Delphi process was implemented when no data was available. Thirteen randomized, controlled trials were identified, that provided levels 1 to 3 of evidence on various aspects of sacrocolpopexy. Sacrocolpopexy is the preferred procedure for vaginal apical prolapse (Grade A), monofilament polypropylene mesh is the graft of choice and the laparoscopic approach is the preferred technique (Grade B). Grade B recommendation supports the performance of concomitant procedures at the time of sacrocolpopexy. Grade C recommendation suggests either permanent or delayed sutures for securing the mesh to the vagina, permanent tackers or sutures for securing the mesh to the sacral promontory and closing the peritoneum over the mesh. A Delphi process Grade C recommendation supports proceeding with sacrocolpopexy after uncomplicated, intraoperative bladder or small bowel injuries. There is insufficient or conflicting data on hysterectomy (total or subtotal) or uterus preservation during sacrocolpopexy (Grade D). Sacrocolpopexy remains an excellent option for vaginal apical prolapse repair. The issue of uterine preservation or excision during the procedure requires further clarification. Variations exist in the performance of most technical aspects of the procedure.

Contents

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Introduction

Sacrocolpopexy, first described in 1962 by Lane [1], has long been a preferred by many surgeons procedure for the management of apical vaginal prolapse, even though vaginal approaches, with or without use of mesh grafts, represent an alternative [2]. Following the Food and Drug Administration (FDA) public health notification regarding transvaginal synthetic mesh repair of vaginal prolapse in 2008 [3], updated in 2011 [4], there has been a significant increase in uptake of sacrocolpopexy, especially of minimally invasive techniques, performed in the United States of America [5]. While robust data supports efficacy of sacrocolpopexy in general, there are significant variations in indications for, and in nearly every technical aspect of the procedure that is commonly referred to as sacrocolpopexy (SCP) or abdominal sacrocolpopexy (ASC).

In 2014, an international faculty of seven, high-volume, urogynecology surgeons critically evaluated the available peer-reviewed literature aiming to produce evidence-based recommendations on indications and technical issues regarding sacrocolpopexy. The literature review was updated in September 2015.

Methods

The panel for this review, convened in March 2014, comprised of seven high-volume urogynecology surgeons from 5 countries; Australia, Canada, Ireland, Italy and USA. During panel deliberations 10 questions emerged as the most important regarding indications for and technical approach to sacrocolpopexy (Appendix A). In order to provide answers and recommendations the group searched the literature published until March 2014 initially, and the literature review was updated in September 2015. PubMed, MEDLINE, the Cochrane Library and ClinicalTrials.gov were searched using the terms sacrocolpopexy, open, abdominal sacrocolpopexy, laparoscopic, robotic assisted, vault prolapse, apical prolapse and prolapse repair. Relevant article reference lists were manually searched for further studies. Only randomized or quasi-randomized controlled trials published in peer reviewed, English-language, journals were included.

Evidence from the included studies was critically evaluated under the modified Oxford grading system [6]. Data were categorized to a Level of Evidence (LoE) from 1, the highest, to 4, the lowest. Once a LoE was assigned, recommendations were possible including, depending on the quality of findings, Grade A (consistent level 1 evidence), Grade B (consistent level 2 and/or 3 studies, or "majority evidence" from RCT's), Grade C (level 4 studies or "majority of evidence" from level 2/3 studies or Delphi processed expert opinion) and Grade D ("no recommendation possible" when the evidence is inadequate or conflicting) recommendations. The Delphi process [7] was implemented when no evidence relating to one specific question was available in the literature. When more than 75% of the panel reached consensus, the notion was carried and awarded a Grade C recommendation with the acknowledgment of "Delphi process expert opinion".

Results

Thirteen randomized, controlled trials (RCTs) [8–20] that evaluated different sacrocolpopexy techniques against one another, or to other procedures, primarily in terms of efficacy and/or complications, were identified. Data deriving from these studies, which provided evidence relevant to the 10 research questions of this review, are presented in Tables 1 and 2. Table 1 lists data on population size, randomization options, concomitant procedures, bowel complications and mesh erosion rates. Table 2 lists data from the same thirteen studies relevant to type and configuration of mesh, methods of fixation of mesh to the vagina and sacrum as well as closing the peritoneum over the mesh or not. Evidence and recommendations for each of the 10 review questions are reported hereunder.

1) How the efficacy of sacrocolpopexy compares to that of alternative, apical vaginal suspension procedures?

The 2013 Cochrane review [2] on the surgical management of pelvic organ prolapse reported on 5 [8–12] of the 13 RCTs included in this review that compared abdominal sacrocolpopexy with vaginal sacrospinous colpopexy [8–10], apical transvaginal mesh [11] and high uterosacral vault suspension (HUVS) [12], at that time published as congress abstract.

On meta-analysis of the three studies comparing ASC and vaginal sacrospinous colpopexy, the authors found that ASC was associated with a lower risk of subjective failure, a lower rate of recurrent vault prolapse as well as less urinary stress incontinence and dyspareunia, compared to the vaginal sacrospinous colpopexy. However, for ASC operating and recovery time was longer and cost was higher, compared to sacrospinous colpopexy.

Maher et al. [11] compared laparoscopic sacrocolpopexy (LSC, $n = 53$) to total vaginal mesh (TVM, $n = 55$) and found that the LSC took significantly longer to perform than the TVM but was associated with reduced blood loss and reduced inpatient days, and resulted in quicker return to activities of daily living, compared to TVM. The rate of recurrent prolapse and reoperation were significantly lower and satisfaction rate higher after the LSC compared to the TVM.

Rondini et al. [12], in their peer reviewed publication, compared ASC ($n = 54$) and HUVS ($n = 56$) and found a reduced rate of prolapse and a lower rate or reoperation at 1 year in the ASC group. Improvement with regards to prolapse symptoms, quality of life, and sexual function was comparable between procedures. The operating time and hospital stay were less with the vaginal procedure (HUVS), as were postoperative complications.

In a single RCT, with primary objective the impact of surgery on urogenital function, Roovers et al. [21] compared vaginal hysterectomy plus uterosacral colpopexy to the abdominal sacrocolpopexy with uterus preservation. In terms of efficacy they reported that, at one year, there was a lower rate of reoperation in the vaginal hysterectomy plus uterosacral colpopexy group (one of 41 patients versus 9 of 41 patients).

Based on the above evidence, sacrocolpopexy offers higher correction rates and may be preferred for apical vaginal prolapse (Grade A recommendation). However, surgeons need to recognize that the vaginal approach is associated with reduced morbidity and that sacrocolpopexy may not be suitable for all patients including the frail and those with significant medical and surgical comorbidities.

2) Perform hysterectomy or preserve the uterus during sacrocolpopexy?

In the RTCs that compared sacrocolpopexy to alternative procedures, both women with post-hysterectomy prolapse and women with uterine prolapse were included. In these studies of the total 192 patients undergoing sacrocolpopexy 41 had a concomitant hysterectomy. Unfortunately, a comparison of outcomes between subjects with and without concomitant hysterectomy could not be determined from these manuscripts.

Gutman and Maher [22] evaluated eleven, non-randomized, studies that reported the rate of mesh exposure in women undergoing sacrocolpopexy with uterus preservation ($n = 339$) and women having sacrocolpopexy with hysterectomy ($n = 129$). Sacrocolpopexy with uterus perseveration (laparoscopic or open) was quicker to perform and as effective as sacrocolpopexy with hysterectomy. Moreover the mesh exposure rate was nearly six

Table 1
Randomized control trials evaluating sacrocolpopexy including hysterectomy, concomitant surgery, postoperative bowel complications and mesh exposure.

Study	No.	Follow up (years)	Randomization options	Hysterectomy	Retropubic surgery	Posterior repair	Post-op ileus or SBO	Mesh exposure
Benson et al. [8]	40	2.5	Sacrocolpopexy or sacrospinous colpopexy	20 (50%)	16 colposuspension 40 paravaginal repair (100%)	38 (95%)	Not stated (NS)	NS
Lo and Wang [9]	52	2.1	Sacrocolpopexy or sacrospinous colpopexy	21 (40%)	NS	19 (36%)	3 cases ileus no surgery	NS
Maher et al. [10]	47	2	Sacrocolpopexy or sacrospinous colpopexy	0 (0%)	34/47 (72%)	11 (23%)	0	1 (2%)
Maher et al. [11]	53	2	Sacrocolpopexy or vaginal polypropylene Mesh	0 (0%)	48 (91%)	27 (51%)	0	1 (2%)
Rondini et al. [12]	110	1	Sacrocolpopexy or uterosacrocolpopexy	89 (81%)	NS	NS	NS	2 (3.5%)
Brubaker et al. [13]	322	2	Sacrocolpopexy ± colposuspension Continent women	91 (27%)	61/322 paravaginal (18%) 154 colposuspension (46%)	87 (26%)	19/322 Ileus 15 Surgery SBO 4	23 (10.7%) at 7 years [27]
Costantini et al. [14]	66	8	Sacrocolpopexy ± colposuspension Continent women	29 (44%)	34/66 (52%)	NS	NS	NS
Costantini et al. [15]	47	4	Sacrocolpopexy ± colposuspension Women with SUI	0 (0%)	24/47 (51%)	NS	NS	NS
Freeman et al. [16]	53	1	Open or laparoscopic sacrocolpopexy	0 (0%)	1	4 (8%)	0	0 (0%)
Anger et al. [17]	73	0.5	Laparoscopic or robotic sacrocolpopexy	45 (62%)	0 (0%)	5 (7%)	2/73	NS
Tate et al. [18]	100	5	Cadaveric fascia or polypropylene mesh at SC	0 (0%)	68/100	46 (46%)	2/54 ileus	1 rectal 1 vaginal
Culligan et al. [19]	119	1	Porcine dermis or polypropylene mesh at SC	Supracervical hysterectomy 88 (74%)	Nil	NS	Nil	Nil polypropylene
Paraiso et al. [20]	61	1	Laparoscopic or robotic sacrocolpopexy	0 (0%)	NS	NS	2/61Robotic	2 (3%)

times lower when the uterus was preserved: 1.5% versus 8.5% ($p < 0.05\%$) in the concomitant hysterectomy group.

In recognition of the increased mesh exposures when performing hysterectomy at time of sacrocolpopexy some have advocated supracervical hysterectomy as an alternative to hysterectomy at sacrocolpopexy in those with uterine prolapse [23,24]. Powered uterine morcellation is often used when subtotal hysterectomy is performed at minimally invasive sacrocolpopexy; this has become controversial following a recent US Food and Drug Administration [25] safety communication. While subtotal hysterectomy appears to reduce the risk of mesh exposure associated with sacrocolpopexy and hysterectomy, further evaluation is required.

Data on the comparison of sacrocolpopexy with concomitant hysterectomy (either total or subtotal) to sacrocolpopexy with uterus preservation are conflicting (Grade D). Nevertheless uterus preservation is associated with less mesh erosion (Grade B)

3) Should anti-incontinence surgery and vaginal repairs be performed at the time of sacrocolpopexy?

The majority of RCTs evaluating sacrocolpopexy [8–20] reported on the performance of concomitant surgery. As shown in Table 1, retropubic interventions were performed in 87% (122/140) and posterior colporrhaphy in 50% (95/195) of sacrocolpopexies providing level 3 evidence. Level 1 evidence from the 7-year follow-up of CARE trial [13,26], an RCT of ASC with and without concomitant Burch colposuspension, demonstrated that the addition of Burch colposuspension resulted in less stress urinary incontinence with no difference in anatomic or symptomatic prolapse outcomes. There were confounding factors in the study, including 20% undergoing paravaginal repair in addition to Burch colposuspension and non-standardization of surgical interventions, which make full evaluation of prolapse outcomes difficult.

Further evaluation of impact of concomitant interventions is required. A majority Grade B recommendation supports the performance of concomitant retropubic or vaginal procedures at sacrocolpopexy.

4) Which type of graft material to use for suspension to the sacrum?

Of the total 13 RCTs included in this review, seven [10–12,14–16,20] used a monofilament polypropylene mesh, one [9] a multifilament polyester graft, two [13,17] a variety of different graft materials at surgeons discretion and one study [8] did not state mesh type. The remaining two RCTs evaluated the specific question of choice of graft material.

Tate et al. [18] reported that at 5 years, the recurrence rate of vaginal prolapse was lower if a polypropylene mesh was used compared to an absorbable cadaveric fascia lata graft. Culligan et al. [19] found no difference in outcomes at one year if a monofilament polypropylene ($n = 58$) or porcine dermis ($n = 57$) graft was employed at minimally invasive sacrocolpopexy.

In eight of the above studies the reported mesh erosion rate ranged from 0 to 3.5%. In contrast the 7-year data [26] from the CARE trial [13] the mesh exposure rate following sacrocolpopexy was 10.7%. Further long-term evaluation of this issue is required.

This high rate needs to be interpreted with caution as confounding factors may have contributed to it: a monofilament polypropylene mesh was utilized in only 39% of cases and concomitant hysterectomy was performed in nearly one third of cases.

In a single comparative, LoE 3, study [27] type 1 polypropylene mesh had better outcomes than porcine small intestinal submucosa and dermal collagen grafts at sacrocolpopexy.

Table 2
Randomized controlled trials evaluating technique of performing sacrocolpopexy.

Study	No.	Follow up (years)	Mesh type	Configuration mesh dual or Y-shaped	Suture type vagina	Suture number	Fixation to the sacrum	Site sacrum	Peritoneal closure
Benson et al. [8]	40	2.5	Not stated (NS)	NS	Monofilament permanent	NS	NS	NS	NS
Lo and Wang [9]	52	2.1	Mersilene	NS	NS	NS	NS	Promontory	NS
Maher et al. [10]	47	2	Polypropylene	Y shaped to trigone and 7–8 cm posterior	PDS[a]	2–3 ant and post	Titanium tacker	Promontory	Closed
Maher et al. [11]	53	2	Polypropylene	Y-shaped	PDS	2–3 ant & post	Titanium tacker	Promontory	Closed
Rondini et al. [12]	54	1	Polypropylene	NS	Polypropylene	4 ant and 4 post	Polypropylene	Promontory	Closed
Brubaker et al. [13]	322	2	17% biological 43% mersiline 39% polypropylene Gortex 6%	NS	Surgeons discretion	Discretion surgeon	NS	NS	Surgeons discretion
Costantini et al. [14]	66	8	Polypropylene	Y shaped	Polyglactin	4 ant & post	1–2 permanent o sutures	Promontory	Closed
Costantini et al. [15]	47	4	Polypropylene	Y shaped	Polyglactin	4 ant & post	1–2x permanent 2.0 suture	Below sacral promontory	Closed
Freeman et al. [16]	53	1	Polypropylene	Y shaped	PDS	NS	Tacker or permanent suture	Promontory	Closed
Anger et al. [17]	73	0.5	Mesh surgeon preference	2 separate pieces	Gore-Tex	NS	Ns	NS	Surgeons discretion
Tate et al. [18]	100	5	Polypropylene versus fascia lata	Y shaped	Gore-Tex	8–10 ant post	2–3 Gore-Tex sutures	S1or S2	Closed
Culligan et al. [19]	119	1	Polypropylene versus porcine dermis	Y shaped Ant 4–7 cm Post 7–10 cm	6–10 Gore-Tex ant and post	6–10 ant & post	2 permanent sutures	Anterior longitudinal ligament sacral promontory	Closed
Paraisio et al. [20]	61	1	Polypropylene	2 separate pieces 4×15 cm	NS	NS	NS	NS	Closed

[a] Polydioxanone suture.

Based on the above data is advised that a monofilament polypropylene mesh is used for sacrocolpopexy (Grade B recommendation).

5) What design of graft material is optimal: two pieces of mesh or one Y-shaped graft?

Of the 13 RCTs included in this review, five [10,11,16,18,19] used a dual leaf Y-shaped design, four [14,15,17,20] two separate pieces of mesh and the remaining four [8,9,12,13] did not describe their technique.

Consistent level 2 and 3 evidence supports a Grade B recommendation for the use of a Y-shaped piece of mesh at sacrocolpopexy. A Grade C recommendation supports the use of two separate pieces of mesh at time of sacrocolpopexy.

6) What type and how many sutures for fixation of graft to the vagina?

Of the 13 RCTs included in this review, one [8] employed a permanent monofilament suture, four [10,11,16,20] a delayed absorbable polydioxanone suture (PDS), three [17–19] monofilament polytetrafluoroethylene (Gor-Tex), two [14,15] braided absorbable polyglactin sutures and one [12] polypropylene sutures. This evidence supports a Grade C recommendation for the utilization of either permanent or absorbable sutures for fixing the mesh at the vagina during sacrocolpopexy.

The number of sutures used for vaginal graft attachment is, in general, poorly described (Table 2) and ranges from 2–3 [10,11] to 6–10 [12,18,19] on the anterior and posterior vagina.

No evidence-based consensus could be reached on the number of sutures necessary to secure the mesh to the vagina (Grade D).

7) Where and how on the sacrum to fix the mesh?

Of the 13 RCTs evaluated in this review, the graft was secured to the sacrum with a permanent titanium tacker in two studies [10,11], with either a permanent tacker or suture at the surgeon's discretion in one [16] and with permanent sutures in four [14,15,18,19]. The remaining studies did not define their sacral fixation method.

In a recent case-control study of 35 patients in whom the mesh was secured on the sacral promontory with titanium tackers and 65 suture controls [28], there were no significant between-group differences in terms of anatomical correction or complications rates. Nevertheless, there was a significant worse lumbar pain intensity and quality of life in the tacker group.

A Grade C recommendation supports either titanium tackers or permanent sutures for securing the mesh to the sacrum.

The site of fixation of the mesh to the sacrum was the sacral promontory in two studies [10,11], the area just below the promontory in three [14–16], the anterior longitudinal ligament at the level of S1-2 in one [18] and the anterior longitudinal ligament at or below the sacral promontory in another one [19]. The remaining RTCs in this review did not state the site of sacral fixation of the mesh.

Grade C recommendation supports securing the mesh at or just below the level of the sacral promontory at sacrocolpopexy.

In a review of 21 cases of pyogenic spondylitis following sacrocolpopexy reported in the literature [29] the authors

determined that the safest site of securing the mesh was the "true" sacral promontory which lies 1.5 cm below L5-S1 intervertebral disc.

8) Should the peritoneum be closed over the mesh?

Of the RCTs included in this review two [8,9] did not report on closing or not the peritoneum over the mesh, in two [13,17] the decision was left to the surgeon's discretion, and the remaining nine trials reported closing the peritoneum. In a single retrospective series of 128 cases evaluating bowel complications post sacrocolpopexy, authors reported no postoperative bowel complications when the peritoneum was not closed over the mesh [30].

Grade C recommendation supports closure of the peritoneum at the completion of sacrocolpopexy.

9) What to do in case of bladder or bowel injury during sacrocolpopexy?

There is no data available on the management of bladder injury during sacrocolpopexy. The panel conducting this review unanimously agreed that bladder injuries should be repaired in the normal fashion and the sacrocolpopexy should proceed as long as the mesh is not in contact with the injury repair (Delphi process Grade C).

As far as bowel injury is concerned, no evidence-based recommendations could be made from the literature. A simple small bowel injury should be repaired and sacrocolpopexy completed. A complicated small bowel injury (diathermy or thru and thru injury) or large bowel injury requires an intraoperative surgical consultation and deferral of sacrocolpopexy (Delphi process Grade C).

10) Open, laparoscopic or robotic assisted sacrocolpopexy?

Three RCTs [16,17,20] addressed this issue. Freeman et al. [16] demonstrated that the LSC and ASC had similar anatomical outcomes with reduced blood loss, length of stay and pain after the LSC. The LSC has also been compared to robotic sacrocolpopexy (RSC) in two RCTs [17,20], with both approaches being equally effective at correcting the prolapse, while the LSC had reduced operating time, post-operative pain and cost compared to RSC.

Laparoscopic seems to be the preferred approach to sacrocolpopexy (Grade B recommendation).

Comment

While sacrocolpopexy has been first described over fifty years ago and nearly twenty years have passed since Dr. Benson's landmark randomized surgical trial, there are still many uncertainties relating to indications/patient selection for sacrocolpopexy and its preferred technical aspects. A Grade A of recommendation was feasible for only one of the 10 questions set in this review (Table 3): sacrocolpopexy is the preferred procedure for apical vaginal prolapse. Laparoscopy was given a Grade B recommendation as the most advantageous approach to sacrocolpopexy. However, the lengthy learning curve associated with laparoscopic sacrocolpopexy may represent a barrier to the uptake of this technique [29].

While uterine prolapse is more common than post-hysterectomy prolapse, only 21% of the patients included in RCTs contributing level 1 evidence for sacrocolpopexy versus vaginal interventions underwent concomitant hysterectomy. Efficacy data for sacrocolpopexy with versus without uterus preservation is scarce. Furthermore an analysis of levels 2-3 data has demonstrated a significant increase in the risk of mesh exposure if hysterectomy is performed at the time of sacrocolpopexy. Recent trials have proposed uterus preservation or sub-total hysterectomy as a measure of avoiding mesh complications. Further, well-designed and large studies evaluating sacrocolpopexy in those with uterine prolapse are required to address the issue of hysterectomy versus uterus preservation.

Level 1 evidence is generally supportive of performing both retropubic surgery and vaginal repairs at time of sacrocolpopexy. Level 2 data is also supportive of paravaginal repair being performed concomitantly at the surgeon's discretion (presumably in those with low anterior compartment prolapse). However, performing these repairs at time of sacrocolpopexy has become less common in clinical studies especially those including the robotic or laparoscopic approaches and, in fact, some protocols specifically exclude retropubic or paravaginal repairs [17,19]. Further trials addressing this issue are needed.

Even though the use of polypropylene mesh for sacrocolpopexy received a Grade B recommendation, significant variation exists in the styling of the graft, type and number of sutures fixating the graft to the vagina and to type and site of fixation to the sacrum. This suggests that variability in the technical aspects of the surgery is either well tolerated or that the studies are not adequately powered to identify any differences that may exist.

The limitations of this paper relate to the weaknesses of evidence-based medicine that attempts to evaluate clinical practice. We acknowledge that evidence from RCTs or meta-analysis takes years to accumulate, frequently include relatively small numbers relative to those undergoing an intervention and often lag changes in clinical practice that may have already developed to address any identified concerns. This has certainly occurred in the area of sacrocolpopexy as identified above. Nevertheless, the process of applying the Oxford grading system

Table 3
List of the grade of recommendation for each of the 10 questions relating to sacrocolpopexy.

Q.1	Sacrocolpopexy is the preferred procedure for apical vaginal prolapse	Grade A
Q.2	Uterus preservation at sacrocolpopexy is associated with lower mesh exposure rates	Grade B
	Currently cannot be recommended for uterus preservation or hysterectomy during sacrocolpopexy in terms of efficacy	Grade D
Q.3	Concomitant retropubic and vaginal repair procedures should be performed as required at sacrocolpopexy	Grade B
Q.4	Polypropylene mesh is recommended for sacrocolpopexy	Grade B
Q.5	Y-shaped mesh is a suitable design for sacrocolpopexy	Grade B
	Dual sheets of mesh secured at the sacrum is an effective mesh design for sacrocolpopexy	Grade C
Q.6	Both permanent and delayed absorbable sutures can be used to secure the mesh to vagina during sacrocolpopexy	Grade C
	No conclusion could be reached on number of sutures required to fix the mesh to the vagina	Grade D
Q.7	Sacral promontory is the preferred site of fixation of the mesh to the sacrum	Grade B
	Either permanent sutures or titanium tackers may be used to fix the mesh to the sacrum	Grade C
Q.8	Peritoneum should be closed at sacrocolpopexy	Grade C
Q.9	Uncomplicated bladder injuries should be repaired and sacrocolpopexy completed	Grade C (Delphi)
	Simple small bowel injury should be repaired and procedure completed	Grade C (Delphi)
	Large bowel and complicated injury to the small bowel require surgical consultation and deferral of sacrocolpopexy	Grade C (Delphi)
Q.10	Laparoscopic seems to be the preferred approach to sacrocolpopexy	Grade B

of evidence to the 10 questions set by this review is strength of this manuscript. The process has allowed us to reflect on the strength of the data undermining our clinical assumptions and highlights the significant areas where clinical practice is not evidence based.

In summary, sacrocolpopexy remains an important option in the armamentarium of the female pelvic reconstructive surgeon. However significant variations exist in the indications for the intervention and in nearly every technical aspect of how the surgery is performed.

Issues that need further evaluation in future trials are especially those of uterus preservation or hysterectomy in sacrocolpopexy for uterine prolapse, performance or not of concomitant retropubic procedures or vaginal repairs and possible ways of reducing the risk of mesh complications.

Appendix A. Ten review questions regarding sacrocolpopexy

1. How the efficacy of sacrocolpopexy compares to that of alternative, apical vaginal suspension procedures?
2. To perform hysterectomy or preserve the uterus during sacrocolpopexy?
3. Should anti-incontinence surgery and vaginal repairs be performed at the time of sacrocolpopexy?
4. Which type of graft material to use for suspension to the sacrum?
5. What design of graft material is optimal: two pieces of mesh or one Y-shaped graft?
6. What type and how many sutures for fixation of graft to the vagina?
7. Where and how on the sacrum to fix the mesh?
8. Should the peritoneum be closed over the mesh?
9. What to do in case of bladder or bowel injury during sacrocolpopexy?
10. Open, laparoscopic or robotic assisted sacrocolpopexy?

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