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ORIGINAL ARTICLE

Laparoscopic sacrocolpopexy for uterine and post-hysterectomy prolapse: anatomical results, quality of life and perioperative outcome—a prospective study with 101 cases

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Abstract Our prospective study evaluates laparoscopic sacrocolpopexy for vaginal vault prolapse focusing on perioperative data, objective anatomical results using the pelvic organ prolapse quantification (POP-Q) system and postoperative quality of life using the Kings Health questionnaire. One hundred one patients completed the study. Fifty five had laparoscopic supracervical hysterectomy and sacrocolpopexy for uterine prolapse and 46 had laparoscopic sacrocolpopexy for post-hysterectomy prolapse. Median follow-up was 12 months. The subjective cure rate was 93% the objective cure rate (no prolapse in any compartment) according to the International Continence Society classification of prolapse was 98%. The main site of objective recurrence (6%) was the anterior compartment. No apical recurrences and no vaginal mesh erosion occurred. Postoperatively overall quality of life and sexual quality showed significant improvement with less than 1% de-novo dyspareunia. The procedure is recommended for experienced laparoscopic surgeons because of severe intraoperative complications like bladder or rectal injuries.

Keywords Laparoscopic prolapse repair · Laparoscopic sacrocolpopexy · POP-Q · Quality of life · Sacrocolpopexy · Vaginal vault prolapse repair

Introduction

With hysterectomy constituting one of the most frequently performed operations, vaginal vault prolapse is a very common phenomenon and occurs in about 0.2–45% after hysterectomy [1, 2]. Traditionally, two methods exist to repair a vault prolapse: the vaginal approach performing a sacrospinous fixation and the abdominal approach involving a sacrocolpopexy. The abdominal approach has been reported to be superior to the vaginal method regarding outcome [3–5] and functionality, especially sexual activity. Because of the higher morbidity of the abdominal approach many surgeons still prefer the vaginal approach.

Laparoscopic sacrocolpopexy combines the advantage of the abdominal approach with low postoperative morbidity. The advances in laparoscopic techniques since first reported in 1994 [6] and the better vision of the lower pelvis could also lead to improvement in functional results. But the lack of randomized controlled trials comparing the laparoscopic with the vaginal approach, especially with mesh augmentation, makes it difficult to decide, which technique is superior.

Most published studies on laparoscopic sacrocolpopexy are retrospective and only a few prospective studies evaluate standardized anatomical results of laparoscopic sacrocolpopexy using the POP-Q system [7]. To our knowledge, this is the largest prospective study on laparoscopic sacrocolpopexy evaluating 101 laparoscopic sacrocolpopexies. We report on the perioperative data, the objective anatomical results using the POP-Q system and the postoperative quality of life using the Kings Health questionnaire [8] in a short term follow-up.

Material and methods

Our urogynecology unit belongs to the Obstetrics and Gynecology Department of a public teaching hospital in Switzerland. We started with laparoscopic sacrocolpopexy

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in 2003. After 20 pilot interventions we collected data from all patients receiving a laparoscopic sacrocolpopexy from October 2003 till July 2007 according to the study protocol for this prospective observational clinical study.

All patients had a clinical examination pre- and postoperatively to assess the degree of prolapse using the pelvic organ prolapse quantification system (POP-Q) [7]. Objective cure rate was defined as no prolapse in any compartment. The examination was performed by an experienced urogynecological specialist in the lithotomy position.

Before surgery, all patients underwent a urodynamic evaluation including urethrocystometry, urethral pressure profiles and flowmetry. Postoperatively, we performed a urodynamic follow-up if a patient presented with a new stress or urge urinary incontinence.

Using a visual analog scale and the German version of the Kings Health questionnaire [8] on urinary incontinence we assessed the quality of life pre- and postoperatively. This questionnaire was applied because at the beginning of our study, there was no validated German questionnaire available for patients with pelvic organ prolapse. Sexual function was evaluated via the King Health questionnaire on sexuality, and five additional questions focusing on general sexual satisfaction, sexual frequency, changes in orgasm, dyspareunia, and incontinence during intercourse.

We also assessed the position and mobility of the bladder neck and the position of the anterior mesh via perineal ultrasound at rest and during Valsalva before and after surgery using the standards described by Schaer et al. [9, 10]. Postoperative follow-up was performed 3, 6, 12, and 24 months after surgery.

All patients participated after informed consent. The local ethical committee was informed and waived committee approval for this study because laparoscopic sacrocolpopexy as well as urodynamic and perineal ultrasound evaluation are standard procedures in our clinic.

All operations were performed by the first author or the senior author, two accomplished urogynecologists experienced in laparoscopic surgery. All operations took place under general anesthesia in a lithotomy position with legs laid flat, with a Foley catheter in the bladder. All patients received perioperative antibiotic prophylaxes; 2 g intravenous cephazolin. If the uterus was still present, a Clermont–Ferrand uterine manipulator (Storz) was placed in the uterus until the supracervical hysterectomy was performed. The manipulator was then removed and a special designed reusable vaginal manipulator with an exchangeable top (Fig. 1) was placed in the vagina with the screw introduced into the cervical stump. The same vaginal cuff manipulator with the round top was inserted into the vagina of patients with post-hysterectomy prolapse. A rectal probe was positioned in the rectum for better exposure of the recto-vaginal septum.

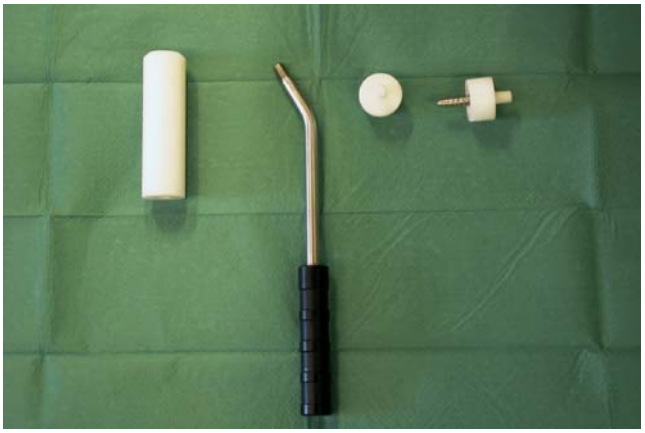

Fig. 1 Special designed Vaginal cuff and cervical stump manipulator for Sacrocolpopexy. Vaginal manipulator with exchangeable top. For cases of post-hysterectomy prolapse the round top was used. When supracervical hysterectomy was performed the top with the screw was used

One 12 mm trocar was inserted 5 cm above the umbilicus for the scope, two 5-mm trocars were placed each laterally to the rectus muscle about 3 cm above and medially to the superior anterior iliac spine and one midline 5-mm trocar was placed about 3 cm caudal to the umbilicus. Most of the instruments were reusable, all operations where performed with a 30° scope and with bipolar and monopolar diathermy. If a uterine prolapse was present we first performed a supracervical hysterectomy, the corpus uteri was then extracted with the Storz–Morcellator. The dissection started at the level of the promontory where the anterior longitudinal ligament of the sacrum was exposed. The peritoneum was then incised parallel to the sigmoid from the promontory to the pouch of Douglas. With the vaginal and rectal manipulators in situ the recto-vaginal septum was exposed and opened. The posterior dissection was performed up to the ventrolateral part of the levator ani muscle. Anteriorly, the vesico-vaginal fascia was dissected up to the lower third of the vagina just below the trigonum of the bladder. Two separate meshes, Gynemesh® (Johnson&Johnson) a macro porous multifilament polypropylene mesh, were used for the anterior and posterior compartment. The posterior mesh was manually cut to a Y-shape (approximately 15–18 cm by 3–4 cm depending on patients' size) and sutured caudally to the levator ani muscle and proximally to the apex of the vagina or the cervical stump. The anterior mesh (approximately 12–15 cm by 3–4 cm depending on patients' size) was placed underneath the bladder and attached to the caudal part of the vagina and the apex with a four-point fixation. The anterior and posterior mesh were sutured together at the level of the vaginal apex and then attached without tension to the longitudinal sacral ligament at the level of S2. No staples or bone-anchors were used. All fixations (levator

ani, vagina, and longitudinal ligament) were performed by laparoscopic suturing using Ethibond® 2-0 with extra corporal knotting technique. Vaginal suturing was performed tangentially to minimize the risk of postoperative erosion. Finally a complete peritonealisation of the mesh was achieved by a laparoscopic running suture with absorbable material.

At the end of the procedure, a suburethral sling, TVT-O® (Johnson&Johnson), was placed under the mid-urethra when urodynamically proven concomitant stress urinary incontinence was present. Patients with a new postoperative stress urinary incontinence received either a pelvic floor re-education program or a sling procedure 4–6 weeks after the prolapse surgery.

Results

A total of 135 patients underwent laparoscopic sacrocolpopexy in our clinic between October 2003 and July 2007. The first 20 pilot interventions were not included in the study. 11 patients were excluded because of incomplete perioperative and follow-up data and 3 patients were excluded due to concomitant laparoscopic operation of a rectal prolapse. None of these 14 excluded patients had any severe intraoperative complications. For 101 patients complete data could be evaluated according to the study protocol.

The median follow-up was 12 months (range 3 to 24 months). Demographic and urogynecological history data are shown in Table 1. 46 patients had laparoscopic sacrocolpopexy only; 55 had simultaneous supracervical hysterectomy and 30 a concurrent suburethral sling (TVT-O®, Johnson&Johnson) procedure because of manifest urinary stress incontinence.

Table 1 Demographic data and prior urogynecologic surgery

	Number of patients	Percentage
Mean age	62 (36–81)[a]	
Parity	2.7 (0–6)[a]	
BMI	26 (19–38)[a]	
Post hysterectomy vault prolapse	46	45.6
Uterocervical prolapse	55	
Stage II prolapse[b]	25	24.8%
Stage III prolapse[b]	59	58.4%
Stage IV prolapse[b]	17	16.8%
Prior hysterectomy, pelvic prolapse or incontinence surgery:		
Hysterectomy	46	
Vaginal prolapse surgery	18	17.8%
Abdominal prolapse surgery	9	8.9%
Vaginal mesh prolapse surgery	3	2.9%
Suburethral slings	2	1.9%
Burch colposuspension	13	12.9%

[a] Median(range)
[b] Prolapse stage according to ICS classification

The median duration of surgery for laparoscopic sacrocolpopexy alone was 141 min (70–210) combined with a supracervical hysterectomy it was 154 min (80–235). If a simultaneous TVT-O® procedure was performed, the mean additional operating time was 19 min including re-positioning of patients and surgeons. Mean blood loss was 95 ml; there were no perioperative blood transfusions.

There were two conversions to laparotomy, one because of a rectal lesion and one because of severe adhesions.

There were three cases with rectal injury: one was repaired laparoscopically and one through laparotomy; they had no postoperative problems. Both received metronidazol 1 g and gentamycin 240 mg intraoperatively as additional single shot antibiotic prophylaxis. For the case repaired laparoscopically surgery was not modified and the distal part of the mesh was placed at the same site (levator ani). During repair laparatomy of the second case it was not possible to expose the levator ani therefore the mesh was sutured to the mid vagina. The third rectal injury was not recognized at the time of surgery, probably because it was a thermal lesion. This patient developed a septical peritonitis 2 days after surgery and underwent laparotomy with flushing and drainage and a sigmoidostomy. The mesh was excised during revision laparotomy. Postoperatively, the patient did well and the sigmoidostomy could be reversed after 3 months. Despite mesh removal, the patient showed no symptoms of recurrent prolapse till now, probably due to post-inflammatory fibrosis of the pelvis.

Four bladder lesions occurred; which were repaired laparoscopically and needed a Foley catheter for 7 days after surgery. Three of these patients had no further postoperative complications. Despite a good outcome initially one of these patients presented with dysuria and hematuria 6 months postoperatively caused by a mesh erosion into the bladder. In this case a laparoscopic cystotomy with partial resection of the anterior mesh and bladder repair was performed. After 10 days with a Foley catheter, the patient had no voiding problems and at the 3 months follow-up the patient was still asymptomatic.

We had no other case with mesh erosion during our median 12 months follow-up, especially no vaginal mesh erosions.

One case with bleeding from epigastric vessels occurred after trocar insertion and in one case, the vagina was opened accidentally. Both could be managed laparoscopically with a suture.

Immediate postoperative complications included one mechanical ileus that required laparotomy 4 days after initial surgery due to early adhesions. During laparotomy, we could not see the mesh because it was still fully

Table 2 Interventions and duration of surgery

	Total	Laparoscopic Sacrocolpopexy	Laparoscopic supracervical hysterectomy and sacrocolpopexy	Additional suburethral sling (TVT-O®)
Number of patients	101	46	55	30
Percentage	100	45.50%	54.50%	29.7%
Median duration of surgery(min)		141 (70–210) min	154 (80–235) min	+19 min (15–35)

peritonealized. The patient was treated with an adhesiolysis and a bowel segment resection and presented no other postoperative and long-term complications, especially no mesh infection or erosion.

Eight patients presented with postoperative voiding dysfunction, requiring suprapubic drainage, seven of them after concurrent TVT-O® procedure. In five of these cases, the problem resolved spontaneously within 2 weeks. Two patients needed transection of the suburethral sling 6 weeks after initial surgery. After this intervention, the voiding dysfunction was resolved and no new stress urinary incontinence occurred.

In 24 cases (23.8%) a postoperative stress urinary incontinence occurred in the first weeks after laparoscopic sacrocolpopexy. In 15 of these cases, a secondary TVT® or TVT-O® procedure was performed 4–6 weeks after primary surgery and all of these patients were cured from stress urinary incontinence without any micturition disorders. The other nine cases with de-novo stress urinary incontinence were managed conservatively with physiotherapy.

There were two patients reporting recent urinary urge symptoms at the 3 months follow-up that were treated medically and disappeared at the 6 months follow-up. There was no patient with long-term primary detrusor instability.

At the 3 months follow-up, 19 (18.8%) patients presented with postoperative primary constipation that occurred immediately after surgery. In 18 of these 19 cases constipation disappeared during the first 3–6 months after surgery with laxatives or dietary measures. There was one patient with a long-term obstructed defecation not responding to therapy without any clinically visible cause. We performed a defecography that showed no abnormalities especially no rectocele and no rectum angulation on the mesh.

Seventeen patients (16.8%) presented with urinary tract infections, one patient with wound infection at the site of the optical trocar insertion. The median postoperative hospital stay was 4.6 days (2–8).

An overview of the perioperative results is shown in Tables 2 and 3.

The median visual analogue scale score on quality of life preoperatively was 5.6 (minimum score 0, maximum score 10) and 9.1 at the 3 months follow-up, this score did not change during further follow-up visits.

Preoperatively, 54 of 101 patients were not sexually active because of other reasons 12 because of prolapse symptoms. Eight of these patients (66.7%) reported a normal sexual life at the 6 months postoperative follow-up.

Forty seven patients were preoperatively sexually active. At the 6 months follow-up, 39 of them (83%) stated an equal or better sexual life and one patient (1%) reported a de-novo dyspareunia.

Preoperatively, 17 of the 101 patients in our study (16.8%) presented with stage IV prolapse, 59 (58.4%) with stage III prolapse and 25 (24.8%) with stage II prolapse according to the ICS classification [7]. All patients were symptomatic.

Postoperatively, we defined the patient as objectively cured if according to the ICS classification [7] there was no evidence of prolapse (Stage 0) in any compartment. We had

Table 3 Outcome and complications

	Number of patients	Percentage
Conversion to laparotomy	2	2%
Rectal injury	3	3%
Bladder injury	4	4%
Port insertion bleeding from epigastric vessels	1	1%
Intra-and postoperative blood transfusions	–	
Accidental Vaginal opening	1	1%
Septical peritonitis	1	1%
Mechanical Ileus	1	1%
Urinary tract infection	17	16.80%
De novo stress incontinence	24	23.80%
Surgery for postoperative stress incontinence	15	14.90%
De novo urge incontinence	2	2%
Postoperative constipation for 3–6 months	18	17.80%
Postoperative constipation >6 months	1	1%
Postoperative voiding disorders	8	7.90%
De novo dyspareunia	1	1%
Mesh erosion	1	1%
subjective cure rate		98%
Objective cure rate		92%
Median hospital stay after surgery (days)	4.6 (2–8)[a]	
Median blood loss	95 ml	

[a] Median(range)

no recurrences in the apical compartment. There were two (2.0%) recurrences in the posterior compartment one with stage I prolapse and one patient with stage II prolapse, both were asymptomatic.

Six (5.9%) patients had a recurrence in the anterior vaginal wall, four of them a stage II prolapse and two a stage I prolapse. Two of these six patients with recurrent prolapse of the anterior vaginal were symptomatic 12 months after initial surgery. In both cases, the apical compartment was still well attached. One of these patients underwent further vaginal prolapse surgery with an isolated vaginal mesh augmentation (Prolift®) of the anterior wall; the other patient did not have further surgery till now because of mild prolapse symptoms. The other four patients with anterior compartment recurrence were completely asymptomatic.

According to these results, we had a subjective cure rate of 98%, an objective cure rate of 92% (median follow-up of 12 months).

The objective anatomical results of the pre- and postoperative POP-Q evaluation at 3, 6, 12, and 24 months of follow-up are shown in Fig. 2.

Discussion

With 101 patients, this, to our knowledge, is the largest prospective controlled study evaluating functional and objective anatomical outcome of laparoscopic sacrocolpopexy.

Our subjective cure rate of 98% was able to show that laparoscopic sacrocolpopexy is an excellent procedure to resolve patients' prolapse symptoms in a short time follow-up. Our results compare well with those of prospective studies by Gadonneix et al. [11] and Ross et al. [12] evaluating laparoscopic sacrocolpopexy and with those evaluating abdominal sacrocolpopexy [13, 14].

Using the POP-Q system pre- and postoperatively, we demonstrated an overall objective cure rate of 92% and that the main site of objective recurrence was the anterior compartment (5.9%).

The overall objective cure rate in our study is in line with the studies by Ross [12], Cosson [15] and Rozet [16] reporting objective cure rates of 93%, 96%, and 94% respectively.

We did not have any apical recurrence showing that laparoscopic sacrocolpopexy gives optimal support to the

POP-Q Results pre-and postoperatively

POP Q	pre-op	3 months	6 months	12 months	24 months
Aa	-1(±1.8)*	-2(±1)	-2(±1.2)	-2(±1.1)	-2(±0.7)
Ba	1(±2.8)	-5(±1.5)	-4(±2.1)	-4(±1.9)	-4(±1.4)
C	-1((±3.4)	-9(±1.1)	-8(±2)	-8(±2)	-7 (±2)
D	-2(±4.8)	-9(±1.2)	-9(±2.7)	-9(±3)	-9(±1.5)
Ap	-2(±1.3)	-3(±0.7)	-3(±1.1)	-3(±1.4)	-3(±0.6)
Bp	-3(±3.1)	-5(±1.1)	-5(±1.5)	-5(±1)	-5(±1)

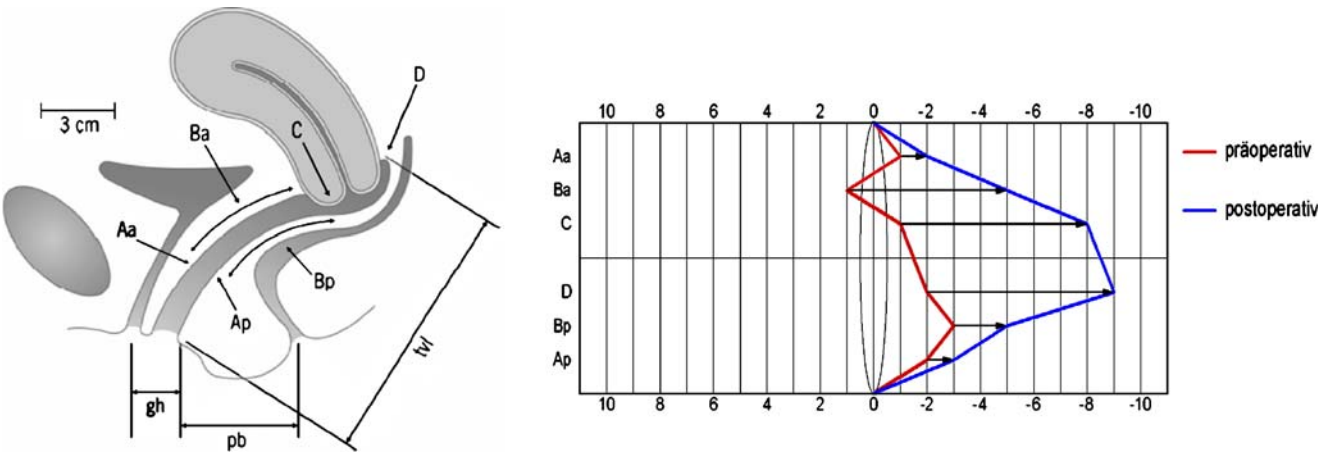

Fig. 2 Pre- and postoperative POP-Q Results. *results are presented in the table as mean with the standard deviation in brackets. Pre- and postoperative POP-Q evaluation and at the 3,6,12 and 24 months follow-up. Anatomical correlations of the mean POP-Q scores are given and illustrated graphically. Point D is only for patients with cervix in situ

apical compartment. By placing the posterior mesh at the level of the pelvic floor and omitting concomitant laparoscopic Burch colposuspension, we had only 2% posterior objective recurrences. In a prospective study by Gadonneix et al. [11], who reported an anatomical cure rate of 83%, the main recurrence was rectocele (12%), but only in women who simultaneously underwent laparoscopic Burch suspension. This fact underlines the probable enhanced risk of recurrent rectocele if a concomitant Burch colposuspension is performed as already stated by Gadonneix [11] and Antiphon et al. [17].

The most objective recurrences in our study were in the anterior compartment (5.9%). We like to comment that out of the 6 patients with anterior compartment recurrence only two were symptomatic. Wattiez et al. [18] advocated the need of systematic retropubic dissection after laparoscopic sacrocolpopexy to search for an eventual paravaginal defect. Some of our anterior recurrences could have been caused by a significant paravaginal defect that was not sufficiently repaired by laparoscopic sacrocolpopexy alone. Nevertheless we think that because of the morbidity and the longer duration of a simultaneous laparoscopic paravaginal repair this approach is not justified for only 2% of symptomatic anterior recurrences in our study.

We could demonstrate that the patients' over all quality of life was significantly improved postoperatively. We also could demonstrate that sexual activity after laparoscopic sacrocolpopexy was equal or improved and that de-novo dyspareunia is negligible (less than 1% in our study). This compares well with other studies [12, 19] evaluating laparoscopic sacrocolpopexy and significantly lower than reported after vaginal prolapse surgery, especially with mesh augmentation that reported dyspareunia rates between 5 and 38% [3–5]. Because of these findings, we think that even in absence of a randomized controlled trial, laparoscopic sacrocolpopexy should be proposed especially to young sexual active women suffering from apical compartment prolapse.

In the 55 cases with uterine prolapse, we performed a concomitant laparoscopic supracervical hysterectomy and sacrocolpopexy. Total hysterectomy was avoided because of the theoretical risk of mesh contamination and erosion by opening the vaginal cuff even if the literature on that point is contradictory.

Our results show that vaginal mesh erosion after laparoscopic sacrocolpopexy alone or in combination with supracervical hysterectomy is insignificant (0% in our study) and in line with published data about laparoscopic sacrocolpopexy that report an erosion rate of 0–2% [11, 15, 16].

Postoperative micturition disorders after concomitant TVT-O® procedure occurred in 27% of cases suggesting that the combination of laparoscopic sacrocolpopexy and suburethral sling procedures is questionable. We recommend combined operations only in selected patients and suggest two-step procedures if postoperative stress urinary incontinence occur.

The most important postoperative long-term complication was constipation in 18.8% of the patients at the 3 months follow-up and resolved with medical treatment within 6 months after surgery in nearly all cases.

In our study, 14.9% of all patients required further surgery for urinary incontinence. None of these patients had signs of unapparent stress urinary incontinence in the preoperative clinical or urodynamic evaluation. This percentage is significantly higher than in other publications evaluating laparoscopic sacrocolpopexy [11, 15]. We can only assume that the demographic data with a high percentage of pre-operated women and a higher median age of 62 in our study may be a reason.

The main intraoperative complications were bladder (4%) and rectal (3%) injuries, demonstrating that this procedure requires surgical skills, a learning curve and that laparoscopic sacrocolpopexy should be performed only in institutions experienced in laparoscopic surgery. Even with this relatively high incidence, especially of rectal lesions, the outcome is good if the lesion is recognized and repaired intraoperatively.

Gadonneix et al. [11] reported 7% bladder injuries, other authors reported 0–6% [15, 19] bladder lesions, similar to those reported in open surgery [14]. Our rate of rectal injuries (3%) seems to be high compared with other laparoscopic series [11, 15, 16, 19, 20]. A possible reason could be the fact that in contrast to other series [20] we attached the posterior mesh to the levator ani muscle. The high percentage of prior vaginal prolapse surgery in our patients of more than 20% including vaginal mesh surgery could give another explanation. In a review article by Nygard et al. evaluating open sacrocolpopexy, the rate of rectal injuries was 0.4%–2.5% [14] and comparable with the results of laparoscopic studies.

Our data suggest that if a bladder or rectal injury is detected intraoperatively, the lesion can be managed laparoscopically or by open surgery according to the surgeons experience and that in these cases, the outcome seems to be unproblematic.

We could demonstrate that laparoscopic sacrocolpopexy is feasible, that operating time, blood loss and hospital stay is comparable with other publications [11, 15, 16]. We had a slightly smaller rate of 2% conversions to laparotomy than in other studies that reported conversion rates of 8–11% [11, 15].

There are many studies demonstrating the feasibility of laparoscopic sacrocolpopexy but most of them are retrospective [6, 15, 16, 18, 19, 20, 21]. To our knowledge, there are two prospective trials concerning laparoscopic sacrocolpopexy [11, 12] both of them with less than 50 patients. However, we have to acknowledge that our median follow-

up of 12 months was much shorter than in the studies by Ross (60 months) and Godonneix (24 months) [11, 12]. Our results, particularly complication rates and postoperative urinary disorders, should be interpreted carefully taking into consideration the epidemiological data of our patients, especially the fact that many patients had multiple prior pelvic surgeries for prolapse or incontinence.

The abdominal approach for sacrocolpopexy is a well-established technique for the treatment of pelvic organ prolapse with an excellent outcome and success rates between 86 to 100% even in a long-term follow-up of 10 years and more [14, 22–26]. It is also associated with a lower rate of recurrences and de-novo dyspareunia than the vaginal sacrospinous fixation [3, 4, 13]. Despite these evident advantages of anatomical and functional outcome especially in young and sexually active women, many centers still prefer the vaginal approach for the treatment of pelvic organ prolapse because of the longer operating time, longer time to return to activities of daily living and increased cost of the abdominal approach.

Laparoscopic sacrocolpopexy is a procedure that combines the advantages of transabdominal sacrocolpopexy with all the advantages of minimal invasive surgery. In the absence of controlled randomized trials comparing laparoscopic and open sacrocolpopexy, retrospective studies have shown [27, 28] that the two procedures have comparable clinical outcomes, that duration of surgery is longer in the laparoscopy group but hospital stay, blood loss and postoperative pain are in favor of the laparoscopic group.

It has to be stated that operating time and complication rate are extremely dependent on the experience of the surgeon.

In our opinion, the laparoscopic approach is not only a means for access to the abdomen but has significant advantages to open surgery. It gives a better view and is an atraumatic surgical technique without compromising the outcome. Also, the possibility to place the mesh at the level of the pelvic floor muscles could lead to an improvement in the outcome. This theory has to be proven by future randomized controlled trials.

Conclusions

Laparoscopic sacrocolpopexy with or without supracervical hysterectomy is a feasible and reproducible procedure with high subjective and objective cure rates, with very low rates of vaginal mesh erosions and de-novo dyspareunia in the short time follow-up.

Laparoscopic sacrocolpopexy should be performed by experienced laparoscopic surgeons and in experienced institutions as severe intraoperative complications like bladder or rectal injuries may occur.

The indication for simultaneous incontinence surgery should be weighed carefully and if in doubt, a separate procedure seems preferable.

More prospective studies with a long-term follow-up are needed to evaluate the long-tern outcome of laparoscopic sacrocolpopexy as well as randomized controlled trials comparing laparoscopic sacrocolpopexy with other procedures especially vaginal mesh surgery. But it might be difficult randomizing young sexually active women to the vaginal surgery taking into consideration the actual evidence of de-novo dyspareunia rates after vaginal surgery.

Conflicts of interest None.

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