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Evaluation of a Laparoscopic Sacropexy Technique: The Y Shape Method

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Abstract

Study objective: to review the feasibility, efficacy, and safety of laparoscopic promontofixation with a Y- shape mesh "trouser technique", combined with a systematic supra-cervical hysterectomy.

Methods: In this monocentric retrospective analysis, we included all women who underwent laparoscopic sacropexy with a Y-shape mesh between June 2005 to February 2020. Professor Jean- Luc Squifflet established the technique in our department. A supracervical hysterectomy is systematically perform during the same procedure if the uterus is still present. Preoperative evaluation, operative techniques, complications, short- and long-term outcomes were assessed.

Results: In this study, a total of 185 patients were included, with a mean age of 60.5 ± 9.8 years and a mean parity of 2.8 ± 1.7. The primary complaint reported before undergoing laparoscopic sacrofixation was vaginal discomfort. The mean operative time for patients who underwent laparoscopic sacrofixation with supracervical hysterectomy was 119 min, whereas for those had previously undergone supracervical hysterectomy, it was 105 min. We had 5 intraoperative complications (3 vesical breaches, 1 vaginal perforation, and 1 case of inhalation pneumonitis with an inflammatory syndrome and peripheral pulmonary embolism). The average hospital stay duration was 3.1 days. During postoperative consultations, 94% of the patients reported being completely satisfied. We have recorded long term follow up for 95 patients. Among them, we noted 2 cases of relapse, 12 patients reported complaints of constipation, and 1 patient experienced mesh erosion.

Conclusion: Laparoscopic sacropexy with a Y-shape mesh is a feasible, safe and efficient technique associated with a low rate of complications and relapse.

Keywords: Pelvic organ prolapse; Laparoscopic sacropexy; the Y shape method; Supra-cervical hysterectomy

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Introduction

Pelvic Organ Prolapse (POP) is a common ailment with an 11% risk of surgery need in a lifetime. With the aging population, the number of POP surgery is expected to increase [1]. The prevalence of POP varies depending on the population studied and the definition used. Studies that assess the prevalence of prolapse based on subjective symptoms report a prevalence ranging from 2.9% to 8.3% [2]. The standard objective tool to evaluate the degree of prolapse is the Pelvic Organ Prolapse Quantification System (POP-Q). The POP-Q system uses nine reference points to define the degree of pelvic organ prolapse, with the hymen as the reference point. The prolapse is measured in centimeters while a Valsalva maneuver is performed lying on the back (Image 1, 2). The Baden Walker scale is the next most commonly use POP score (Image 3). Treatment should be proposed based on symptoms. The aim of the cure of POP is to restore a good quality of life using a minimally invasive technique that is safe and easily reproductible. Laparoscopic Sacropexy (LSP) is the gold standard technique to treat POP. It has demonstrated its effectiveness in reducing morbidity compared to laparotomy and in decreasing relapse rates compared to the vaginal approach [3]. There is no consensus in the literature regarding the optimal promontofixation technique.

The association of LSP with a hysterectomy should be discussed with the patient, especially in cases of postmenopausal patients, with at least the mandatory removal of the fallopian tubes.

Pelvic organ prolapse quantification system (POP-Q)	
Stage	Description
0	No prolapse, anterior and posterior points are all –3 cm, and C or D is between -TVL and -(TVL-2) cm
1	The criteria for stage 0 are not met, and the most distal prolapse is more than 1 cm above the level of the hymen (less than –1 cm)
2	The most distal prolapse if between 1 cm above and 1 cm below the hymen (at least one point is –1, 0, or +1)
3	The most distal prolapse is more than 1 cm below the hymen but no further than 2 cm less than TVL
4	Represents complete procidentia or vault eversion; the most distal prolapse protrudes to at least (TVL-2) cm

Figure 1: Pelvic organ prolapse quantification system.

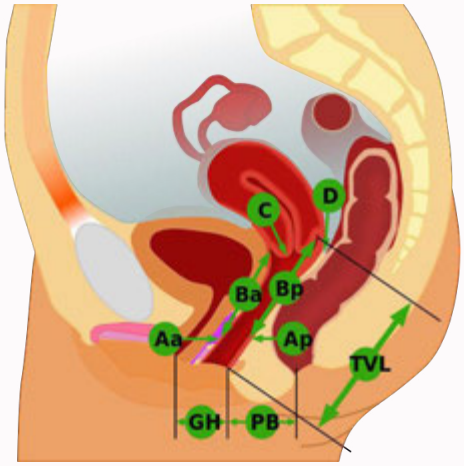

Figure 2: Valsalva maneuver.

When performing a hysterectomy, the supracervical approach should be preferred when there are no contra-indication. This approach is associated with a better success rate and a reduced risk of mesh erosion [4]. The most commonly used mesh is the synthetic one. Polypropylene mesh is described in almost all recent publications and appear to be safe and effective, as is Polyvinylidene Fluoride (PVDF) [5]. Expanded Polytetrafluoroethylene (PTFE) seems to be associated with more mesh exposure [6]. Biological prostheses, such as porcine graft compared to polypropylene mesh, was associated with more apical failure [7,8].

According to studies, there is no difference between tackers or non-absorbable sutures to fix the mesh to the promontory regarding estimated blood loss, operative time, rate of recurrence or reoperations, postoperative Dorso-lumbar pain, and complication rates [8]. The extent of dissection into the vesico- and/or recto-vaginal space remains without consensus with no high-quality data in publications. Classically, the mesh is fixed posteriorly by stitching it in the muscle levator ani, which requires an extended rectovaginal dissection and modifies the pelvis statics. Anchoring the meshes only to the vaginal apex without opening it and without extending dissection to the trigone or the muscles levator ani seems to have a good success rate, fewer complications (such as mesh exposure and cystotomie) and be time saving. It also appears to decrease urinary symptoms, pain, and constipation in short-term postoperative evaluation [8]. We developed at the Cliniques Universitaire Saint Luc a technique that allows lighter posterior dissection, fixing the mesh on the posterior wall of the vagina, then in the cervix that offers a good hanging point (one part of the "Y") and the anterior part of the

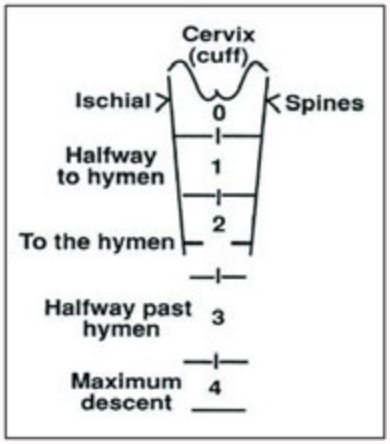

Figure 3: Baden Walker scale use for POP score.

'Y', stitches in the anterior wall of the vagina with no stitch in the bladder.

Methods

This is a monocentric observational retrospective study. We reviewed all the patients who underwent an LSP with a Y-shape mesh in the gynecological department of the Cliniques Universitaires Saint-Luc in Brussel, Belgium between June 2005 to February 2020. We decided to assess only the patients who had undergone a supracervical hysterectomy or had a history of supracervical hysterectomy associated to LSP.

After approval of the Ethical committee of the Cliniques Universitaire Saint Luc, 21-08-2023/B 403, we identified 185 patients who met our criteria.

Preoperative evaluation

We recorded in the medical file of the patient the clinical exam and degree of POP, evaluated with the Baden Walker scale, the cervical examen and the last PAP smear. Regarding the specific preoperative evaluation, we recorded urodynamic assessment, uterine cavity assessment and sacral radiography.

Operative technique

We initiate the procedure by performing a classical subtotal hysterectomy. The vesicovaginal space dissection is done during the hysterectomy. The orifice of the cervix is closed by an X stitch of monofilament resorbable 1-0. Thereafter, the posterior compartment is created by dissecting of the rectovaginal space. However, we do not extend this dissection as far or as laterally as the levator ani muscles. The mesh is fixed to the posterior wall of the vagina and the distance at which the mesh is fixed is dictated by the ease with which the rectovaginal space can be dissected; as soon as the plane is no longer easily dissected (i.e. significant recoiling of the vagina to the rectum), it is the sign that the tissues at this level are well fixed and do not need to be reinforced further down.

The dissection is continued on the right sight by opening the posterior peritoneum until we reach the sacral promontory. The coagulation of sacral vessels is done carefully.

The polypropylene mesh is cut with a Y shape. The arms are cut according to the anatomy of the patient, but in most cases the anterior arm is shorter with 3 cm to 4 cm long *vs.* 4 cm to 5 cm for the posterior one. The mesh is introduced in the abdomen by the central

trocar. The distal part of one arm is attached by a Polysorb 2/0 or BIOSYN 0 stitch in the rectovaginal space. The proximal part of this arm is fixed on the posterior cervix by two stitches. We do the same on the anterior dissection with the second arm of the mesh that we fix with one stitch in the vagina at the level of the end of the dissection of the vesicovaginal space and another proximally in the anterior part of the cervix. There is no opening of the vagina during the procedure.

The longest arm is anchored on the sacral promontory using 2 to 5 tackers, being careful not to put too much tension on the mesh. We performed full peritonization of the mesh with a V-lock 2/0. The prolapse reduction is check with a vaginal examination.

The operation is ended by the morcellation of the uterus. Before the surgery, an ultrasound is performed at all the patient to ensure that there is no endometrial anomaly, and in case of doubt, a hysteroscopy is performed preoperatively with endometrial biopsy.

A perioperative antibiotic one-shot was given systematically by cefuroxime 1.5 g and metronidazole 500 mg.

We retrospectively collected data about operating time, complications during the procedure and during the early postoperative period, and the duration of the hospitalization.

Postoperative assessment

We took the postoperative consultation and the last gynecological consultation of each patient. The collected data included subjective satisfaction, symptoms, relapses, and a review of the anatomopathological results.

Results

We include 185 patients in this study. Four surgeons performed all operations during the studied period. The mean age is 60.5 ± 9.8 years. The parity is 2.8 ± 1.7. The principal complaint before LSP was vaginal discomfort. Ten patients had urinary symptoms, one had constipation and one had ureterohydronephrosis. Forty-five patients had 2 complaints and 7 patients had 3 or more complaints. The mean degree of POP was cystocele 2.5 ± 0.9, uterine prolapse or elytrocele 2.5 ± 0.8 and rectocele 1.22 ± 0.8 (Table 1).

Before the intervention, all patients had a vaginal ultrasonography. Out of the 185 patients, 166 patients had a PAP smear, while 11 did not have one, and for 8 patients, the information was missing. A total of 45 women (24.3%) underwent a urodynamic assessment, and sacral radiography was performed preoperatively in 29 cases. Among the patients, 18 underwent intra-uterine hysteroscopy/biopsy due to abnormal ultrasound findings. Pathological analysis revealed normal results in 16 patients, while 2 patients had early simple hyperplasia of the endometrium.

The mean operating time for an LSP associated with a supracervical hysterectomy was 119 ± 28 min, for an LSP with a previous supracervical hysterectomy was 105.8 ± 33.2. No cases of hemorrhage were reported. In two cases, the access of the promontory was difficult, one because of obesity and the other because of multiple adhesions, but the two interventions remained possible by laparoscopy. We found 5 intraoperative complications (2.7%): 3 bladder breaches (1.6%), 1 vaginal perforation (0.5%) and 1 case of inhalation pneumonitis with an inflammatory syndrome and peripheral pulmonary embolism (0.5%).

In the immediate post-surgery period, there was one reintervention for bleeding on the stump of the round ligament, and one patient experienced plexopathy of the left upper limb, despite adopting a position in accordance with medical recommendations.

The mean hospitalization time was 3.1 ± 1.1 days. During this hospitalization, 94 patients had postoperative sacral radiography that shows that tackers were well placed in all cases (Table 2).

One hundred sixty-seven patients were seen in postoperative consultation in our hospital. One hundred fifty-seven of them said there were totally satisfied by the intervention (94%), 9 were satisfied but still had a complaint (5,4%) (3 had constipation, 1 suffered from lower back pain, 3 had urinary symptoms and 2 had constipation and urinary symptoms), and 1 patient said she was not satisfied because of constipation and more urinary symptom than before surgery (0.6%)

Table 1: Preoperative data.

Age (years):	60 ± 9.8
Parity:	2.8 ± 1.7
Initial symptoma:	Vaginal discomfort: 122 patients (65.9%)
	Urinary symptoma: 10 patients (18.5%)
	Constipation: 1 patient (1.8%)
	Ureterohydronephrosis: 1 patient (1.8%)
	2 complains: 45 patients (24.3%)
	3 complains: 7 patients (3.7%)
	>3 complains: 3 patients (1.6%)
Baden Walker (grade):	Cystocele 2.5 ± 0.9
	Uterine prolapsus/elytrocele: 2.5 ± 0.8
	Rectocele: 1.22 ± 0.8

Table 2: Perioperative data.

Operative time (minutes):	LSP with supracervical hysterectomy: 119 ± 28
	LSP with previous supracervical hysterectomy: 105.8 ± 33.2
Intraoperative complications (2.7%):	Vesical breach: 3 (1.6%)
	Vaginal perforation: 1 (0.5%)
	Inhalation pneumonitis with an inflammatory syndrome and peripheral pulmonary embolism: 1 (0.5%)
Immediate post-operative complication:	Reintervention for bleeding: 1 patient (0.5%)
	Left upper limb plexopathy: 1 patient (0.5%)
Hospital stays (days):	3.1 ± 1.1

Table 3: Postoperative consultation data.

Satisfaction:	Totally: 154 patients (94%)	
	Partially: 9 patients (5.4%):	Constipation: 3 patients
		Low back pain: 1 patient
		Urinary symptoma: 3 patients
		Constipation + urinary symptoma: 2 patients
	Not satisfied: 1 patient (0.6%)	

Table 4: Long-term postoperative data.

Time after the surgery (months):	42.4 ± 36.5
Relapse:	2 cases (2%)
Symptoma:	Constipation: 12 patients (12.6%)
	Mesh erosion: 1 patient (1%)

(Table 3).

In 168 cases, the anatomopathological assessment was benign (97.1%). We found 5 cases of malignant results (2.9%): 4 cases of focal Endometrial Intraepithelial Neoplasia (EIN) and 1 case of granulosa cell tumor of the ovary stage T1a. None of those patients present a recurrence of their pre-cancerous disease.

We have seen 95 patients in long-term postoperative consultation. The mean time after surgery was 42.4 ± 36.5 months. We found 2 relapses (2%) same or worse than before the intervention; 1 was a cystocele, and the other had a de novo rectocele. The principal complaint was constipation (12.6%). One patient had a mesh erosion (1%). We found no sacral complication (Table 4).

Discussion

The aim of the POP surgery should be the improvement of the quality of life. The major criterion to judge if this functional surgery is efficient is the subjective satisfaction of the patient. Although, safety, feasibility and postoperative complications of the surgery remain stay our first concern, laparoscopic sacropexy is a widely and commonly used surgery, but there is no consensus on a gold standard technique to perform it. Many techniques are used. The most described technic uses two separate meshes, one anterior and one posterior [9,10]. One study describes lateral suspension of the mesh that can be useful in case of difficult access to the promontory [11].

Hospitalization time in the literature is comparable to our study. We find a mean time of 1.8 to 4.1 days [4,12,13]. In our series, hospitalization time is decreasing with the years. In 2010, the normal stay at the hospital was 4 to 5 days, but after 2015, patient was discharged from the hospital after 2 days. In 2018, Rambeaud et al. have shown, with a small cohort study, that outpatient LSP was feasible if there were no complication and if patients were well selected [14].

In the literature, the operative time taken to perform an LSP associated with a supracervical hysterectomy using a double mesh is 160 min to 180 min [4,15] and in one study, it was 123.6 ± 26 min [13]. In our study, the mean operative time is 119 ± 28 min. It is principally dependent on the pelvic status, on the experience of the surgeon and might be relate to the depth of vesico- and recto-vaginal dissection. We found a slight decrease in surgery time with the Y-shape mesh. Perioperative complication rate is difficult to compare because it depends on the one you include. Globally, in the literature, the rate varies around 8.4% [16]. In our study we have 2.7% of intraoperative complications. This rate can be considered low and very acceptable regarding the severity of the complication. We had no case of laparoconversion in comparison to the 0.3% rate reported by Bojahr [13] and the 2.2% described by Rozet [17].

As mentioned before, a major characteristic to evaluate the surgery is the subjective satisfaction of the patient. We had 94% of patients who were totally satisfied. 5.4% were satisfied but still had one complaint, mostly constipation. Patients are often unsatisfied because the primary complaint has not been resolved or there is a *de novo* symptom. In the literature de subjective success rates varies from 89% to 100% after an LSP associated with a supracervical hysterectomy [10]. Unfortunately, we have not found a standard definition of the relapse to standardize the statistics. We decided to define the recurrence as the same or worse POP than before the intervention. Long-term follow-up shows a rate of 2% relapses with a follow-up of 42.4 ± 36.5 months. In the review of Ganatra et al. [10], the relapse rate based on the 11 studies of LSP ranged from 0% to 42% with a mean follow-up of 24 months.

Concerning mesh exposure, Nygaar et al. [18] found a 10.5% probability at 7 years. Risk factors are the type of mesh used, the association with a hysterectomy, and the tobacco habit [19]. We had 1% of mesh exposure. The fact that we select only patient with supracervical hysterectomy, that we do not perform a deep vaginal dissection neither opening the vagina nor transfixing it while we fix the mesh can be a hypothesis for this low rate. Cosma et al. [20] also showed that avoiding deep vaginal dissection shows a lower rate of 1.7% vaginal erosion. This rate can be compared to ours and supports the hypothesis that vaginal dissection should not be deep.

In our study, we assessed only patients with an associated supracervical hysterectomy to have more uniformized and reproducible results, which means we must morcellate the uterus. In case of suspicion of malignant pathology in the preoperative assessment, supracervical hysterectomy is contraindicated. Despite an ultrasound for all patients and a meticulous anamnesis, we still found 2.9% of pre-malignant pathology. Frick et al. [21] showed a risk of unanticipated uterine pathology of 2.6% among postmenopausal women with no history of abnormal vaginal bleeding and showed that this risk can be reduced by preoperative endometrial evaluation such as ultrasound or endometrial biopsy. Mansoor et al. [22] reported a rate of 1.4% of precancerous and cancerous cervix and endometrial pathology while PAP smear and ultrasonography were normal preoperatively.

Postmenopausal patient with a history of bleeding, even with a normal preoperative assessment should not have a supracervical hysterectomy.

As a limitation of our study, we should list its retrospective, non-randomized, monocentric, and without controlled group design: A randomized trial with good definitions of the techniques, indications and follow-up should be performed to assess the best techniques. The elevated rate of lost follow-up patients is also a bias. Despite these limitations, it is interesting to observe that the Y- shape mesh is a safe and feasible method of LSP.

Conclusion

This retrospective study confirms the safety and the feasibility of laparoscopic sacropexy with the Y-shape mesh while highlighting the perioperative risk and the postoperative complications. It appears to be a safe and rapid procedure with a short hospitalization time. We found a low rate of perioperative and long-term complications with a good patient. The recurrence rate was difficult to evaluate because clear definition of it does not exist. With our criteria we had only recorded 2% of relapsed.

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