

A Posterior Approach to Laparoscopic Sacrospinous Ligament Suspension

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ABSTRACT

Background and Objectives: Laparoscopic sacrospinous ligament suspension, as commonly performed, is associated with extensive stripping, high risk of intraoperative bleeding, and prolonged operative time. We explore the safety and feasibility of posterior laparoscopic approach sacrospinous ligament suspension (LPASLS) in the treatment of pelvic organ prolapse (POP).

Methods: We retrospectively analyzed the clinical data of 9 patients with symptomatic POP treated intraoperatively with LPASLS at the Women's and Children's Health Centre, The Third Affiliated Hospital of Chongqing Medical University, between November 2016 and July 2017. Regular follow-up was performed at 1, 3, and 6 months after the operation. Subjective cure was considered as the absence of any postoperative subjective symptoms, and objective cure was considered as a postoperative POP-Q grade of 0.

Results: All operations were completed successfully. The operative time ranged from 90 to 140 (mean, 117.78 ± 20.01) minutes, and the mean suspension time was about 30 minutes. The intraoperative estimated blood loss ranged from 30 to 100 (range, 54.9 ± 24.2) mL, and pelvic vascular injury occurred in 1 patient. Postoperative sacrococcygeal pain occurred in 5 patients, and Visual Analog Scale scores ranged from 3 to 4 (mean, 3.4 ± 0.5). The symptom disappeared without any treatment after 3–4 d. Patients were followed up for 3–10 (mean, 6.3 ± 2.1) months, and the subjective and objective cure rates were both 100%.

Conclusion: LPASLS is safe and feasible and may be considered as an alternative approach to traditional laparoscopic sacrospinous ligament suspension.

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Laparoscopic sacrospinous ligament suspension has been widely applied clinically as a new method for the treatment of pelvic organ prolapse (POP). This surgical approach exposes the sacrospinous ligament by dissecting the retropubic space and the pelvic sidewall space on both sides.¹ However, this approach is associated with extensive stripping, a high risk of bleeding, and a prolonged duration of surgery. In this study, we proposed a modified approach that we called laparoscopic posterior approach sacrospinous ligament suspension (LPASLS), wherein the sacrospinous ligament is exposed by dissecting the right pararectal loose tissue. The present study was conducted to explore the safety and feasibility of this LPASLS approach in the treatment of POP.

MATERIALS AND METHODS

Baseline characteristics

Nine patients with POP underwent LPASLS between November 2016 and July 2017 and were enrolled in the study. Their ages ranged from 45 to 66 (mean, 54.8 ± 7.0) years. In addition, gravidity ranged from 1 to 5 (mean, 3.6 ± 1.3) and parity from 1 to 3. There was no history of natural labor involving fetal macrosomia. Seven patients were admitted because of subjective POP. Among these 7 patients, gynecological examinations revealed that 3 patients had prolapse of the uterus accompanied by prolapse of the anterior and posterior vaginal walls, 3 patients had prolapse of the uterus with prolapse of the anterior vaginal wall, and 1 patient had only prolapse of the uterus. In the remaining 2 patients, complications occurred after mesh suspension. Of those patients, 1 had experienced lumbosacral pain for 2 months and reprotrusion of the vaginal wall (POP-Q stage II) after laparoscopic cervical sacroanterior mesh suspension 3 years previously and 1 patient had had abnormal vaginal bleeding for 9 months, which was diagnosed as postoperative

mesh erosion 2 years after laparoscopic hysterectomy, bilateral salpingectomy, and sacrocolpopexy (**Table 1**).

Of the 9 patients, 4 had histories of abdominal surgery and, of those, 1 underwent abdominal hysterectomy, bilateral salpingectomy, and laparoscopic cholecystectomy because of uterine fibroids and cholelithiasis; 1 underwent laparoscopy because of abdominal pain; 1 underwent laparoscopic anterior vaginal wall suspension and sacrocolpopexy because of uterine prolapse; and 1 underwent laparoscopic hysterectomy, bilateral tubal resection, and sacrocolpopexy because of uterine prolapse and uterine fibroids and had an abdominal appendectomy because of acute appendicitis. Six patients were postmenopausal, and 2 had undergone hysterectomy. One patient had coexisting hypertension, and 1 had coexisting uterine fibroids and cervical low-grade squamous intraepithelial lesions.

The inclusion criteria were (1) prolapse beyond the hymen accompanied by symptoms and (2) no fertility requirement. The exclusion criteria were (1) desire to retain the uterus and (2) intolerance to surgery because of severe cardiopulmonary disease or other complications.

Table 1.
Surgical Indications in the Nine Study Patients

Patient	POP-Q stages		
	Anterior Vaginal Wall	Uterus	Posterior Vaginal Wall
1	III	III	I
2	III	I	
3	III	III	I
4		III	
5	III	II	
6	III	I	
7	II	II	II
8 ^a	I	I	II
9 ^b	II		

^aReoperation for lumbosacral pain for 2 months and reprostitution.

^bReoperation for postoperative mesh erosion and abnormal vaginal bleeding for 9 months.

Surgical Methods

Preoperative Preparation

Routine iodophor vaginal scrub was performed twice a day for 3 d, and all patients received an enema on the last preoperative night. One postmenopausal woman who had obvious atrophy of the vaginal mucosa was treated with estriol cream for 1 week.

Surgical Procedure

Patients received intravenous anesthesia with endotracheal intubation and were placed in the lithotomy position. Then, an umbilical incision was made to construct an artificial pneumoperitoneum, in which a 10-mm trocar and laparoscope were inserted. Subsequently, two 5-mm trocars were inserted at the left midabdomen and left lower quadrant of the abdomen, respectively, and one 5-mm trocar was inserted at the right McBurney's point. Laparoscopic hysterectomy was performed routinely, and resection of ovaries, or fallopian tubes, or both on both sides depended on the condition of each patient. Vaginal anterior and posterior wall repair and perineal repair were performed for colpocystocele, douglascele, and old perineal lacerations, respectively. The vaginal stump was closed, and LPASLS was performed.

The LPASLS procedure was performed as follows:

(1) After identifying the right ureter, the retroperitoneum was longitudinally opened ~8 cm at the right pararectal groove and on the medial side of the right uterosacral ligament (**Figure 1**). Loose tissues were bluntly separated layer by layer to expose the coccygeus muscle on the surface of the sacrospinous ligament. The sacrospinous ligament was confirmed by touching the sciatic spine from the vagina (**Figure 2**).

(2) After confirming the sacrospinous ligament, the upper margin of the medial segment of the ligament was inter-

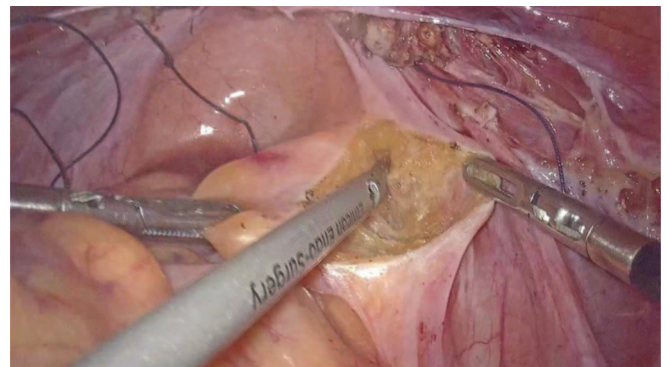


Figure 1. Open retroperitoneum of the right pararectal groove.

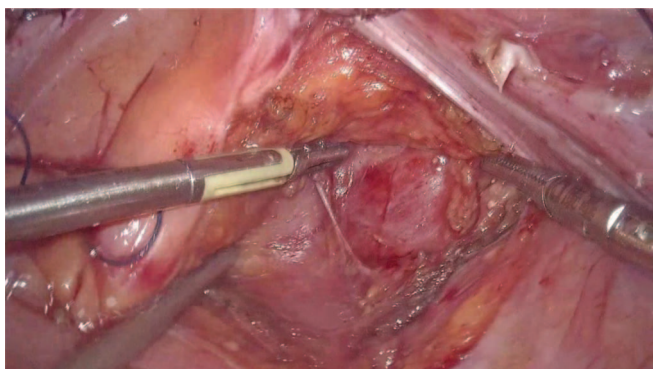


Figure 2. Exposed coccygeus muscle on the surface of the sacrospinous ligament.

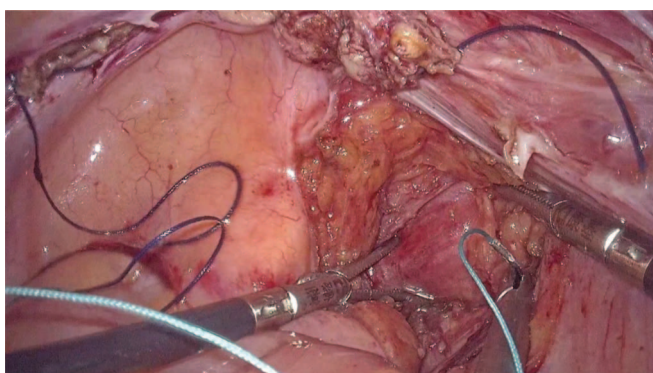


Figure 3. Suture of the medial segment of the sacrospinous ligament.

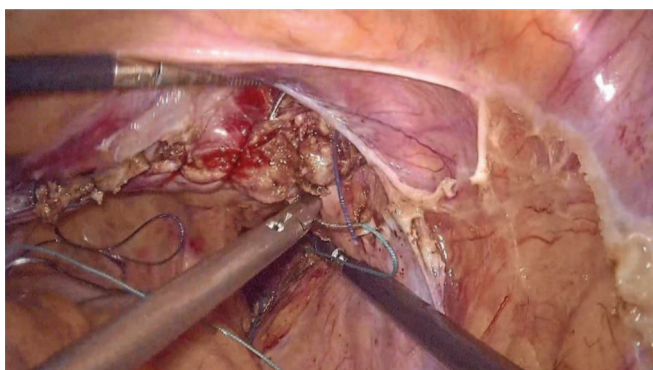


Figure 4. Suture of the vaginal stump.

mittently and vertically sutured for 2 pins using No. 0 Ethibond polyester suture material (X424; depth, 3–5 mm; interval, 5–6 mm; Ethicon, Somerville, New Jersey, USA) (**Figure 3**). An assistant inserted gauze into the vagina with an oval clamp and lifted the right vaginal vault, and the Ethibond suture was passed through the full thickness of the vaginal stump (**Figure 4**). The suture was tightened

and knotted when the vaginal stump was stretched 1.5–2 cm from the sacrospinous ligament.

(3) The vaginal stump was then lifted and relaxed to confirm 1–2 cm range of motion of the vaginal vault. Subsequently, vaginal disinfection was performed, and the stump position and presence of bleeding were checked.

(4) The pelvic peritoneum was closed using 3-0 absorbable sutures.

Postoperative Treatment

The catheter was retained for 2–5 days, and antibiotics were administered according to the intraoperative condition. Bladder residual urine volume was measured after removal of the catheter.

The patients were followed up at 1, 3, and 6 months after the operation to assess the urination status, assess the presence of the sensation of mass exodus or pressure in the vagina, perform gynecologic examination, assess the POP-Q grade, and measure the axial deviation of the vagina. The vaginal axis was defined as the axis from the center of the vaginal vault to the midpoint of the vaginal orificium. The patient was placed in the lithotomy position, and the minimum angles between the vaginal axis and the horizontal and sagittal planes were measured and recorded. Subjective cure was considered as the absence of any postoperative subjective symptoms, and objective cure was considered as a postoperative POP-Q grade of 0.¹

RESULTS

All operations were successfully completed. Among the 9 patients, 7 underwent hysterectomy, 8 underwent anterior vaginal wall repair, 1 underwent posterior vaginal wall repair, and 3 underwent perineal repair. The operative time ranged from 90 to 140 (mean, 117.78 ± 20.01) minutes, and the mean suspension time was ~ 30 minutes. The intraoperative estimated blood loss ranged from 30 to 100 (mean, 54.9 ± 24.2) mL. One patient experienced injury of the pelvic floor vessels during suturing of the sacrospinous ligament, and bleeding was stopped by knotting the suspension suture. No other intraoperative complication was noted. After surgery, the anal exhaust time ranged from 1 to 2 days, the catheterization time ranged from 1 to 12 (mean, 5.8 ± 3.4) days, and the postoperative hospital stay ranged from 4 to 12 (mean, 7.1 ± 2.7) days. After surgery, 5 patients had sacrococcygeal pain, and the Visual Analog Scale (VAS) scores ranged from 3 to 4 (mean, 3.4 ± 0.5). There was no

abnormal sensation or muscle tension of the lower limbs. The symptom disappeared after 3–4 days without treatment.

Patients were followed up for 3–10 (mean, 6.3 ± 2.1) months. None of the patients had symptoms and signs of vaginal vault prolapse or urinary retention/incontinence. Two patients started sexual intercourse and did not complain of dyspareunia. Pelvic examination demonstrated a POP-Q grade of 0 and deviation of the vaginal axis as right deviation of 5–15° and dorsal deviation of 5–10°. The subjective and objective cure rates were both 100%.

DISCUSSION

Advantages of Laparoscopic Sacrospinous Ligament Suspension

The sacrospinous ligament, located in the deep posterior pelvis, is solid, strong, and powerful, and it is an effective point for vaginal stump suspension.² Sacrospinous ligament fixation involves suspension of the vaginal stump from the sacrospinous ligament (Figure 5) and movement of the upper part of the vagina above the levator ani. The short-term effective rate of the treatment of vaginal vault and uterine prolapse has been reported to be >90%.^{3,4} The approach can also be used as an auxiliary means for hysterectomy, to prevent postoperative prolapse of the vaginal vault.⁵

As the sacrospinous ligament is located deep in the posterior pelvis, its exposure is difficult in transvaginal sacrospinous ligament fixation, which relies on the operator's touch and special suture instruments, and the operation can result in

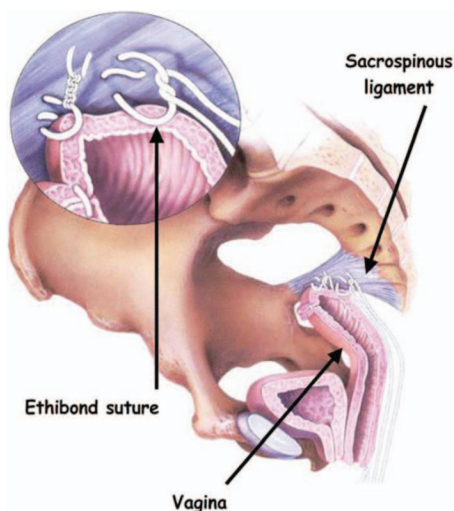


Figure 5. Image of sacrospinous ligament fixation (source: <http://tongjipendi.h2.zbv.cn/operation/SSLF.htm/>; in Chinese).

injury to the sciatic nerve and vaginal and sacral vessels, leading to hemorrhage.⁶ It has been reported that during transvaginal sacrospinous ligament fixation, ~4.3% of patients require blood transfusion, 3% of patients experience injury of the sciatic nerve, and up to 10% of patients experience fever.⁷ After the development of laparoscopic techniques, laparoscopic pelvic structure reconstruction surgery is being performed gradually. Compared with transvaginal sacrospinous ligament fixation, the laparoscopic operation has the advantages of transabdominal retropubic approach surgery, including good exposure, direct vision, low possibility of damage to the sciatic nerve, easy hemostasis, and a wound-free outcome in the vagina. It also has the advantages of a small abdominal incision, mild postoperative pain, quick recovery, and better acceptability.¹ If necessary, Burch suspension and paravaginal suspension can be performed simultaneously.

Key Techniques of the Posterior Approach and Conventional Laparoscopic Sacrospinous Ligament Suspension

Laparoscopic sacrospinous ligament suspension is a new method for the treatment of POP that has been widely used clinically¹. This operation exposes the sacrospinous ligament by dissecting the retropubic space and lateral pelvic sidewall space. The peritoneum is opened at 1–2 cm above the symphysis pubis, and the retropubic space, lateral pelvic sidewall space, and paravaginal space are bluntly dissected, followed by backward dissection until the sciatic spine is reached. After identification of the sciatic spine, blunt posterior dissection is performed to clearly expose the coccygeus muscle, followed by separate suturing of the bilateral sacrospinous ligaments and lateral wall of the vaginal stump.¹ This method requires a wide range of stripping and is cumbersome. In addition, there is a chance of damaging the bladder and ureter. Furthermore, 1 or 2 sides of the vaginal stump are suspended to the ipsilateral sacrospinous ligament, which may cause vaginal wall tear, bleeding, and infection, especially in patients with a thin vaginal sidewall. Moreover, this technique is associated with a long operation time.

The posterior approach can be performed via dissection and exposure of the sacrospinous ligament or suturing. The sacrospinous ligament runs behind the coccygeus muscle and extends posteriorly from the sciatic spine to the sacrum. Although the sacrospinous ligament is present in a deep location and is close to the posterior pelvic wall, it can be exposed easily and rapidly using our new approach. In this approach, the peritoneum is directly split at the right pararectal groove and medial side of the right uterosacral ligament

to expose the sacrospinous ligament gradually, which requires the least range of stripping. In addition, the structure has loose tissue without vessels and nerves, which greatly reduces injury risks to vessels and nerves.

Suturing of the sacrospinous ligament is a key point, as the depth and width should be appropriate. Shallow suturing may cause insufficient strength and ligament tear, leading to surgical failure, whereas excessively deep suturing may cause damage to the venous plexus at the lateral side of the sacrum and posterior side of the sacrospinous ligament. According to our experience, it is adequate to pass the needle at up to one-half the width of the sacrospinous ligament and then stretch the suture to check the width and thickness of the suturing part, to determine firmness and the risk of avulsion.

The vaginal vault should be sutured sufficiently deep by passing the suture through the full thickness of the closed anterior and posterior vaginal walls, such that it is firm and there is less avulsion. Nevertheless, the suture should not pass under the absorbable suture for closing the vaginal stump to prevent suture exposure and infection. The tension of the sutures should be appropriate. Minor tension is unlikely to achieve the effects of the suspension. Moreover, excessive tension may not only split the vagina or ligament, leading to suspension failure, but could also cause postoperative or coital pain, severely affecting the quality of life of patients, especially with regard to their sexual life. Thus, we suggest inserting gauze into the vagina with an oval clamp and lifting and relaxing the vaginal stump again to allow a 1- to 2-cm range of motion of the suspended vaginal vault.

Perspective of LPASLS

In LPASLS, the sacrospinous ligament is exposed by dissecting the peritoneum via the posterior approach, wherein a satisfactory effect can be achieved by suturing the medial segment of the sacrospinous ligament and the right vaginal stump. During the surgery, the firmness of the suturing of the ligament and vaginal stump can be examined and confirmed by direct vision, to ensure effectiveness of the suspension. Furthermore, the range of motion of the vaginal stump should be examined. This can help restore the vaginal stump to the normal anatomic position and ensure a specific range of motion of the suspended vaginal stump, thereby avoiding suspension failure caused by postoperative hip pain, coital pain, and splitting of tissues by excessive suture traction. With this surgical approach, the vaginal axis exhibits only a small change after surgery, with 5–15° deviation to the right and

5–10° deviation to the dorsal side. This approach keeps away from the areas of main vessels and nerves in the pelvis, resulting in a low chance of intraoperative hemorrhage and nerve injury. In this study, LPASLS was successfully performed in 9 patients. One patient experienced pelvic vascular injury during suturing of the sacrospinous ligament, and hemostasis was achieved. None of the patients experienced abnormal sensations in the vulva or abnormal sensations and muscle tension in the lower limbs. However, 5 patients experienced postoperative sacrococcygeal pain, which disappeared after 3–4 d. In addition, the subjective and objective cure rates were both 100%, and there was no case of recurrence.

In summary, LPASLS is safe and feasible for the treatment of central POP. However, as the sample size was small, the results lack power. The efficiency and disadvantages of LPASLS should be assessed in further studies with a large number of patients and a longer follow-up period. Furthermore, the applicability of this approach in patients who desire to retain the uterus should be explored further.

References:

1. Hui-Cheng XU, Wang D, Wang YZ. Laparoscopic sacrospinous ligament fixation for uterovaginal and vault prolapse. *Chin J Pract Gynecol Obstet*. 2007;23:278–280.
2. Zhang QX, Lang JH, Zhu L, et al. [Clinical anatomic study on ischial spinous fascia fixation] (in Chinese). *Zhonghua Fu Chan Ke Za Zhi*. 2009;44:350–353.
3. David-Montefiore E, Barranger E, Dubernard G, et al. Functional results and quality of life after bilateral sacrospinous ligament fixation for genital prolapse. *Eur J Obstet Gynecol Reprod Biol*. 2007;132:209–213.
4. Mothes AR, Wanzke L, Radosa MP, et al. Bilateral minimal tension sacrospinous fixation in pelvic organ prolapse: an observational study. *Eur J Obstet Gynecol Reprod Biol*. 2015;188:1–5.
5. Halaska M, Maxova K, Sottner O, et al. A multicenter, randomized, prospective, controlled study comparing sacrospinous fixation and transvaginal mesh in the treatment of posthysterectomy vaginal vault prolapse. *Am J Obstet Gynecol*. 2012;207:301.e1–e7.
6. Xie QH, Chen YL, Liu XC, et al. clinical analysis of cross-stitching of the uterosacral-cardinal ligament complex and pubovaginalis muscle combined with sacrospinous ligament fixation in treating 48 cases of severe pelvic organ prolapse. *Chin J Pract Gynecol Obstet*. 2016;32:347–352.
7. Leone Roberti Maggiore U, Venturini PL, Ferrero S, et al. Operative time required to perform sacrospinous ligament suspension. *Arch Gynecol Obstet*. 2014;289:233–234.