

Comparison between laparoscopic uterus/sacrocolpopexy and total pelvic floor reconstruction with vaginal mesh for the treatment of pelvic organ prolapse

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Abstract

Aim: To compare total pelvic floor reconstruction with vaginal mesh (TVM) and laparoscopic uterus/sacrocolpopexy (LSC) for the treatment of pelvic organ prolapse (POP).

Methods: Six hundred and seventy patients with POP stage 3 and 4 underwent LSC ($n = 350$) or TVM ($n = 320$) at the West China Second Hospital, Sichuan University between January 2011 and December 2016. Retrospective analysis was done to compare the POP-Q value before operation and 6 months, 5 years after operation, also compare the patient global impression of change (PGI-C), pelvic floor distress inventory (PFDI-20) and pelvic floor impact questionnaire (PFIQ-7). Patients were followed for a median 36 months. Thirty-five patients in the LSC and 37 in the TVM groups were lost to follow-up.

Results: Preoperative POP value and disease course were similar ($P = 0.075$). The LSC group was younger (52.8 ± 6.8 vs. 63.9 ± 8.7 years, $P = 0.037$). Intraoperative bleeding was smaller in the LSC group (74.4 ± 33.2 vs. 150.4 ± 80.3 mL, $P < 0.01$), with longer operation time (130.0 ± 34.1 min vs 100.4 ± 40.4 min, $P < 0.035$). The patients were followed for 10–60 months (median, 36 months). Postoperative PISQ-12 ($P < 0.01$) was better in the LSC group. PFDI-20 and PFIQ-7 were improved after operation in both groups. Objective satisfaction (94.9% vs 91.9%, $P > 0.05$) and recurrence rate (8.4% vs 5.1%, $P = 0.064$) were similar. No infection or fistula occurred after operation in both groups. The complication rate of intraoperative bladder injury and postoperative perineal pain in LSC group was lower than those in the TVM group ($P < 0.05$).

Conclusion: LSC showed no serious adverse events and led to higher postoperative satisfaction than TVM in selected patients. Nevertheless, treatment should be selected in accordance with the willingness and condition of each patient.

Key words: pelvic floor disease therapy, pelvic organ prolapse, sacral colpopexy, total vaginal mesh implantation, treatment outcome.

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Introduction

Pelvic organ prolapse (POP) can occur in nearly 50% of multiparous females older than 50 years,¹ and is likely to become more prevalent as the population ages.² POP may be asymptomatic but is sometimes associated with pelvic pressure and difficulties with urination and defecation.³ POP also has a negative impact upon a woman's emotional health and subjective well-being.⁴ POP at a low grade can be successfully treated with conservative management including behavioral modification and pelvic floor muscle exercise.⁵ Nevertheless, increasingly POP patients are resorting to surgical intervention to improve their quality of life.⁶ A study from the United States suggests that the probability of women to undergo surgical treatment due to POP or urinary incontinence is 11–12% in their lifetimes.¹

Currently, there are many surgical techniques for pelvic floor repair; among them, two methods are commonly used at our center: total pelvic floor reconstruction with vaginal mesh (TVM)^{6–9} and laparoscopic sacrocolpopexy (LSC)^{10–13}; however, reports that compare these two modes are rare,^{14,15} especially those that include long-term follow-up results on the quality of life of patients. These two operations have their own pros and cons. The degree of anatomic restoration is generally high through the TVM technique, but the complications (including mesh exposure and erosion, discomfort of sexual intercourse and postoperative perineal pain) can be serious and have led to some controversy over its use.^{14,15} LSC has merits, such as high subjective satisfaction, and a low rate of secondary operation, though it has disadvantages including a longer operation time, slower recovery and higher cost than TVM.^{16,17} Previous studies have usually focused on the effects in terms of anatomy; in the current study, we aimed not only to compare the anatomic effects of the two methods, but we also evaluated the functional effects and long-term complications in a large sample of patients with long-term follow-up. This should allow us to compare the results of these two surgical methods.

Material and Methods

Patients

Patients with moderate to severe POP (stage ≥ 2) were selected for retrospective analysis. They underwent TVM or LSC in the Department of Gynecology and

Obstetrics, West China Second Hospital, Sichuan University between January 2011 and December 2016. The surgical method was originally selected in accordance with the willingness of the patient to undergo the procedure and the specific condition of each patient.

The study followed the ethics standards for clinical trials agreed by the ethics committee of our hospital, and it was approved by the committee. The requirement for individual consent was waived by the committee because of the retrospective nature of the study.

The inclusion criteria were: (i) patients with moderate to severe POP (stage ≥ 2) treated with TVM or LSC and (ii) patients without previous pelvic floor mesh repair. The exclusion criteria were: (i) patients with previous pelvic floor mesh repair or (ii) patients without postoperative follow-up.

Study design

The clinical characteristics of the patients were retrospectively compared after they were classified into two groups according to the surgical procedure they had undergone: the LSC group ($n = 350$) and the TVM group ($n = 320$). The primary outcome was the subjective anatomic recovery. The secondary outcome was functional recovery. The other outcomes assessed were postoperative complications and recurrence.

The surgery was conducted by the same surgeon, who was a professional with many years of experience of pelvic floor surgery.

For the LSC procedure, the polypropylene mesh was cut into a Y shape (the anterior and posterior ends were fixed onto the anterior wall and posterior wall of the vaginal stump, respectively) or into a T shape (the mesh was wrapped around the uterine isthmus and sutured with cervical fascia, the long arm was fixed to anterior longitudinal ligament of sacrum with nonabsorbable suture without tension).¹⁸

For the TVM procedure, the operation followed the description by the TVM collaboration group published in 2004, and the Prolift mesh (Johnson & Johnson) or Avault mesh (BCR) were used.¹⁹ Cervical resection was conducted simultaneously for patients concurrent with elongation of cervix, or tension-free trans-obturator vaginal tape surgery was managed for the patients with stress urinary incontinence. The other corresponding operations were conducted for patients with concurrent other gynecological diseases.

Clinical data collection

The study outcomes were the anatomic success rates, functional results, surgical complications and reoperation, according to the data from the medical charts. The anatomic restoration of the pelvic location (including the Aa, Ba, Ap, Bp, C and TVL points) was evaluated by POP quantification (POP-Q).²⁰ The surgical effects were determined by the objective cure rate, which was defined as postoperative uterine or vaginal fornix POP-Q stage ≤ 1 , and without further interference.²¹

Recurrence was defined as 6-week postoperative uterine or vaginal fornix POP-Q stage of 2 (according to the International Classification for Standards, ICS), and with corresponding symptoms.²¹ The surgical effect was re-evaluated from the medical charts by a surgeon with many years' surgical and clinical experiences on pelvic floor disease (Dr X. N.), who was blinded to the patients' information to reduce bias. Detrusor overactivity refers to a syndrome characterized by symptoms of urgency, often combined with urinary frequency and nocturia, with or without urge urinary incontinence. The frequency of daytime urination is greater than 8 and frequency of night urination is greater than 2.

The postoperative 5-year subjective satisfaction was evaluated by using patient global impression of change (PGI-C), including seven items and with score 1 indicating the 'significant improvement', score 7 indicating the 'much worse' compared with preoperation. The subjective satisfaction was defined as 'significant improvement' (score 1 point) or 'improvement' (score 2 points).²² Preoperative and postoperative life quality evaluation was assessed using the following questionnaires for preoperative and 5-year postoperative quality of life evaluation, including (i) pelvic floor distress inventory-short form 20 (PFDI-20) and pelvic floor impact questionnaire 7 (PFIQ-7) and (ii) POP/urinary incontinence sexual questionnaire-12 (PISQ-12).²³

Perioperative complications included massive hemorrhage, intestinal and bladder injury. Postoperative complications included urinary retention, mesh exposure or erosion, pain and sensory dysfunction.

Follow-up

The patients were followed up for 10–60 months, with median time of 36 months. The first follow-up examination was carried out 1 month after operation. The subsequent follow-up examinations included

conventional gynecological examination and the PFDI-20, PISQ-12, PFIQ-7 and PGI-C questionnaires. Patients were routinely contacted by phone if they missed an examination. Sixty patients out of 670 were lost during follow-up, including 28 patients who had received TVM and 32 patients who had received LSC. The causes included five deaths due to nonsurgical causes, and 55 patients who missed the follow-up examinations. A total of 610 patients participated with the follow-up examinations, including 318 patients who had received LSC and 292 patients who had received TVM.

All questionnaires were reviewed by the same surgeon (Dr X. N.), who had many years' surgical experiences in pelvic floor surgery and was blinded to patients' grouping. The surgery was considered successful in patients who were free of bulge or pressure symptoms and in whom the vaginal support was POP-Q stage 1.

Statistical analysis

SPSS version 19.0 (IBM Corp.) was used for statistical analysis. The continuous data were firstly tested by Kolmogorov–Smirnov for normal distribution. The continuous data were presented as mean \pm SD for those that fulfilled normal distribution, and the comparison between preoperation and postoperation was analyzed by *t*-test. The continuous data that had not fulfilled normal distribution were presented as median (min/max), and the comparison was carried out by Mann–Whitney test. The categorical data were presented as percentage (%), the intraoperative comparison was conducted by χ^2 test. $P < 0.05$ was considered as statistically significant.

Results

Comparison of baseline clinical information

The patients in the LSC group were younger than the patients in the TVM group; the preoperative menopause rate of the LSC group was significantly lower than that in the TVM group ($P < 0.05$). The preoperative sexual activity was higher in the LSC group compared with the TVM group ($P < 0.05$). There were fewer patients with detrusor overactivity in the LSC group compared with the TVM group ($P < 0.05$). The other baseline clinical information was similar between the two groups ($P > 0.05$) (Table 1).

Table 1 Comparison of general clinical data between the two groups (cases number, %)

| General information | TVM group (<i>n</i> = 320) | LSC group (<i>n</i> = 350) | <i>P</i> -value |
|--|-----------------------------|-----------------------------|-----------------|
| Age (years) | 63.9 ± 8.7 (55–75) | 52.8 ± 6.8 (40–65) | 0.037 |
| Disease course (years) | 6.9 ± 8.1 (6–10) | 7.9 ± 7.4 (5–9.5) | 0.363 |
| BMI (kg/m ²) | 22.6 ± 4.9 (17.5–29.4) | 23.6 ± 3.5 (18.4–30.2) | 0.471 |
| Diabetes, <i>n</i> (%) | 96 (30) | 104 (29.71) | 0.937 |
| Bronchitis, <i>n</i> (%) | 52 (16.3) | 48 (13.7) | 0.745 |
| Difficult defecation, <i>n</i> (%) | 68 (21.3) | 78 (22.3) | 0.856 |
| Menopause, <i>n</i> (%) | 294 (92.0) | 182 (52.0) | 0.024 |
| Stress urinary incontinence, <i>n</i> (%) | 53 (16.6) | 54 (15.5) | 0.978 |
| Dysuria, <i>n</i> (%) | 86 (26.8) | 89 (25.4) | 0.894 |
| Elongation of cervix, <i>n</i> (%) | 72 (22.5) | 86 (24.6) | 0.147 |
| Concurrent gynecological diseases, <i>n</i> (%) | 56 (17.5) | 68 (19.4) | 0.065 |
| Past pelvic surgery history, <i>n</i> (%) | 96 (30.0) | 89 (25.4) | 0.745 |
| Detrusor overactivity, <i>n</i> (%) | 33 (10.3) | 10 (2.8) | 0.025 |
| Bladder outlet obstruction, <i>n</i> (%) | 40 (12.5) | 43 (12.3) | 0.635 |
| Hysterectomy, <i>n</i> (%) | 35 (10.9) | 40 (11.4) | 0.673 |
| History of uterine prolapse repair, <i>n</i> (%) | 32 (7.8) | 34 (9.7) | 0.765 |
| Active sexual activity, <i>n</i> (%) | 100 (31.3) | 140 (40.0) | 0.045 |

BMI, body mass index; LSC, laparoscopic hysterectomy of uterus/sacrocolpopexy; TVM, reconstruction with vaginal mesh.

Comparison of perioperative parameters

The operation time in the TVM group was significantly shorter than that in the LSC group ($P < 0.05$), but the intraoperative bleeding amount, hospital stay and catheter indwelling were all significantly higher in the TVM group ($P < 0.05$). There was no significant difference regarding patients with or without combined operations such as hysterectomy, excision of extended cervix, trans-obturator vaginal tape and perineal reconstruction ($P > 0.05$) (Table 2).

Comparison of surgical outcomes

Regarding the objective effect comparison between two groups, the scores of locations Aa, Ba, C, Bp and Ap 5 years postoperatively were compared, and they were significantly improved compared with the preoperative scores ($P < 0.01$) (Table 3). The results present the data from only those patients who were followed. Thirty-five patients were lost to follow-up

in the LSC group and 37 patients in the TVM group. The follow-up rate was 90% and 88.4%, respectively.

Regarding the comparison of postoperative quality of life, the patients were followed for 5 years and the PFIQ-7, PFDI-20 and PISQ-12 scores were compared with those measured preoperatively. All differences were found to be statistically significant ($P < 0.01$). Sexual life quality (PISQ-12) was significantly improved, and the improvement in the LSC group was more significant than the improvement in the TVM group ($P < 0.01$). The postoperative subjective satisfaction score in the LSC group was significantly higher than in the TVM group ($P < 0.01$) (Table 4).

Regarding the comparison of intraoperative, postoperative complications and recurrence rates, there were no cases of rectum injury in either group, but the rate of bladder injury in the TVM group was significantly higher than that in the LSC group ($P < 0.01$). The rate of perineal pain and discomfort was significantly higher in the TVM group compared

Table 2 Comparison of perioperative parameters between the two groups (*n*, mean ± SD)

| Perioperative parameter | TVM group (<i>n</i> = 320) | LSC group (<i>n</i> = 350) | <i>P</i> -value |
|---|-----------------------------|-----------------------------|-----------------|
| Operation time (min) | 100 ± 40 | 140 ± 34 | <0.01 |
| Bleeding amount (mL) | 150 ± 80 | 74 ± 33 | <0.01 |
| Urinary catheter duration (day) | 3.5 ± 1.5 | 2.0 ± 0.5 | <0.01 |
| Hospital stay (day) | 4.5 ± 1.3 | 3.5 ± 1.3 | <0.01 |
| Hysterectomy | 72 (45.0) | 74 (47.1) | 0.11 |
| Excision of extended cervix, <i>n</i> (%) | 64 (40.0) | 65 (41.4) | 0.473 |
| Perineal reconstruction, <i>n</i> (%) | 45 (28.1) | 44 (28.0) | 0.746 |
| TVT-O, <i>n</i> (%) | 18 (11.3) | 20 (12.7) | 0.574 |

LSC, laparoscopic hysterectomy of uterus/sacrocolpopexy; TVT-O, trans-obturator vaginal tape; TVM, reconstruction with vaginal mesh.

Table 3 POP-Q comparison between the two groups before operation and after operation during follow-up (median of 36 months; range: 10–60).

| POP-Q | LSC group (<i>n</i> = 315) | | <i>P</i> -value | TVM group (<i>n</i> = 283) | | <i>P</i> -value | Intra-group <i>P</i> -value |
|-------|-----------------------------|---------------|-----------------|-----------------------------|---------------|-----------------|-----------------------------|
| | Preoperation | Postoperation | | Preoperation | Postoperation | | |
| Aa | 2.1 ± 1.1 | -2.3 ± 0.5 | <0.001 | 2.3 ± 1.2 | -2.5 ± 0.5 | <0.001 | 0.043 |
| Ba | 2.1 ± 2.5 | -2.8 ± 0.4 | <0.001 | 4.1 ± 1.5 | -2.6 ± 0.5 | <0.001 | 0.118 |
| C | 2.1 ± 3.8 | -7.1 ± 0.9 | <0.001 | 2.5 ± 3.3 | -6.1 ± 1.1 | <0.001 | 0.036 |
| Ap | 2.6 ± 1.5 | -2.8 ± 0.6 | <0.001 | 1.6 ± 1.8 | -2.7 ± 0.6 | <0.001 | 0.245 |
| Bp | 0.5 ± 2.9 | -2.5 ± 0.4 | <0.001 | 2.4 ± 2.8 | -2.7 ± 0.7 | <0.001 | 0.236 |
| PB | 2.10 ± 0.50 | 3.38 ± 0.54 | <0.001 | 2.14 ± 0.33 | 3.46 ± 0.56 | <0.001 | 0.139 |
| TVL | 7.0 ± 0.4 | 8.81 ± 0.748 | <0.001 | 7.8 ± 0.4 | 7.7 ± 0.3 | 0.163 | <0.001 |
| GH | 3.95 ± 0.54 | 2.48 ± 0.54 | <0.001 | 3.80 ± 0.43 | 2.66 ± 0.57 | <0.001 | >0.983 |

All data are given in cm (mean ± SD). LSC, laparoscopic hysterectomy of uterus/sacrocolpopexy; POP-Q, pelvic organ prolapsed quantification; TVM, reconstruction with vaginal mesh.

Table 4 Preoperation and postoperation quality of life comparison between the two groups (score, mean ± SD)

| | LSC group (<i>n</i> = 315) | | | TVM group (<i>n</i> = 283) | | | Postoperative inter-group <i>P</i> -value |
|---------|-----------------------------|---------------|-----------------|-----------------------------|---------------|-----------------|---|
| | Preoperation | Postoperation | <i>P</i> -value | Preoperation | Postoperation | <i>P</i> -value | |
| PFIQ-7 | 14.6 ± 6.7 | 2.7 ± 1.4 | <0.01 | 16.7 ± 6.5 | 3.7 ± 2.2 | <0.01 | 0.735 |
| PFDI-20 | 17.1 ± 8.1 | 2.4 ± 1.6 | <0.01 | 18.8 ± 10.7 | 4.3 ± 1.5 | <0.01 | 0.643 |
| PISQ-12 | 50.4 ± 8.7 | 80.6 ± 6.6 | <0.01 | 40.3 ± 9.7 | 67.7 ± 8.1 | <0.01 | 0.210 |
| PGI-C | — | 1.2 ± 0.6 | — | — | 1.8 ± 0.7 | — | 0.341 |

PISQ-12 score comparison was based on the patients who had sexual intercourse, including 188 patients from the TVM group and 253 patients from the LSC group; *P* < 0.05 for the TVM group versus the LSC group. There were 35 and 37 patients lost to follow-up in the LSC and TVM groups, respectively. LSC, laparoscopic hysterectomy of uterus/sacrocolpopexy; PFIQ-7, pelvic floor impact questionnaire 7; PFDI-20, pelvic floor distress inventory-short form 20; PGI-C, patient global impression of change; PISQ-12, pelvic organ prolapse/urinary incontinence sexual questionnaire-12; TVM, reconstruction with vaginal mesh.

with the LSC group (*P* < 0.01). The postoperative mesh exposure rate was also higher in the TVM group compared with the LSC group. There was no recurrence of infections and fistula in both groups. There was no significant difference between the groups regarding the rates of the other intraoperative and postoperative complication (*P* > 0.05) (Table 5).

There were 27 patients in the TVM group with postoperative recurrence that was considered to be moderate to severe for 6 cases of prolapse in the anterior and posterior walls of vagina; 15 of them received secondary operation to remove the partial mesh and repair the anterior/posterior vaginal wall. Five of them underwent hysterectomy. Among 15 patients who received secondary repair operation, 10 underwent sacral colpopexy via the vagina and recovered well after operation. There were 12 patients with mild vaginal anterior wall prolapse who did not receive secondary operation because of no aggravation during follow-up. The remaining patients recovered well. There were 18 patients in the LSC group with postoperative recurrent prolapse, and 12 of them without symptoms did not receive secondary operation

because of no aggravation during follow-up. The other six patients received secondary operation. The overall recurrence rate was similar in both groups (Table 5).

Discussion

The aim of this study was to make a retrospective comparison of TVM and LSC for pelvic floor reconstruction, with a long-term follow-up to evaluate their effects and safety. Few studies have compared the two methods directly.^{16,17} The results show that intraoperative bleeding was less in the LSC group, but the operation time was longer. Objective satisfaction was similar between the two groups but the PGI-C score and subjective satisfaction level were higher in the LSC group than in the TVM group. PFDI-20 and PFIQ-7 significantly improved after operation in both groups and were similar between groups. Postoperative PISQ-12 scores were better in the LSC group than in the TVM group. The recurrence rate was similar. There remains some debate about the optimal surgical treatment for POP. It was reported

Table 5 Comparison of intraoperative and postoperative complications and recurrence rates between the two groups (cases, %) during follow-up (median of 36 months; range: 10–60)

| | TVM group (<i>n</i> = 315) | LSC group (<i>n</i> = 283) | <i>P</i> -value |
|---|--------------------------------|--------------------------------|-----------------|
| Bladder injury | 8 (2.5) | 1 (0.03) | 0.005 |
| Intestine injury | 0 | 0 | — |
| Postoperative transient urinary retention | 14 (4.4) | 18 (6.4) | 0.178 |
| Perineal pain | 44 (14.0) | 18 (6.4) | 0.004 |
| New onset urinary incontinence | 22 (7.5) | 23 (7.2) | 0.457 |
| New stress urinary incontinence | 35 (12.0) | 38 (12.0) | 0.885 |
| New onset of pain in intercourse | 18 (6.2) | 19 (6.0) | 0.746 |
| Mesh exposure | 10 (3.4) | 6 (1.9) | 0.002 |
| Postoperative improvement of urinary incontinence | 26 (8.3) | 27 (9.5) | 0.756 |
| Postoperative recurrence | 25 (8.6) | 16 (5.0) | 0.064 |
| Infections | 0 | 0 | — |
| Fistula | 0 | 0 | — |
| Ba [†] | 22 (88%) | 15 (93.75%) | — |
| C [†] | 12 (48%) | 0 | — |
| Bp [†] | 7 (28%) | 13 (81.25%) | — |
| Reoperation [‡] | 15 (60%) [‡] | 4 (25%) [§] | — |

[†]Among recurrences. [‡]Procedures of reoperation were vaginal hysterectomy, anterior and posterior colporrhaphy or LSC. [§]Procedure of reoperation was anterior and posterior colporrhaphy. LSC, laparoscopic hysterectomy of uterus/sacrocolporrhaphy; TVM, reconstruction with vaginal mesh.

that LSC had multiple merits including less intraoperative bleeding, faster postoperative recovery, longer lasting efficacy and lower rates of complication.^{24,25} For young women with an active sexual life, LSC is considered to be the best option. Nevertheless, a recent prospective multicenter clinical trial by Yesil *et al.*²⁶ indicated that TVM could improve the patient quality of life to a higher degree, including their sexual quality of life. Our study showed that the patients from the LSC group were younger than patients from the TVM group, and with lower rates of menopause ($P < 0.01$). The expectation for sexual life was higher in young patients with active sexual life, and LSC can maintain the length and axis of the vagina.²⁷ Moreover, our study showed

that PISQ-12 scores after operation were significantly improved compared with preoperation in both groups. The sexual quality of life was better in the LSC group compared with the TVM group. The subjective satisfaction was also higher in the LSC group compared with the TVM group. Importantly, it must be highlighted that the comparison of the PISQ-12 score was based on patients with sexual activities after the procedure ($n = 188$ in the TVM group and $n = 253$ in the LSC group). Both procedures improved the PISQ-12 scores, but there was no difference between the two groups after surgery. A number of factors can be responsible for this, including different scores at baseline and patient selection for surgery.

Our study indicated that Aa, Ba, C, Ap and Bp showed significant improvement in terms of anatomic restoration after either LSC or TVM. The total length of the vagina in the TVM group was relatively shorter after operation compared with preoperation, though the difference was not statistically significant. In the LSC group, the vaginal length was not changed after operation compared with preoperation. Our findings were similar to those previously reported.¹⁶

Similar to the present study, previous studies also found the operation time to be longer with LSC,^{16,17} but LSC has the advantage over TVM of less blood loss during the operation, shorter hospital stay, and shorter indwelling catheter time.¹⁷ Hospitalization stay was longer in the TVM group than in the LSC group due to longer surgical time, more intraoperative bleeding and older age. This is possibly because the operation field during laparoscopic surgery has a good exposure. In addition, when the sutures are placed onto the anterior sacrum, it is easy to avoid injuries to nerve and blood vessels. Intraoperative bladder injury occurred in four patients in the TVM group, significantly more than that in the LSC group (one patient), which might be ascribed to the operation method during TVM, with blind puncture, and no direct visual operation like laparoscopy. There were 42 patients with perineal discomfort in the TVM group, significantly more than that in the LSC group (20 patients), which might be associated with stimulation after puncture, fascia traction by the mesh or pain caused by nerve compression.

Complications such as mesh exposure and erosion were found in both procedures, and the incidence was reported to be around 14–21% within 6 months after operation.^{28,29} In our study, the incidence of

vaginal mesh erosion rate was 3.1% for TVM and 2.6% for LSC. Although there is a risk of mesh erosion/exposure, TVM was considered to be the best option for patients with senior age and those who are intolerant to laparoscopic operation.²⁶ There was no bladder or intestine erosion or exposure found within postoperative 3 months. The patients with mesh exposure were treated with local trimming of mesh and estrogen ointment. To date, there is a lack of evidence for the prevention of postoperative mesh exposure and erosion. It was proposed by Kaufman *et al.*³⁰ that mesh exposure and erosion might be associated with age and degree of sexual activity. Other potential factors that might influence mesh exposure include the type of mesh, the repaired area, mesh patch aperture and elasticity, tension, compatibility, estrogen levels, concurrent diabetes, smoking and proactive control of vaginitis. Patients were routinely asked to avoid sex within the first 3 months of surgery to allow vaginal stump healing.

In the present study, the postoperative recurrence rates were 8.5% for TVM and 5.1% for LSC, without significant difference. These results were similar to those of a previous study.¹⁷

This study has some limitations. The sample number was large in the current study, with long follow-up period (the median follow-up time was 36 months), but the study was retrospective. Because LSC development was carried out a bit earlier, this method was more developed. Therefore, the results of the study might be influenced by the experience of the surgeons. In addition, the two groups were different in terms of age, menopause, sexual activity, baseline POP-Q score and urinary symptoms; therefore, the two groups cannot be reliably directly compared, limiting our conclusions.

The follow-up examinations in the study indicated that both surgery modes had their own pros and cons. Compared with TVM, LSC could have some advantages such as minimal invasiveness, faster postoperative recovery, less intraoperative bleeding, significant improvement on postoperative quality of life, normal vaginal length, higher satisfaction with postoperative sexual life, and higher satisfaction with surgery, at least in selected patients. TVM could have advantages that included being noninvasive to the abdominal cavity, less interference on and intestine, shorter operation time. The surgical methods selected should be based upon age, requirement for sexual activity, prolapse severity and concurrent diseases.

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Disclosure

All authors declare that they have no conflict of interests.

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