Changes in Female Sexual Function following Anterior with and without Posterior Vaginal Mesh Surgery for the Treatment of Pelvic Organ Prolapse

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ABSTRACT

Introduction. Comparison of female sexual function following anterior and total transvaginal mesh (TVM) surgery has never been reported.

Aim. To compare the sexual function after anterior and total TVM repair for the treatment of pelvic organ prolapse (POP).

Main Outcome Measures. The short forms of Urogenital Distress Inventory (UDI-6) and Incontinence Impact Questionnaire (IIQ-7), and the Female Sexual Function Index (FSFI).

Methods. One hundred and sixty-five women with symptomatic POP stages II to IV defined by the POP quantification (POP-Q) staging system underwent TVM procedures at our hospitals. Seventy women were included because they were sexually active and had complete follow-up. All subjects were divided into the anterior group (anterior TVM; N = 39) and total group (anterior and posterior TVM; N = 31). Preoperative and postoperative assessments included pelvic examination using the POP-Q system, urodynamic study, and a personal interview to evaluate urinary and sexual symptoms with the short forms of UDI-6 and IIQ-7, and the FSFI.

Results. There was no difference between the two groups as for age, parity, diabetes, hypertension, concomitant procedures, and success rates for TVM and mid-urethral sling in this study (P > 0.05). Regarding the POP-Q analysis, there was a significant improvement at points Aa, Ba, C, Ap, and Bp (P < 0.05) in both groups except for total vaginal length (P > 0.05). The preoperative scores of UDI-6 and IIQ-7 were significantly higher in the total group (P < 0.01), and the UDI-6 and IIQ-7 scores showed significant decreases in both groups postoperatively (P < 0.01). After TVM surgery, the score of the dyspareunia domain worsened significantly in both groups (P < 0.05), and the deteriorated lubrication domain was noted only in the total group (P = 0.042).


Key Words. Dyspareunia; Long-term Efficacy and Safety; Pelvic Organ Prolapse; Sexual Function; Transvaginal Mesh Repair; Urinary Symptom
Introduction

Female pelvic organ prolapse (POP) adversely affects the quality of life in terms of urinary, bowel, and sexual symptoms [1]. Nearly 11% of all women need some type of operation for POP or urinary incontinence in their lifetime, with 29% needing a second operation for recurrence within 5 years [2]. Traditional anterior and posterior colporrhaphy with vaginal hysterectomy has been the established treatment for POP over the past decades, but carries a higher rate of recurrence [2–4].

Conventional standard procedures for advanced POP is usually accomplished either by vaginal sacrospinous ligament fixation or by abdominal sacrocolpopexy, but the common use of vaginal sacrospinous suspension has been associated with preferential anterior compartment prolapse recurrence [5]. Therefore, surgery with synthetic mesh or graft materials has become increasingly popular over the last decade due to the excellent short-term cure rate [6–8]. However, limited data are available on the long-term efficacy and safety following these transvaginal mesh (TVM) surgeries.

Perigee/Apogee® (AMS, Inc., Minnetonka, MN, USA) and Prolift® systems (Gynecare Prolift, Ethicon, Inc., Piscataway, NJ, USA) are the most popular examples of synthetic mesh kits recently developed and adopted in pelvic reconstructive surgery.

Both can reinforce the pubocervical and/or rectovaginal fascia to provide a support of pelvic floor. As life expectancy increases, changes in sexual function following TVM repair have become a critical issue that should be discussed with patients in addition to anatomical restoration.

A recent study by Su et al. stated that “condom-like” effect may be found in women with total TVM repair encircling the entire vagina [9]. If it is, there should be less sexual impairment in women undergoing anterior TVM alone. Reviewing the literature, comparison of female sexual function following anterior and total TVM surgery has never been reported. Lack of standardized surgical techniques and validated instruments further complicates interpretation of related studies. We had published a pilot study comparing sexual function of premenopausal and postmenopausal women before and 6 months after TVM repair [10]. This time, we designed a study to test the hypothesis that women undergoing total mesh repair would experience more sexual impairment than anterior TVM alone. Thus, the aim of our study was to compare the change in sexual function following these two procedures using the validated questionnaire.

Aims

The aim of our study was to compare the change in sexual function following anterior with and without posterior TVM procedures using the Female Sexual Function Index (FSFI) questionnaire.

Methods

From June 2004 through March 2010, 165 consecutive women with symptomatic POP stages II to IV defined by the POP quantification (POP-Q) staging system [11] were referred for TVM procedures (85 Perigee and/or Apogee; 80 Prolift devices) at our hospitals. Concomitant mid-urethral sling operations, including tension-free vaginal tape (TVT) (Gynecare TVT, Ethicon, Inc.), TVT-O (Gynecare TVT-Obturator System, Ethicon, Inc., Somerville, NJ, USA), and Monarc (AMS, Inc.), were performed in women with current or occult urodynamic stress incontinence (USI), unless they did not desire additional surgery.

Seventy women were included because they were sexually active and had complete follow-up. “Sexually active” was defined as a woman with vaginal intercourse in the 6 months before this intervention. Among them, 39 women had anterior TVM (anterior group), and 31 underwent combination of anterior and posterior TVM surgery (total group). Current hormone user was defined as a woman taking at least a 6-month course of continuous hormone therapy before surgery, and they continued medication after TVM. Preoperative and postoperative (6 months after TVM) assessments included pelvic examination using the POP-Q system, urodynamic study, and a personal interview to evaluate urinary and sexual symptoms with the short forms of Urogenital Distress Inventory (UDI-6) and Incontinence Impact Questionnaire (IIQ-7) [12], and the FSFI questionnaire. Surgical failure was defined as the most distal portion of POP stage II or greater, regardless if it is a primary or a new site.

The FSFI is a questionnaire proposed by Rosen et al. who demonstrated its reliability and validity [13]. The instrument is comprised of six domains, including sexual desire, subjective arousal, lubrication, orgasm, satisfaction, and pain. Each domain
is assigned a maximum and minimum score, and the total score for sexual function is the sum of all domains. It is a 19-question, self-report measure of female sexual function. The Taiwan translation of the FSFI has been validated for linguistic accuracy in a recent report [14].

Point Aa of the POP-Q system is located at the midline of the anterior vaginal wall, 3 cm proximal to the external urethral meatus, and the corresponding point of the posterior vaginal wall is Ap. Point Ba represents the most distal position of any part of the anterior vaginal wall from the anterior vaginal fornix or vaginal cuff to point Aa, and the corresponding point of the posterior vaginal wall is Bp. Point C is the most dependent edge of the cervix or the leading edge of the vaginal cuff after hysterectomy. The total vaginal length is measured as the greatest depth of the vagina in centimeters. All points of the POP-Q system must be measured in women with maximum straining, except for the total vaginal length [11].

USI was defined as involuntary urine leakage with cough in the absence of detrusor contraction during cystometry. The diagnosis of occult USI was made by the presence of urine leakage during the reduction of prolapse. Postoperative assessments were performed at 6 months after surgery, with the same physician repeating the previous evaluations. All subjects were asked to finish every question of the three questionnaires on their own. The improved or worsening result was defined as a woman reporting the higher or lower score of FSFI domain postoperatively.

Perigee–Apogee and Prolift systems are similar with only a minor difference in the posterior procedure involved. In the Prolift procedure for apical and posterior prolapse, the trocar is pierced 3 cm lateral and inferior to the anus. The needle is designed to pass through the sacrospinous ligament at a level of 2 cm posterior and medial to the ischial spine. The Apogee system uses the same insertion location, but with a more helical trocar that pierces the ileococcygeus muscle rather than the sacrospinous ligament at the level of the ischial spine. During anterior TVM repair, superior trocars of both devices are inserted through the upper medial angle of the obturator foramen at the level of the clitoris, while the inferior trocars are inserted 2 cm inferior and 1 cm lateral to the upper incisions. All trocars are designed to pass through the arcus tendineus and emerge within the vaginal wound.

The mesh arms of both systems are then connected to the corresponding passers and brought out of the skin wounds. Then, cystoscopy was performed to ensure intact bladder and ureters. The synthetic mesh is positioned underneath the bladder and fixed with 3-0 Prolene sutures proximally and distally. The vaginal wound is closed with 3-0 polyglactin sutures. The skin incisions are closed using Dermabond® and vaginal packing is placed for 24–48 hours.

All patients were given antibiotic prophylaxis (intravenous Cefazolin 1 g; Cefamezin, Fujisawa, Tokyo, Japan) before surgery. The operations were carried out with the patients under spinal, epidural or general anesthesia. All surgeries were performed mainly by the first author (C.Y.L.), with individual experience of more than 150 TVM repairs.

Ethics approval by the Institutional Review Board of our hospitals had been obtained for data collection and analysis. Before POP surgery, all women were requested to sign an informed consent approved by the Institutional Review Board of the Kaohsiung Medical University. A statistical analysis was performed using Student’s t-test or Wilcoxon signed-rank test for continuous variables, and the Chi-square or Fisher’s exact test for categorical variables. A difference was considered statistically significant when $P < 0.05$.

Main Outcome Measure

The main outcome measure for our study was the postoperative change in the scores of the FSFI, a validated questionnaire to evaluate the female sexual function in women with symptomatic POP. The FSFI contains 19 items divided into six domains: sexual desire, arousal, lubrication, orgasm, satisfaction, and pain. In addition to the total score, the results of each domain were also individually evaluated. The lower FSFI score indicates poorer sexual function. The UDI-6 and IIQ-7 were used to assess the symptom distress and quality of life in women with urinary incontinence and related circumstances. In contrast, the higher the score in these instruments, the worse the urogenital symptoms are.

Results

Participant characteristics of the anterior and total groups are compared in Table 1. There was no difference between the two groups with regards to age, parity, body mass index, current hormone use, diabetes, hypertension, concomitant procedures, and success rates for TVM and mid-urethral sling.
in this study ($P > 0.05$). A total of nine women receive either systemic low-dose hormone (0.625 mg of conjugated equine estrogen/1.5 mg of medroxyprogesterone acetate per tablet once daily; $N = 6$) (Premelle Lite®, Ayerst, Inc., New York, NY) or topical cream (0.625 mg conjugated equine estrogen per 1 g vaginal cream twice weekly; $N = 3$) (Premarin vaginal cream®, Ayerst, Inc.).

As for the POP-Q analysis, there was a significant improvement at points Aa, Ba, C, Ap, and Bp ($P < 0.05$) in both groups except for total vaginal length ($P > 0.05$) (Table 2). The preoperative scores of UDI-6 and IIQ-7 were significantly higher in the total group ($P < 0.01$), and the UDI-6 and IIQ-7 scores showed significant decreases in both groups postoperatively ($P < 0.01$) (Table 2).

The preoperative scores of FSFI domains in both groups, including sexual desire, sexual arousal, lubrication, orgasm, satisfaction, dyspareunia, and total scores, were not significantly different ($P > 0.05$) (Figure 1). After TVM surgery, the score of the dyspareunia domain worsened significantly in both groups ($P < 0.05$), and the deteriorated lubrication domain was noted only in the total group ($P = 0.042$). There were no significant changes in other domains and total scores of both groups ($P > 0.05$) (Table 3).

In regard to intra-operative complications including bladder injury, rectal injury, and transfusion, none was suspected and confirmed by cystoscopy and rectal examinations. The rates of postoperative complications, included urinary tract infection, voiding dysfunction (difficulty initiating the void), pelvic hematoma and mesh erosion, were not statistically significant between the two groups ($P > 0.05$) (Table 4). There were three vaginal erosions found in the anterior group and five in the total group. All vaginal erosions

### Table 1  Clinical background of patients in anterior and total groups. Data are given as mean ± standard deviation, or N (%).

<table>
<thead>
<tr>
<th></th>
<th>Anterior (N = 39)</th>
<th>Total (N = 31)</th>
<th>$P$ values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (years)</td>
<td>47.7 ± 8.6</td>
<td>50.7 ± 10.6</td>
<td>0.21*</td>
</tr>
<tr>
<td>Mean parity</td>
<td>2.6 ± 0.8</td>
<td>2.7 ± 1.0</td>
<td>0.99*</td>
</tr>
<tr>
<td>Mean BMI (kg/m²)</td>
<td>22.6 ± 2.3</td>
<td>23.9 ± 2.8</td>
<td>0.08*</td>
</tr>
<tr>
<td>Menopause</td>
<td>18 (46.2)</td>
<td>15 (48.4)</td>
<td>0.85†</td>
</tr>
<tr>
<td>Current hormone therapy</td>
<td>5 (12.8)</td>
<td>4 (12.9)</td>
<td>0.99†</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>4 (10.3)</td>
<td>2 (6.5)</td>
<td>0.69†</td>
</tr>
<tr>
<td>Hypertension</td>
<td>4 (10.3)</td>
<td>7 (22.6)</td>
<td>0.20†</td>
</tr>
<tr>
<td>History of hysterectomy</td>
<td>2 (5.1)</td>
<td>7 (22.6)</td>
<td>0.07†</td>
</tr>
<tr>
<td>Procedures in this study</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaginal hysterectomy</td>
<td>0</td>
<td>0</td>
<td>———</td>
</tr>
<tr>
<td>Suburethral sling TVT</td>
<td>7 (18.0)</td>
<td>5 (16.1)</td>
<td>0.84‡</td>
</tr>
<tr>
<td>TOT</td>
<td>14 (35.9)</td>
<td>10 (32.3)</td>
<td>0.75‡</td>
</tr>
<tr>
<td>Successful rate for TVM</td>
<td>38 (97.4)</td>
<td>30 (96.8)</td>
<td>1.0†</td>
</tr>
<tr>
<td>Successful rate for sling</td>
<td>17/21 (81.0)</td>
<td>12/15 (80.0)</td>
<td>1.0†</td>
</tr>
</tbody>
</table>

*Student’s t test
†Fisher’s exact test
‡Chi-square test
———, cannot be calculated
BMI = body mass index; TVT = tension-free vaginal tape; TOT = transobturator tape; TVM = transvaginal mesh

### Table 2  Pelvic organ prolapse quantification (POP-Q) values and incontinence-related quality of life in both groups before and after surgery. Data are given as median (range) or mean ± standard deviation.

<table>
<thead>
<tr>
<th>POP-Q parameters (cm)</th>
<th>Anterior (N = 39)</th>
<th>Total (N = 31)</th>
<th>$P$ values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Preoperative</td>
<td>Postoperative</td>
<td></td>
</tr>
<tr>
<td>Aa</td>
<td>2 (-1–3)</td>
<td>-2 (-3–0)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Ba</td>
<td>2 (1–4)</td>
<td>-2 (-3–1)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>C</td>
<td>-1 (-7–4)</td>
<td>-7 (-4–7)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Ap</td>
<td>-2 (-2–0)</td>
<td>-2 (-3–1)</td>
<td>&lt;0.01*</td>
</tr>
<tr>
<td>Bp</td>
<td>-1 (-2–1)</td>
<td>-2 (-2–1)</td>
<td>0.02*</td>
</tr>
<tr>
<td>Tvl</td>
<td>8 (6–8)</td>
<td>8 (7–8)</td>
<td>0.06*</td>
</tr>
<tr>
<td>UDI-6</td>
<td>6.0 ± 3.1</td>
<td>2.3 ± 1.6</td>
<td>&lt;0.01†</td>
</tr>
<tr>
<td>IIQ-7</td>
<td>7.6 ± 3.9†</td>
<td>1.3 ± 0.7</td>
<td>&lt;0.01†</td>
</tr>
</tbody>
</table>

*Wilcoxon signed rank test
†Student’s t test
‡Chi-square test
†§, Student’s t test, $P < 0.01$
Tvl = total vaginal length; UDI-6 = Urogenital Distress Inventory; IIQ-7 = Incontinence Impact Questionnaire

were detected on pelvic examination between 4 and 10 weeks after TVM surgery and only one woman with erosion larger than 1 cm in size. All women were initially treated conservatively with vaginal estrogen cream, although the majority of them (two in the anterior group, five in total group) subsequently required debridement of the exposed mesh.

Discussion

In an attempt to improve the outcome of traditional pelvic reconstructive surgery, synthetic materials are increasingly being adopted to augment POP repair despite insufficient evidence concerning long-term safety. The effects of the Perigee–Apogee and Prolift devices should theoretically be similar on functional outcome due to the similar mesh materials and wound locations [7]. Therefore, women undergoing either device were enrolled together for analyses. Despite the majority (114/162; 70.4%) of our patients being postmenopausal, only 29% (33/114) of these were sexually active and had complete follow-up; the corresponding figure of the premenopausal group was 77% (37/48). Overall, the completion rate of FSFI questionnaire was 43% (70/162), as previously reported by Barber et al. [15].

Most of the literature has suggested that sexual dysfunction is more common in the postmenopausal population [16], while most women undergoing POP repair fall into this age group. The application of hormone therapy may have an impact on sexual function, especially in women with the use of topical estrogen [17]. In our series, the majority of hormone users (6/9; 67%) took a systemic low-dose hormone and the remaining women used a very low-dose vaginal estrogen (twice weekly). They were requested to continue the administration of hormone therapy after surgery. Thus, there should be limited effect of hormone use on our assessment.

Some authors found that women with better pelvic support after TVM were likely to have sat-

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**Table 3** Changes in scores of Female Sexual Function Index in both groups before and 6 months after surgery. Data are given as mean ± standard deviation.

<table>
<thead>
<tr>
<th>Domains</th>
<th>Preoperative</th>
<th>Postoperative</th>
<th>P value</th>
<th>Total (N = 31)</th>
<th>Preoperative</th>
<th>Postoperative</th>
<th>P value</th>
<th>Intergroup</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anterior (N = 39)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sexual desire</td>
<td>2.9 ± 1.0</td>
<td>3.0 ± 1.0</td>
<td>0.63</td>
<td>3.2 ± 1.4</td>
<td>3.1 ± 1.2</td>
<td>0.73</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sexual arousal</td>
<td>3.1 ± 1.0</td>
<td>3.2 ± 1.0</td>
<td>0.70</td>
<td>3.5 ± 1.1</td>
<td>3.3 ± 1.0</td>
<td>0.23</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lubrication</td>
<td>4.0 ± 1.4</td>
<td>4.0 ± 1.3</td>
<td>0.91</td>
<td>4.6 ± 1.1</td>
<td>4.2 ± 0.8</td>
<td>0.042†</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orgasm</td>
<td>4.1 ± 1.1</td>
<td>4.3 ± 1.0</td>
<td>0.56</td>
<td>4.1 ± 1.2</td>
<td>3.9 ± 1.1</td>
<td>0.18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfaction</td>
<td>4.4 ± 1.0</td>
<td>4.5 ± 1.0</td>
<td>0.35</td>
<td>4.4 ± 1.2</td>
<td>4.2 ± 1.3</td>
<td>0.34</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dyspareunia</td>
<td>4.5 ± 1.4</td>
<td>4.0 ± 1.1†</td>
<td>0.027†</td>
<td>4.2 ± 1.2</td>
<td>3.6 ± 1.3†</td>
<td>0.044‡</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total scores</td>
<td>23.0 ± 5.1</td>
<td>23.1 ± 5.2†</td>
<td>0.94</td>
<td>24.0 ± 5.9</td>
<td>22.4 ± 4.9†</td>
<td>0.09</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Paired Hest
†Student’s t-test
‡Statistical significance

**Table 4** Intraoperative, postoperative and mesh-related complications in both groups. Data are given as N (%).

<table>
<thead>
<tr>
<th></th>
<th>Anterior (N = 39)</th>
<th>Total (N = 31)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intraoperative complications</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bladder injury</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Rectal injury</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Blood transfusion</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Postoperative complications</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urinary tract infection</td>
<td>4 (10.3)</td>
<td>5 (16.1)</td>
<td>0.50*</td>
</tr>
<tr>
<td>Voiding dysfunction</td>
<td>1 (2.6)</td>
<td>1 (3.2)</td>
<td>1.0*</td>
</tr>
<tr>
<td>Perineal hematoma</td>
<td>0</td>
<td>1 (2.6)</td>
<td>0.44*</td>
</tr>
<tr>
<td><strong>Mesh complications</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaginal erosion</td>
<td>3 (7.7)</td>
<td>5 (16.1)</td>
<td>0.45*</td>
</tr>
<tr>
<td>Bladder erosion</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

*Fisher’s exact test
isfactory sexual function [18]. In our series, each point of POP-Q system was significantly restored in both groups at 6 months postoperatively, except for the total vaginal length. However, none of the FSFI domains improved following these two procedures, suggesting that anatomical correction may be inadequate to improve sexual function. Our finding was in accordance with the report of Altman et al. [19].

Nearly half of our patients underwent concomitant TVM with suburethral sling; thus, we should include assessments not only for anatomical restoration but vesicourethral function as well. Theoretically, women with advanced POP are more likely to report a variety of urinary symptoms, as evidenced by the higher scores of UDI-6 and IIQ-7 in our total group. The high success rate for USI and significant improvement in UDI-6, IIQ-7, and POP-Q measurements indicated our surgeries were successful for the treatment of POP and incontinence. Some authors did not observe any difference in sexual function between groups with and without additional anti-incontinence sling procedures [18]. Hence, there should be limited effect of concomitant sling surgery on sexual function after TVM.

Preoperative scores of all FSFI domains, including sexual desire, sexual arousal, lubrication, orgasm, satisfaction, dyspareunia, and total scores, were not significantly different between the two groups. After the TVM procedure, there were no significant changes in the total FSFI scores of both groups, indicating that anterior or total TVM may not have overall beneficial or detrimental effect on sexual function. A previous study reported a lower FSFI score of dyspareunia, desire, and lubrication domains following TVM repair, although an improvement was observed with time and a resolution at 6 months follow-up [20]. Therefore, we assessed the sexual function at 6 months after surgery, and also found significant deterioration on dyspareunia in both groups. Although a total of eight vaginal erosions were detected on pelvic examination between 4 and 10 weeks after TVM surgery, all were treated successfully within 2 months. Thus, there should be little impact of mesh extrusions on our assessments of the dyspareunia domain. Dyspareunia has been one of the concerns associated with the use of synthetic meshes, ranging from 20–36% in previous studies [7,21]. In addition, we found the lubrication domain worsening only in the total group, implying that total TVM appeared to cause a greater sexual impairment on lubrication compared with anterior TVM alone.

The anterior vaginal wall is densely innervated by the branches of the pudendal nerve, which are critical for preserving female sexual function and urinary continence [22]. Any vaginal surgery involving the neurovascular damage to the anterior vaginal wall and clitoral region may cause diminished genital blood flow and vaginal fibrosis, resulting in painful intercourse, as well as consequent arousal and orgasmic disorders [23,24]. Moreover, not only the anterior compartment but also posterior vaginal wall is involved in the total TVM surgery.

Psychological factors may play an important role in sexual function as well, and can be affected by the education, culture, and religious background of women [25]. Psychological causes involving sexual dysfunction include the fear of dyspareunia, partner relationship, and mental health status, such as anxiety and depression. Fortunately, we did not find any woman with previous history of major depression or anxiety disorders in all participants.

A strength of our study was that all women finished the validated questionnaires alone, without other opinions to minimize bias. However, the FSFI questionnaire we used is limited by a lack of detailed information about the intimate partner relationship and the mental health status, which could potentially affect sexual function. Another flaw was the shorter follow-up of sexual function; whether the impairment or improvement of sexual function in the long run remains unknown. Previous studies found that sexual function scores deteriorate 1 year after trocar-guided TVM surgery [19,26]. In the study of Su et al. 73% of subjects had worse sexual function 6 months after the total Prolift procedure. Interestingly, four women of this group who were assessed at 1 year postoperatively, three had better sexual function than they had had at 6 months [9]. However, a recent study obtained a conflicting result, showing that sexually active women who underwent TVM surgery could experience improvement in sexual intercourse at 2 years postoperatively [20].

Conclusions
The results of our study suggest that the TVM procedure creates an effective anatomical restoration of POP, but individual domains of FSFI may worsen, such as less lubrication and painful intercourse. Compared with the anterior group, women of the total group had worse quality of life.
in term of urinary symptoms preoperatively, and experienced a greater detrimental impact on lubrication following surgery. We believe that these findings may aid in counseling women with POP before surgery about potential effects on sexual function postoperatively. Nevertheless, the case numbers and follow-up of this study were limited and therefore further studies are warranted to confirm our findings.

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