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ORIGINAL ARTICLE

Sexual function and health-related quality of life following anterior vaginal wall surgery for stress urinary incontinence and pelvic organ prolapse

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To assess female sexual function (FSF) and health-related quality of life (HRQOL) following anterior vaginal wall surgeries for stress urinary incontinence (SUI) and pelvic organ prolapse (POP). The retrospective study consisted of 116 patients. Chinese translations of the modified Lemack Questionnaire (not validated) and Pelvic Floor Distress Inventory—Short Form 20 were used to assess FSF and HRQOL, 3 months pre-operatively and 12–24 months (mean 16.8 months) post-operatively. Sixty-one (52.6%, 29 in SUI group and 32 in POP group) of patients were sexually active before and after the operation. Overall, 12 (19.7%, six in SUI group and six in POP group) reported an improvement in overall intercourse satisfaction, 21 (34.4%, 8 in the SUI and 13 in the POP group) were decreased and 28 (45.9%, 15 in SUI group and 13 in POP group) were unchanged. Incidence of coital incontinence decreased significantly in SUI group. Frequency of intercourse decreased, vaginal dryness and pain due to it and asymptomatic vaginal narrowing increased significantly, following the surgery in POP group. There were no statistically significant differences in the frequency of intercourse in SUI group, patients' perception of intercourse, frequency of orgasm and the importance of sex life in both groups. Partner discomfort remained unchanged. HRQOL improved significantly after the operation in both groups. There was no association between HRQOL and FSF in the post-operative period. In most patients, overall FSF did not impaired. All trans-anterior vaginal wall surgery positively impacted on the patients' HRQOL. A prospective study with validated questionnaire is necessary in future.
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Introduction

Stress urinary incontinence (SUI) and pelvic organ prolapse (POP) are highly prevalent health problems in women. Women with SUI and/or POP report impaired sexual function and significantly decreased health-related quality of life (HRQOL), often resulting from inactive lifestyles, loss of self-confidence, physical discomfort and psychosexual problems.[1–4] Urinary incontinence affects 10–50% of women,[5] and the lifetime likelihood of undergoing a single operation for incontinence or prolapse has been reported to be 11.1%.[6] Several minimally invasive anti-incontinence procedures have emerged in the past 10 years, specifically the tension-free vaginal tape (TVT; Ethicon SARL, CH-2000 Neuchatel, Switzerland) procedure first described by Ulmsten *et al.*[7] Other techniques were subsequently described, including the trans-obturator tape outside-in and inside-out (TVT-O) procedures, which had similar efficacy and complications rate to TVT in short-term studies.[8,9] To reduce the recurrence of prolapse and decrease morbidity and hospitalization costs, minimally invasive surgery using tension-free polypropylene vaginal mesh (for example, Gynecare (Ethicon, Inc., Somerville, NJ, USA), Prolift and Gynemesh (Ethicon SARL, CH 2000 Neuchatel, Switzerland)) has been proposed.[6]

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The pelvic autonomic and somatic nerves are responsible for the female sexual function (FSF) including congestion, vaginal wall thickening, tenting, lubrication and the production of mucous secretion.[10] These nerves course on the anterior and lateral vaginal walls.[10] Therefore, trans-anterior vaginal wall surgery, for example, TVT, trans-obturator tape outside-in, TVT-O and trans-vaginal mesh repairs, may affect FSF. The effects of these surgeries on sexual relationships are often overlooked. Surgeons focusing on the outcomes of these procedures often neglect to investigate their affect on sexual function. However, sexual function is an important consideration for both patients and their sexual partners. When one assumes that SUI and POP are contributing factors to female sexual dysfunction, it may seem likely that procedures correcting SUI and POP would reduce female sexual dysfunction and lead to improved HRQOL. Recently, a number of studies have investigated the potential impact of surgical procedures for SUI and POP on women's sexual health. Several authors have documented improvements,[11–13] as well as declines in FSF,[2,14] whereas other authors have suggested that such procedures have no impact.[15,16]

The primary objective of the present study is to compare FSF and HRQOL, before and after anterior vaginal wall surgery for SUI and POP. The secondary aim is to determine whether there is association between FSF and HRQOL.

Materials and methods

The institutional review board and ethics committee approved the study. The study design was retrospective and included 116 women who underwent surgery for SUI and POP between January 2007 and June 2008. The surgical procedures included TVT (Gynecare, Johnson & Johnson, New Brunswick, NJ, USA), TVT-O (Gynecare, Johnson & Johnson) and transvaginal mesh repairs (Gynemesh and Prolift, Gynecare, Johnson & Johnson). The participants were recruited from the Department of Urology and Gynecology at the Sixth People's Hospital of Shanghai Jiaotong University.

Participants were sent questionnaires (Modified Lemack Questionnaire and Pelvic Floor Distress Inventory—Short Form 20 (PFDI-20)) 12–24 months (mean 16.8 months) after surgery. The questionnaires requested information about sexual activity and quality of life.

All the patients were informed about the purpose of this research and consented to participate by telephone. Questionnaires were sent by mail along with a return-addressed stamped envelope.

Chinese translations of the modified Lemack Questionnaire, which was not validated before employing in this study, was used to assess FSF 3 months pre-operatively and 12–24 months post-operatively. The modified Lemack Questionnaire developed by Lemack and Zimmern[15] included questions regarding sexual activity, their satisfaction with their sex life and surgical history, as well as questions regarding their sexual partners. Questions pertaining to overall sexual satisfaction were phrased as follows: 'Compared to the quality of sexual intercourse three months before the operation, how would you describe your level of sexual activity 12 months after the operation?' Patients could select responses of better, worse or unchanged. We divided the patients into three subgroups according to their responses to questions regarding their level of overall satisfaction with their sex life. This allowed us to investigate the association between patients' sexual satisfaction and PFDI-20 scores in the periods of time 12–24 months post-operatively. The condition-specific HRQOL instrument selected for this study was the PFDI-20.[17] This 20-item validated symptom inventory generates a total score and three scale scores: the urinary distress, colorectal–anal distress and POP distress inventories. Each scale is scored from 0 to 100, with higher scores indicating greater symptom burden.

We reviewed patient charts to record age, parity, menopausal status, use of estrogen therapy and surgical history.

We retrospectively considered patient responses in two time frames: 3 months pre-operatively and 12–24 months post-operatively. Patient responses in SUI and POP groups were statistically analyzed. Responses of patients' perception of intercourse were analyzed with the Wilcoxon rank sum test and χ^2-test, as appropriate. Multinomial logistic regression was employed to identify the factors influencing overall sexual function in baseline demographic and clinical data of the SUI and the POP groups. PFDI-20 scores and scale scores among the different periods were compared with the analysis of variance; analysis of variance was also used to compare the PFDI-20 scores among groups reporting different levels of sexual function. All *P*-values were two-tailed and $P<0.05$ was considered statistically significant among groups. All statistical analyses were performed using the SAS software, Version 6.12 (SAS Institute, Cary, NC, USA).

Results

One hundred and sixteen women met the inclusion criteria and agreed to participate. The mean age was 57.8 years (range, 31–76 years). Of the 116 participants, 53 patients came for treatment of urinary incontinence and 63 came for treatment of POP. None of the patients received hormonal replacement therapy.

In this research, the question 'Do you satisfied with the procure?' was devised to ascertain insight

into the patient's own objective evaluation of the outcome of operations. All of the patients in the SUI group were satisfied with the outcome of the procedure. Only two patients (2/63, 3.2%) in the POP group were unsatisfied with the procedure for POP recurrence.

Female sexual function

Twenty-seven patients were sexually inactive in the preoperative periods. The preoperative reasons for sexual inactivity were: no partner in 13 (48.1%, six in SUI group and seven in POP group) cases, physical problems of patients related to SUI, POP or other reasons in five (9.1%, two in SUI group and three in POP group) cases, physical problem of the partner in six (10.9%, two in SUI group and four in POP group) cases and physical problems of both patient and partner in three (5.5%, two in SUI group and one in POP group) cases. Only one patient who was sexually inactive before surgery due to the absence of partner became sexually active 6 months after surgery. Twenty-eight patients who were sexually active became sexually inactive post-operatively; the reasons were: physical problems of patients in two (7.1%, in the POP group) cases, physical problem of the partner in four (14.3%, two in SUI group and two in POP group) cases, concern of sexual intercourse might damage the surgical outcome in 22 patients (78.6%, 10 in SUI group and 12 in POP group).

Sixty-one participants (29 in SUI group and 32 in POP group) were sexually active both before and after surgery. The baseline demographic characteristics of this sub-group are summarized in Table 1. Ten patients with SUI waited less than 3 months to resume engaging in intercourse, 18 patients (15 in the SUI group and three in the POP group) waited 3–6 months, 26 patients (four in the SUI group and 22 in the POP group) waited 6–12 months and seven patients with POP waited more than 12 months.

The results demonstrated that patients' perception with intercourse, frequency of orgasm and the importance of sexual life did not change significantly after the operation in both groups ($P>0.05$). Table 2 summarizes perception of sexual activity changed with statistical significance.

Depending on the question 'Compared to the quality of sexual intercourse three months before the operation, how would you describe your level of

Table 1 Baseline demographic and clinical data on the SUI and POP patients

	All the patients included		*Sexually active before and after the operation*	
	SUI group (n = 53)	*POP group (n = 63)*	*SUI group (n = 29)*	*POP group (n = 32)*
Age (year)	55.1 ± 10.6	60.7 ± 7.2	49.1 ± 8.2	58.2 ± 7.8
Parity (*n*)	1.9 ± 1.3	2.1 ± 1.1	1.2 ± 0.5	1.9 ± 1.1
Postmenopausal women (*n*)	32 (60.4)	59 (93.7)	12 (41.4)	29 (90.6)
Prior hysterectomy (*n*)	10 (18.9)	0	3 (10.3)	0
Prior incontinence procedure (*n*)	2 (3.8)	0	1 (3.4)	0
Prior prolapse procedure (*n*)	2 (3.8)	1 (1.6)	1 (3.4)	1 (3.1)
Pure SUI	42 (79.2)		23 (79.3)	
Mixed incontinence	11 (20.8)		6 (20.7)	
No. with SUI grade (%)				
1	5 (9.4)		4 (13.8)	
2	29 (54.7)		16 (55.2)	
3	19 (35.8)		9 (31.0)	
Surgical procedure performed in the SUI group				
TVT (n)	38 (71.7)		23 (79.3)	
TVT-O (n)	15 (28.3)		6 (20.7)	
Stage II prolapse (*n*)		1 (1.6)		0
Stage III prolapse (*n*)		52 (82.5)		27 (84.4)
Stage IV prolapse (*n*)		10 (15.9)		5 (15.6)
Surgical procedure performed in the POP group[a]				
Transvaginal mesh-total (*n*)		3 (4.8)		2 (6.2)
Transvaginal mesh-anterior with traditional posterior repair		29 (46.0)		16 (50.0)
Transvaginal mesh-anterior		31 (49.2)		14 (43.8)

Abbreviations: POP, pelvic organ prolapse; SUI, stress urinary incontinence; TVT, tension-free vaginal tape; TVT-O, TVT inside-out.
Data are presented as mean ± s.d. with ranges in parentheses, or as number of patients with percentages in parentheses.
[a]All the patients underwent hysterectomy except three patients.

Table 2 Patients' perception of intercourse

Variable	*SUI group* (n = *29*)			*POP group* (n = *32*)		
	3 months pre-op	*12 months later post-op*	P-*value*	*3 months pre-op*	*12 months later post-op*	P-*value*
Frequency of sexual activity with penetration						
>2 times a week	0	1	0.419	0	0	0.042
1–2 times a week	6	8		4	3	
1–3 times a month	9	8		16	8	
<1 time a month	14	12		12	21	
Did you experience vaginal dryness during intercourse?						
Not at all	24	22	0.453	21	13	0.008
A little dry	5	5		11	10	
Dry	0	2		0	8	
Very dry	0	0		0	1	
Did you experience pain due to vaginal dryness during sexual intercourse?						
Yes	1	3	0.3	3	12	0.008
No	28	26		29	20	
Did you experience vaginal narrowing?						
Not at all	29	25	0.04	32	20	<0.001
A little narrow	0	4		0	12	
Narrow	0	0		0	0	
Very narrow	0	0		0	0	
Did you experience pain due to vaginal narrowing during sexual intercourse?						
Yes	0	0	1	0	0	1
No	29	29		32	32	
Did you feel the tape and/or mesh after the operation?						
Yes	0	2	0.150	0	4	0.039
No	29	27		32	28	
If yes, did you experience pain due to the feeling of the tape and/or mesh?						
Yes	0	0	1	0	0	1
No	29	29		32	32	
Was there a question of urinary incontinence during sexual intercourse?						
No	20	27	0.014	28	31	0.157
Yes, but rarely	2	2		2	1	
Yes, occasionally	5	0		2	0	
Yes, frequently	1	0		0	0	
Yes, always	1	0		0	0	

Abbreviations: POP, pelvic organ prolapse; SUI, stress urinary incontinence.
Statistical significance was considered at $P<0.05$.

sexual activity 12 months after the operation?', 21 patients (34.4%, 8 in the SUI group and 13 in the POP group) reported a deterioration in overall satisfaction with their sex life, 12 (19.7%, six in the SUI group and six in the POP group) reported an improvement and 28 (45.9%, 15 in the SUI group and 13 in the POP group) reported no change in sexual function 12–24 months postoperatively.

Multinomial logistic regression was employed to identify the factors influencing overall sexual function in baseline demographic and clinical data of the SUI and the POP groups, respectively; however, no risk factors was observed including age, parity, menopausal state, previous anti-incontinence or POP surgery, SUI or POP severity and the surgical procedure performed this time.

There was no statistically significant influence in responses to questions pertaining to sexual function and sexual activity of the partners, pre- and post-operatively in the SUI and POP groups, respectively.

Health-related quality of life

PFDI-20 scores are summarized in Figure 1. The results showed that PFDI-20 scores improved significantly postoperatively in both groups.

Association between HRQOL and sexual function

Analysis of variance was also used to compare the PFDI-20 scores among subgroups reporting

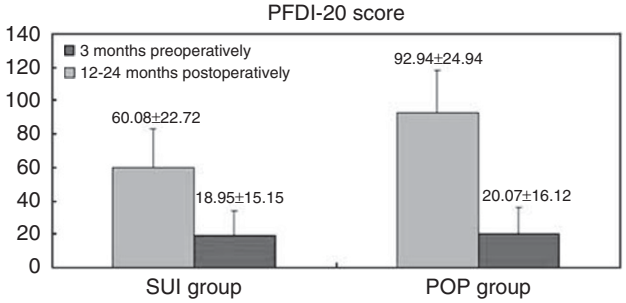

Figure 1 Means and s.e. of Pelvic Floor Distress Inventory—Short Form 20 (PFDI-20) score for 53 patients with stress urinary incontinence (SUI) and 63 patients with pelvic organ prolapse (POP). The *P*-values were 0.02 and <0.001 in the SUI and POP groups, respectively.

improved, worsened and unchanged sexual function postoperatively. The *P*-values postoperatively were 0.670 and 0.894 in the SUI and POP groups, respectively. The results demonstrate that there was no statistical association between sexual function and HRQOL, postoperatively in either group.

Discussion

Recent studies have evaluated the impact of vaginal surgery (SUI and POP) on FSF. However, it is difficult to draw definitive conclusions from the conflicting data presenting in these studies. Lemack and Zimmern[15] report that sexually active women did not appear to be affected by a vaginal suspension procedure for incontinence, though nearly 20% of women considered intercourse to be worse postoperatively. Elzevier[18] compared sexual function after trans-obturator tape outside-in and TVT-O and reported both positive impacts on sexual function in 19.2% of patients, but negative impacts in 10.3% of study participants. In a prospective study, Thakar *et al.*[12] report significant improvement in sexual function 4 months after surgery for SUI and POP. Mazouni *et al.*[19] report a decline in overall sexual function in 20% of their patients after TVT; symptoms included dyspareunia (14.5%) and loss of libido (5.4%).

In general, improvement in sexual function was secondary to resolution of coital incontinence and symptoms of SUI and POP. By comparison, deterioration in sexual contrast may be attributed to decreased libido, vaginal narrowing, scarring or damage to the highly innervated anterior vagina wall and clitoral region, following vaginal surgery, and placement of artificial material near the urethra and base of the bladder.[20,21]

The Chinese translation of sexual function questionnaire is not validated before employing in this study. However, Cronbach's alpha coefficient of the modified Lemack questionnaire we used was 0.836, which indicated a good reliability. The Lemack questionnaire is a non-validated, but popular and condition-specific sexual function questionnaire that has been previously used in retrospective and prospective studies.[18,22–24] Sentilhes *et al.*[24] evaluated FSF with POP by both the Lemack and the Pelvic Organ Prolapse Urinary Incontinence Sexual Questionnaires in a prospective study and showed that the results of the Lemack questionnaire was concordant with the validated Pelvic Organ Prolapse Urinary Incontinence Sexual Questionnaires. For this reason, we applied the Lemack questionnaire to both SUI and POP patients. To make the questionnaire more suitable for Chinese patients, we invited 10 patients with SUI/POP to answer our modified questionnaire to confirm whether it was suitable for our patients in China and what further alteration could be done to the questionnaire at the beginning of the current study. Then the questionnaire was modified again and finally mailed to all the patients. As a result, we found our modified Lemack questionnaire could be answered by the patients completely.

In the present study, 21 patients (34.4%, 8 in the SUI group and 13 in the POP group) reported deterioration in sexual function postoperatively, 12 (19.7%, six in SUI group and six in POP group) described improvement and 28 (45.9%, 15 in SUI group and 13 in POP group) experienced no change. Previous studies showed deteriorations in sexual function of 14–20% in SUI patients and 21.6–26.0% in POP patients.[15,24–26] Deterioration in sexual function occurred more frequently in the present study (27.6% in the SUI group and 40.6% in the POP group) compared with the published literature. Cultural factors and study methodology may have contributed to this difference.

Pain due to vaginal dryness was observed in 15 patients (24.6%, 3 in SUI group and 12 in POP group). Eleven of these patients (73.3%, two in SUI group and nine in POP group) reported deterioration in overall sexual function postoperatively. This problem was statistically significant in POP group comparing post-op with pre-op, but in SUI group, it was observed with no statistical significance. Different mesh size used in the SUI and POP groups may be the contributing factor, for large-sized mesh left in the space between anterior vaginal wall and bladder base was more likely to lead to deterioration in lubrication in POP patients. Another reason for more vaginal dryness in POP group might be that the mean age of this subgroup was older. None of the patients tried to resolve this problem by any measures. This information may aid in counseling patients that gel should be used for the presence of vaginal dryness, particularly pain due to it postoperatively. To the best of our knowledge, Chinese patients did not receive any counseling or therapy for the treatment of vaginal dryness. Our results

suggest that such counseling and medical therapy (that is, vaginal gels) should be routinely offered.

Vaginal narrowing increased significantly in both groups postoperatively, but discomfort resulting from it was not observed. The majority of the patients (3/4, 75.0% in the SUI group and 7/12, 58.3% in the POP group) underwent resection of the redundant anterior vaginal mucosa, which maybe the reason for asymptomatic vaginal narrowing.

We suggest that resolution of coital incontinence may be the main contributing factor to improvement in patient-related sexual function. Ten (seven in the SUI group and three in the POP group) of 13 patients (76.9%, nine in the SUI group and four in the POP group) experiencing coital incontinence preoperatively reported a complete resolution or decrease in coital continence in the post-op period. These results are in agreement with others.[11,25,27,28]

Twenty-two patients (10 in the SUI group and 12 in the POP group) who were sexually active preoperatively did not regain sexual intercourse, because they worried that sexual activity would affect the surgical outcome. This is considered to be another negative effect on FSF after anterior vaginal surgery. Actually, our advice for patients undergoing TVT, TVT-O and trans-vaginal mesh repair without hysterectomy was to resume sexual life after 1 month. Patients undergoing trans-vaginal mesh repair with hysterectomy were counseled to resume sexual activity after 3 months. The observation that the majority of patients did not resume sexual function due to fear about adverse impact on surgical outcomes also highlights the importance of post-operative counseling.

The major limitation of our study is that, like many others assessing sexual function following anterior vaginal wall surgery for SUI and/or POP, it was retrospective, which may introduce a likely recall bias. In particular, one cannot conclude that changes in sexual function are related to the SUI and/or POP procedure when questionnaires were applied 12–24 months postoperatively. The second limitation is that the sexual function questionnaire we used here is a non-validated one and it may not reflect the change of sexual function accurately. Therefore, the conclusion of the present study was limited and prospective studies with a larger sample size using validated instruments are merited to further exploration in future.

In conclusion, overall sexual function was not impaired after trans-anterior vaginal wall surgery in most patients. In the SUI group, improvement in coital incontinence was the major contributing factor responsible for improvement in FSF. In the POP group, pain due to vaginal dryness may be responsible for the overall deterioration in sexual function. Although no statistical association was identified between FSF and HRQOL, all trans-anterior vaginal wall surgery positively impacted on the patients' HRQOL. However, the conclusion of this study is limited and a prospective study with validated questionnaire is necessary.

Conflict of interest

The authors declare no conflict of interest.

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