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Original Article

Comparison of the efficiency of partial versus subtotal mesh removal on urogenital distress and sexual functions after stress urinary incontinence surgery

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ABSTRACT

Objective: To compare the efficiency of the partial mesh removal (PMR) versus subtotal mesh removal (SMR) on urogenital distress and sexual functions in patients who experienced vaginal mesh extrusion.

Material and methods: Between June 2014 and January 2018, 45 patients who experienced vaginal mesh extrusion following midurethral sling surgeries and therefore underwent mesh excision were evaluated retrospectively. The effectiveness of PMR and SMR was compared using the "Urinary Distress Inventory-6 (UDI-6)" and "Female Sexual Function Index (FSFI)" forms, at the 6th month postoperatively.

Results: Fourteen PMR-patients and 21 SMR-patients who met the study criteria were evaluated for the study. There was a significant improvement in UDI-6 scores and FSFI scores in both PMR and SMR groups at the 6th month postoperatively (p=0.001, p=0.001, p=0.001, and p=0.001, respectively). When the two groups were compared in terms of improvement rates, there was no significant difference in UDI-6 scores [(–)30.21±6.56% vs. (–)26.33±9.01%, p=0.222]. However, there was a statistically significant improvement in the FSFI scores in the SMR group [(+)83.71±14.81% vs. (+)124.42±36.82%, p=0.001]. There was no significant difference in overactive bladder symptoms between the two groups, with a decrease of 75% in the PMR group and 71.42% in the SMR group (p=0.721). Recurrent stress urinary incontinence was observed in two (14.2%) patients in the PMR group and four (19.1%) patients in the SMR group at the 6th month postoperatively (p=0.544).

Conclusion: In cases where extrusion is developed, subtotal/total mesh removal provides a significant improvement in patients' complaints of sexual dysfunction related to extrusion.

Keywords: Mesh extrusion; mesh removal; sexual functions; urogenital distress.

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Introduction

Urinary incontinence in women is a health condition that negatively affects the quality of life regarding psychological, social, and sexual terms.[1] Owing to its convenience of application and satisfactory outcomes, the midurethral sling (MUS) surgery that is performed with the polypropylene mesh has become the gold standard for surgical therapies in stress urinary incontinence (SUI). Randomized controlled studies of tension-free vaginal tape (TVT) and transobturator tape (TOT) demonstrated subjective and objective successful outcomes. However, especially in recent studies, there is an increase in related late-stage complications.[2]

Complications related to the use of mesh are classified as early and late complications. Early-stage complications include injuries that occurred during surgery, urinary retention, and postoperative infection. Late-stage complications occur weeks or months after surgery and include bladder outlet obstruction, urgency and/or urge urinary incontinence, recurrent urinary tract infection, erosion of the mesh to urethra or bladder, and vaginal mesh extrusion.[3] Mesh-related complications may impair the quality of health of patients. Dyspareunia is an important complaint in these patients. Therefore, it is important for clinicians to identify possible complications early and to intervene as soon as possible.[4] Complication rates are reported to

be 4.3-75% for retropubic slings and 10.5-31.3% for TOT.[5,6] In a study that reviewed 388 complications following MUS application, vaginal mesh extrusion was stated as the fourth common complication, with the rate of 17%.[7] In another study, mesh erosion was found to be 1.6% in SUI surgery where mesh was used at a one-year follow-up. In a study by Morling et al.[8], this rate was found to be 3% after 10 years of follow-up. In the presence of complications, vaginal estrogen, physical therapy of pelvic floor, and local pain treatment can be used. In case these do not succeed, the mesh may need to be removed.[2] Singla et al.[9] presented the outcomes of the experience of 100 patients who underwent removal of mesh slings during the 10-year period between 2005 and 2015. This study only included patients who underwent mesh sling placements. The indications to remove the sling were pelvic pain, dyspareunia, obstructive voiding dysfunction, vaginal extrusion, urinary incontinence, and recurrent urinary tract infections (UTIs). Because the study focused on continence outcomes, there is no informatıon whether pain, dyspareunia, and recurrent UTIs resolved after sling removal.[9]

In our study, we aimed to compare the efficiency of the partial mesh removal (PMR) versus subtotal mesh removal (SMR) on the urogenital distress and sexual functions in patients who experienced vaginal mesh extrusion.

Material and methods

Between June 2014 and January 2018, 45 patients who experienced vaginal mesh extrusion following MUS surgeries and therefore underwent mesh excision were evaluated retrospectively. The study protocol was approved by Gaziantep University Faculty of Medicine Clinical Research Ethics Committee (Approval number:2018/101). Informed consent was obtained from all individual participants included in the study. All procedures performed in the studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The same two surgeons performed PMR and SMR.

Main Points:

- In patients with vajinal mesh extrusion, the effectiveness of partial and subtotal mesh removal were evaluated using the UDI-6 and FSFI scores.
- In both groups, urinary complaints and sexual functions improved.
- Improvement rate in sexual functions is evident in subtotal mesh removal cases.
- It should be recommended to remove the mesh whenever possible.

Age and body mass index (BMI) of patients, pregnancy, vaginal delivery, menopause status, whether diabetes mellitus (DM) is present, smoking status, genitourinary system symptoms, postvoid residual urine volume (PVR), previous MUS history, and mesh removal time from implantation were recorded. Vaginal mesh extrusion was diagnosed with a physical examination. Patients who underwent synthetic grafting for pelvic organ prolapse, had pelvic radiation history, were suspected of urethra and bladder injury in cystoscopy, were not sexually active, underwent mesh removal previously, and underwent concomitant incontinence surgery following mesh removal were excluded from the study. Complete urinalysis and urine culture were obtained from all patients before surgery. Antibiotic treatment was given to patients with infection.

Efficacy evaluations

The effectiveness of the surgical procedures was compared using the "Urinary Distress Inventory-6 (UDI-6)" and the "Female Sexual Function Index (FSFI)" forms. We used these forms translated into native language.[10] Patients filled out UDI-6 and FSFI forms preoperatively and at the 6th month postoperatively. The FSFI consisted of 19 questions scored from 0-1 to 5. To calculate the individualistic domain score, the scores of questions comprising the domain are summed and multiplied by the factor specific to the pertinent domain. The total score is calculated by adding the scores of the six domains. The total score ranged from 2 to 36. A higher score means a lesser degree of sexual dysfunction.[11]

Surgical techniques

Urethra and bladder of the patient who underwent cystoscopy under spinal anesthesia were evaluated. A 16 French Foley urethral catheter was inserted into the patient. Subsequently, an inverted "U" incision was performed to the proximal of the vaginal mucosa in which the mesh was placed, and a vaginal flap was created. In the PMR group, only the extruded mesh tissue was removed from the surrounding tissues. In the SMR group, the middle of the mesh was cut and held on one end by a clamp. In the patient with TOT toward the obturator fossa, the mesh tissue was removed from the surrounding tissues, via a sharp and blunt dissection. The maximum mesh tissue was extracted as much as possible. Subsequently, the same operation was performed on the other end of the mesh. After the edges of the vaginal mucosa were detached and debrided, the vagina was closed with an inverted "U" flap and the procedure was terminated. The length of the removed mesh tissue was measured. Following surgical operations, a vaginal pack was inserted into the vagina, which was removed on the first postoperative day. The urethral catheters were pulled out on the first postoperative day. Intraoperative and postoperative complications were noted.

Statistical analysis

The statistical package "Statistical Package for the Social Sciences 11 for Windows" (SPSS Inc.; Chicago, IL, USA) was used

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for statistical analyses, and the data were expressed in arithmetic mean and standard deviation. A Chi-squared test was performed for the calculation of categorical variables, and the Mann-Whitney U test was used to compare the mean values. A 95% confidence interval ($p<0.05$) was considered statistically significant.

Results

Ten patients were excluded from the study because they were not sexually active. Fourteen PMR-patients and 21 SMR-patients who met the study criteria were evaluated for the study. No difference was detected in terms of age, BMI, pregnancy, vaginal delivery, menopause status, DM, smoking status, genitourinary system symptoms, PVR, previous midurethral surgery, and mesh removal time from implantation between the two groups (Table 1).

In the PMR-patients, the length of the removed mesh (2.71±0.62 cm vs. 7.33±0.85 cm, p=0.001) and the duration of operation (57.28±4.77 min vs. 69.52±6.4, p=0.001) were shorter. No patients had preoperative or postoperative complications (Table 1).

At the 6th month postoperatively, there was a significant improvement in total UDI-6 scores and total FSFI scores in both the PMR and SMR groups (p=0.001, p=0.001, p=0.001, and p=0.001, respectively) (Table 2). When the two groups were compared in terms of improvement rates, there was no significant difference in UDI-6 scores [(–)30.21±6.56% vs. (–)26.33±9.01%, p=0.222]. However, there was a statistically significant improvement in the total FSFI scores in the SMR group [(+)83.71±14.81% vs. (+)124.42±36.82%, p=0.001] (Table 3). According to the total FSFI survey results, pain and satisfaction were the most effected subitems.

Following mesh excision, there was no significant difference in overactive bladder (OAB) symptoms between the two groups, with a decrease of 75% in the PMR group and 71.42% in the SMR group (p=0.721). Recurrent SUI was observed in two (14.2%) patients in the PMR group and four (19.1%) patients in the SMR group at the 6th month postoperatively, but no significant difference was found between the two groups (p=0.544) (Table 3).

Discussion

Although the MUS are minimally invasive interventions, they may cause voiding dysfunction, infection, pain, vaginal infection, vaginal extrusion, and bladder injuries.[12] Vaginal extru-

Table 1. Demographic and operative data

	PMR (n=14)	SMR (n=21)	p
Age (year)	48.28±8.57	49.52±8.25	0.583
Body mass index (kg/m²)	28±2.57	28.42±2.54	0.561
Pregnancy (n)	3.07±1.26	3.38±1.07	0.359
Vaginal delivery (n)	2.85±0.94	3±1.18	0.606
Menopause status (n, %)	3 (21.42)	4 (19.04)	0.594
DM (n, %)	2 (14.28)	2 (9.52)	0.530
Smoking status (n, %)	4 (28.5)	7 (33.3)	0.533
Genitourinary system symptoms			
OAB symptoms: 11 (31.4%)	4 (28.5%)	7 (33.3%)	0.218
Voiding symptoms: 14 (40%)	7 (50%)	7 (33.7%)	
Urinary tract infection: 9 (25.7%)	4 (28.5%)	5 (23.8%)	
Pelvic pain: 18 (51.4%)	8 (57.1%)	10 (47.6%)	
Dyspareunia: 23 (65.7%)	9 (64.2%)	14 (66.7%)	
Penal pain during intercourse: 7 (20%)	4 (28.5%)	3 (14.2%)	
PVR (mL)	58.07±12.65	56.23±13.22	0.630
Mesh removal time from implantation (month)	7±2.68	9.28±4.91	0.359
Removed mesh length (cm)	2.71±0.62	7.33±0.85	0.001*
Operation time (min)	57.28±4.77	69.52±6.4	0.001*

*p values lower than 0.05 were considered significant. n: number of patients; mL: milliliter; cm: centimeter; DM: diabetes mellitus; OAB: overactive bladder; TOT: transobturator tape; TVT: tension-free vaginal tape; PVR: postvoid residual urine; PMR: partial mesh removal; SMR: subtotal mesh removal; kg/m²: kilogram/square meter

sion rates are reported to be 0-1.5% for retropubic slings and 0-10.9% for transobturator slings. Regardless of the route, risk factors for mesh extrusion include inadequate closure of vaginal incision, atrophic vaginal mucosa, and local infection.[13] In the present study, 13 patients (92.9%) in the PMR group and 20 patients (95.4%) in the SMR group had TOT history. Similar to that found in the literature, mesh extrusions were more common in patients undergoing TOT surgery. Older age, DM, smoking status, immunosuppression, previous pelvic radiation and vaginal surgical history, and increased BMI may be listed as risk factors for mesh extrusion.[14] In our study, the mean age of patients was 48.8 years. Seven of 35 (20%) patients were menopausal, 11/35 (31.4%) patients had a history of smoking, the mean BMI was 28, and 4/35 (11.4%) patients had a history of DM.

Dyspareunia occurring after mesh placement can be seen related to fibrotic tissue around the mesh, mesh contraction, mesh infection, and mesh extrusion.[15,16] Dyspareunia is frequently reported as a symptom leading to the diagnosis of mesh extrusion in studies.[15-18] In a study reported by Vollebregt et al.[19], 15% of patients were found to have dyspareunia after TOT. In our study, dyspareunia is the most common symptom in patients who have mesh extrusion, and dyspareunia was detected in 23/35 (65.7%) patients. In sexually active women, vaginal extrusion can often be perceived as a rough surface that causes pain by the patient's sexual partner. A significant correlation was found between mesh extrusion and hyspareunia (male dyspareunia). In a cohort study of 797 cases, Kuhrucharoen et al.[20] reported that 7.9% of patients' partners had hyspareunia. We also found that 7/35 (20%) patients' male partners had hyspareunia.

Table 2. Comparison of the preoperative and postoperative 6th month's data

	Preoperative	Postoperative	p
UDI-6 scores			
PMR	7.78±0.89	5.42±0.64	0.001*
SMR	7.66±0.91	5.61±0.66	0.001*
Total FSFI scores			
PMR	12.78±1.42	23.07±1.59	0.001*
SMR	12.57±1.02	27.95±3.33	0.001*
OAB symptoms (n, %)			
PMR	4/14 (28.5)	1/14 (7.1)	0.163
SMR	7/21 (33.4)	2/21 (9.5)	0.065
Recurrent SUI (n, %)			
PMR	-	2 (14.2)	0.241
SMR	-	4 (19.1)	0.053

*p values lower than 0.05 were considered significant. UDI-6: Urinary Distress Inventory-6; FSFI: Female Sexual Function Index; OAB: overactive bladder; SUI: stress urinary incontinence; PMR: partial mesh removal; SMR: subtotal mesh removal

Abdel Fattah et al.[21] compared 112 TVT and 204 TOT cases in their study; they reported erosion in 16 cases and found that the mean time between erosion diagnosis and the procedure was 13 weeks. Similar to the literature, mesh extrusion was diagnosed at 7 months (28 weeks) after the first procedure in the PMR group and 9 months (36 weeks) in the SMR group, in the present study. Conservative treatment with antibiotics and/or vaginal estrogen cream is recommended if extrusions are smaller than 0.5 cm and seen in the early stage.[22,23] If conservative treatment fails, partial mesh excision should be considered to perform to close the primary defect with intact vaginal mucosa. We performed PMR or SMR in patients who did not respond to conservative treatment nor had a large extrusion.

In order to make an objective evaluation in patients who underwent mesh excision, our study is important, as it is the first study to investigate urogenital distress and sexual functions together. UDI-6 and FSFI questionnaires were completed by the patients in both the groups at the diagnosis and 6 months after mesh excision, and the rates of improvement in patients' complaints were objectively evaluated. Statistically significant improvements were observed in both urinary and sexual functions of the patients in the postoperative period. When two groups were compared, there was no significant difference in the improvement rates in UDI-6 scores; however, there is a significant difference between total FSFI scores of the two groups, favoring the SMR group.

One of the most frequent complications following mesh excision is recurrent SUI. In cases in which mesh removal is re-

Table 3. Comparison of the groups for the changes at the 6th month postoperatively

	PMR	SMR	p
Improvement rate on UDI-6 scores (%)	(–)30.21±6.56%	(–)26.33±9.01%	0.222
Improvement rate on total FSFI scores (%)	(+)83.71±14.81%	(+)124.42±36.82%	0.001*
Improvements on OAB symptoms (%)	(–)75%	(–)71.42%	0.721
SUI recurrence (%)	(+)14.2%	(+)19.1%	0.544

*p values lower than 0.05 were considered significant. UDI-6: Urinary Distress Inventory-6; FSFI: Female Sexual Function Index; PMR: partial mesh removal; SMR: subtotal mesh removal; OAB: overactive bladder; SUI: stress urinary incontinence

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quired, patients should be informed of the complications that may be caused by this, especially when there is a need for a new surgical procedure for recurrent incontinence. Marcus-Braun and von Theobald showed that 38% of 83 patients who underwent mesh excision developed recurrent SUI within 5 years.[24] In a study reported by Ramart et al.[2], 38.6% of retropubic mesh removal cases and 34% of transobturator mesh removal cases developed urinary incontinence within one year, which required an antiincontinence procedure in the forthcoming period. In the current study, two patients (14.2%) in the PMR group and four patients (19.1%) in the SMR group developed recurrent SUI after mesh excision. We think that the rate of de novo SUI is lower than that found in the literature data, because the postoperative follow-up period is shorter than other studies. Pubovaginal sling surgery by rectus facia was planned for the patients who developed recurrent SUI. In our study, an improvement was observed in OAB symptoms compared to the preoperative period, without any difference between two groups. The improvement of OAB symptoms is considered to be attributable to the disappearance of the obstruction around the urethra.

The limitations of our study are the retrospective nature and small sample size of patients in each group. Our results may be supported by studies with larger patient groups. Although the limited number of patients is a limitation of our study, the evaluation of preoperative and postoperative complaints according to objective questionnaire forms is a remarkable aspect of the current study.

In conclusion, vaginal mesh extrusion is an important complication that may occur following mesh-related procedures. The patient group that has risk factors for mesh extrusion in the preoperative period may be determined, and patients should be informed about mesh complications. In addition, in cases where the extruded portion should be removed, patients should be informed that the de novo SUI may develop after excision surgery and that it may require a new surgical procedure.

In cases where extrusion is developed, subtotal/total removal of mesh provides a significant improvement in patients' complaints of sexual dysfunction related to extrusion.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Gaziantep University Faculty of Medicine Clinical Research Ethics Committee (Approval number: 2018/101).

Informed Consent: Written informed consent was obtained from patients who participated in this study.

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