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CLINICAL ARTICLE

Age-stratified analysis of long-term outcomes of transvaginal mesh repair for treatment of pelvic organ prolapse

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ABSTRACT

Objective: To investigate long-term outcomes after transvaginal mesh repair among patients with pelvic organ prolapse in different age groups. *Methods:* A retrospective cohort study was conducted among women who underwent transvaginal mesh repair with polypropylene mesh for pelvic organ prolapse of stage II or higher between January 2007 and November 2011 at a center in Shanghai, China. Patients were invited to attend a follow-up appointment between July 2014 and May 2015. Surgical outcomes were compared among three age groups (≤59, 60–74, and ≥75 years), and quality-of-life questionnaires were evaluated. Multivariate logistic regression was used to identify risk factors associated with recurrent prolapse and mesh exposure. *Results:* Among 158 patients, 143 (90.5%) were objectively cured and 149 (94.3%) were subjectively cured at follow-up. Surgical outcomes were similar across all age groups. Significant improvements were observed on the Pelvic Floor Distress Inventory across all applicable subscales in all age groups ($P<0.001$ for all). Multivariate logistic regression showed that an active postoperative sex life significantly increased the risk of mesh exposure (odds ratio 11.89, 95% confidence interval 1.08–131.48; $P=0.043$). *Conclusion:* Transvaginal mesh repair was found to be a safe and effective technique for treating pelvic organ prolapse among women of all ages. An active postoperative sex life increased the odds of mesh exposure.

1. Introduction

Pelvic organ prolapse (POP) is a prevalent disorder worldwide, occurring typically among older women and having a serious negative impact on daily life. Previous studies [1,2] have reported that 11%–12% of women in the USA will experience POP and/or urinary incontinence requiring surgical intervention by the age of 80 years, with 29.2% of these women requiring repeat surgical procedures [1]. Smith et al. [3] reported a higher lifetime risk of 19% for surgery for POP in the general female population in Western Australia. Similarly, a large investigation reported in 2014 [4] showed that the lifetime risk of requiring primary surgery for stress urinary incontinence (SUI) or POP by the age of 80 years in the USA was 20.0% (95% confidence interval 19.9–20.2).

The traditional surgical treatment for mild-to-severe pelvic floor distress is enhancement of the weak point of the loose tissue. However, this treatment often fails to improve strength against abdominal pressure and the pelvic organs are therefore prone to relapse, with a recurrence rate ranging from 20% to 40% [1,5]. Currently, reconstructive pelvic surgery (RPS) is commonly used to treat POP. A polypropylene mesh has been widely used in RPS, despite a lack of proof of its long-term safety and efficacy. Similarly, tension-free vaginal tape (TVT)—the gold standard for treatment of SUI [6]—was widely used before its long-term outcomes had been evaluated. Whether the long-term use of polypropylene mesh is safe has not been determined, and the association between mesh-related complications and age has yet to be established.

The aim of the present study was therefore to evaluate long-term outcomes among patients who underwent transvaginal mesh repair for POP, and to investigate the association between age and mesh-related complications.

2. Materials and methods

The present retrospective cohort study was conducted among consecutive women who underwent transvaginal mesh repair for POP between January 1, 2007, and November 30, 2011, at the Department of Gynecology, Tongji Hospital, Shanghai, China. The hospital database was searched for women who had had symptomatic prolapse of stage II or higher (as graded by the Pelvic Organ Prolapse Quantification [POP-Q] system [7]), and underwent surgery in which polypropylene mesh was used. The exclusion criteria were previous failure of implanted pelvic constructive surgery, uncured infection and lesions related to the urinary and genital organs, and pelvic cancer and/or radiation to the pelvic area. Patients meeting the inclusion criteria were contacted and asked to attend a follow-up visit between July 2014 and May 2015. The

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study was approved by the Ethics Review Committee of Tongji Hospital (permit no. 172). All participants provided signed informed consent at the follow-up visit.

Relevant clinical data were extracted from the database for women who agreed to participate. The follow-up visit included completion of the Pelvic Floor Distress Inventory (PFDI) and POP-Q survey, and gynecologic examinations to detect any local mesh-related complications. The PFDI is an inventory consisting of 20 questions and three scales [8]: the Pelvic Organ Prolapse Distress Inventory (POPDI-6; 6 questions), the Colorectal–Anal Distress Inventory (CRADI-8; 8 questions), and the Urinary Distress Inventory (UDI-6; 6 questions). Higher scores on the PFDI indicate a worse quality of life. All patients were interviewed for symptoms suggestive of complications and for any inter-current urogynecologic events, including infection, recurrence of prolapse, mesh exposure, vaginal, bladder, rectal or urethral erosion, neurologic complications, persistent pain, or dyspareunia.

The study outcome measures were indicators of surgical outcomes, including duration of the surgical process, intraoperative bleeding, catheter indwelling, and objective cure rate, subjective cure rate, PFDI score, recurrent prolapse, and mesh exposure at time of follow-up. Objective cure was defined as a POP-Q measurement of stage I or lower after surgery. Subjective cure was defined as a response of "yes" to the question "Are you satisfied with the outcome of the surgery?"

Two cutoff points of age (59 years and 75 years) were determined with reference to WHO standards [9]. Patients were divided into the following three groups: women aged 59 years or younger (group A), women aged 60–74 years (group B), and women aged 75 years or older (group C) at time of surgery.

Data were analyzed using SPSS version 15.0.1. (SPSS Inc, Chicago, IL, USA). The measurement data were expressed as mean ± SD. Comparisons among groups were examined by using one-way analysis of variance, followed by Student–Neuman–Keuls or Dunnett T3 test for multiple comparisons, according to the result of test of homogeneity of variances. Comparisons between preoperative and postoperative data were performed by paired *t* test. Categorical and percentage data were analyzed using the χ^2 test.

Risk factors for recurrent prolapse and mesh exposure were evaluated using multivariable logistic analyses with the following confounding variables: body mass index (BMI, calculated as weight in kilograms divided by the square of height in meters), parity, preoperative complications, POP-Q stage, pelvic colposuspension type, and postoperative sex life. Statistical tests were two-tailed, and significance was set at a *P* value of less than 0.05.

3. Results

Overall, 179 patients met the study criteria, of whom 9 could not be contacted and 12 refused to attend follow-up. Thus, 158 patients were included in the study. The mean age was 67.20 years (range 31–85). Among the participants, 41 (25.9%) were 59 years or younger (group A), 69 (43.7%) were aged between 60 and 74 years (group B), and 48 (30.4%) were 75 years or older (group C) at the time of surgery. The overall mean follow-up duration was 59.78 months (range 35–91). Baseline characteristics are shown in Table 1.

Table 2
Results of the baseline examination.[a]

Examination finding	Overall (n = 158)	Group A, 59 y (n = 41)	Group B, 60–74 y (n = 69)	Group C, ≥75 y (n = 48)	*P* value [b]
Compartment defect					
Cystocele	137 (86.7)	32 (78.0)	64 (92.8)	41 (85.4)	0.085
Vault/uterine prolapse	131 (82.9)	33 (80.5)	56 (81.2)	42 (87.5)	0.597
Rectocele/enterocele	71 (44.9)	21 (51.2)	31 (44.9)	19 (39.6)	0.546
POP-Q stage					0.125
II	84 (53.2)	28 (68.3)	36 (52.2)	20 (41.7)	
III	44 (27.8)	9 (22.0)	20 (29.0)	15 (31.3)	
IV	30 (19.0)	4 (9.8)	13 (18.8)	13 (27.1)	

Abbreviation: POP-Q, Pelvic Organ Prolapse Quantification.
[a] Values are given as number (percentage) unless indicated otherwise.
[b] Comparison between all three groups.

The clinical findings are given in Table 2. Cystocele and uterus prolapse were the two dominant types of compartment defect. Preoperative examination showed that more than half the women were at POP-Q stage II. The proportion of posterior prolapse and POP-Q stage were similar among the three age groups.

The surgical procedures are summarized in Table 3. Concomitant procedures included transobturator tape (TVT-O) procedures, anterior repair, posterior repair, vaginal hysterectomy, and perineorrhaphy. Duration of surgery did not differ by age (Table 4). Amount of intraoperative bleeding and catheter indwelling time were similar among the three groups (Table 4). No intraoperative surgical complications were recorded.

Of the 158 patients, 143 (90.5%) were objectively cured and 149 (94.3%) were subjectively cured at time of follow-up. No significant differences in cure or complication rate were observed among the three groups (Table 4). The baseline scores of the POPDI-6 and UDI-6 were significantly higher among women aged 75 years or older than among those aged 59 years or younger ($P<0.05$ for both), whereas CRADI-8 scores were similar in the three groups. Significant improvements were observed on the PFDI across all applicable subscales in each of the three age groups (Table 4).

None of the patients presented symptoms suggestive of infection, neurological complications, persistent pain, or vaginal, bladder, rectal, or urethral erosion at follow-up. However, 8 (5.1%) women had developed symptomatic POP at the 5-year follow-up: three cases occurred within 6 months of surgery, two developed in the first year, and three

Table 1
Baseline characteristics.[a]

Characteristic	Overall (n = 158)	Group A, ≤59 y (n = 41)	Group B, 60–74 y (n = 69)	Group C, ≥75 y (n = 48)	*P* value [b]
Follow-up, mo	59.78 ± 15.16	61.8 ± 16.13	60.17 ± 15.63	57.50 ± 13.55	0.202
Age, y	67.20 ± 11.29	51.98 ± 8.09	68.29 ± 4.16	78.63 ± 2.80	<0.001
Body mass index [c]	23.24 ± 2.51	23.28 ± 2.25	23.59 ± 2.42	22.70 ± 2.77	0.358
Parity	2.59 ± 1.39	1.41 ± 0.80	2.54 ± 1.07 [d]	3.67 ± 1.37 [d,e]	<0.001
Preoperative complications	79 (50.0)	9 (22.0)	39 (56.5) [d]	31 (64.6) [d]	<0.001
Diabetes	21 (13.3)	1 (2.4)	15 (21.7) [d]	5 (10.4) [d]	0.012
Hypertension	60 (38.0)	2 (4.9)	31 (44.9) [d]	27 (56.3) [d]	<0.001
Cardiac disease	20 (12.7)	1 (2.4)	9 (13.0) [d]	10 (20.8) [d]	0.034
Cerebral infarction	13 (8.2)	0	6 (8.7) [d]	7 (14.6) [d]	0.010
Hysterectomy	3 (1.9)	0	3 (4.3)	0	0.078
Other diseases	9 (5.7)	2 (4.9)	5 (7.2)	2 (4.2)	0.74

[a] Values are given as mean ± SD or number (percentage), unless indicated otherwise.
[b] Comparison between all three groups.
[c] Calculated as weight in kilograms divided by the square of height in meters.
[d] $P<0.05$ vs group A.
[e] $P<0.05$ vs group B.

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