Original Research

Comparison of vaginal hysterectomy with McCall culdoplasty and transvaginal mesh surgery in the management of female pelvic organ prolapse

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Background: The aim of this study was to compare the outcomes of vaginal hysterectomy with McCall culdoplasty and transvaginal mesh surgery in the management of female pelvic organ prolapse. *Methods*: We compared anatomical and functional outcomes who underwent vaginal hysterectomy with McCall culdoplasty or transvaginal mesh surgery for anterior and apical vaginal prolapse at a single tertiary center from January 2009 to December 2016. Anatomical outcome was measured by POP-Q stage and functional outcomes were measured using three questionnaires: the Pelvic Floor Distress Inventory (PFDI-20), the Pelvic Floor Impact Questionnaire (PFIQ-7), and the Pelvic Organ Prolapse/Urinary Incontinence Sexual Questionnaire (PISQ-12). Surgical treatment was done with POP-Q stage > III and anterior or apical compartment prolased patients. Total follow up legnth is two years for each surgical groups. *Results*: We compared anatomical and functional outcomes in 154 women who underwent vaginal hysterectomy with McCall culdoplasty (n = 80) or transvaginal mesh surgery (n = 74) for anterior and apical vaginal prolapse at a single tertiary center from January 2009 to December 2016. In this retrospective cohort study, no significant differences in anatomical and functional outcomes were observed at 1- and 2-year follow-up between women who underwent McCall culdoplasty or transvaginal mesh surgery, except for total vaginal length. There were no statistical differences between the two groups for postoperative complications like POSUI (transvaginal mesh operation vs hysterectomy with McCall culdoplasty, 17.5% vs 22.5%, respectively, $P = 0.651$), urinary urgency incontinence (9.4% vs 8.7%, $P = 0.48$), overactive bladder (4.0% vs 10.0%, $P = 0.147$), urinary tract infection (0% vs 2.5%, $P = 0.21$) or recurrence rate (12.3% vs 2.5%, $P = 0.155$). *Conclusion*: There were no anatomical or functional differences in outcome between vaginal hysterectomy with McCall culdoplasy and transvaginal mesh surgery.

Keywords

Synthetic mesh; Native tissue repair; McCall culdoplasty; Pelvic organ prolapse

1. Introduction

The prevalence of pelvic organ prolapse (POP) is increasing because of the increase in the elderly female population. POP is the abnormal descent of pelvic organs [1] and its overall prevalence currently ranges from 3 to 50% [2, 3]. One of the surgical treatments for POP is transvaginal mesh surgery and this has been widely utilized due to the relatively short operating time and the less invasive surgical approach [4, 5]. However, during the last decade the US Food and Drug Administration (FDA) has issued warnings regarding the safety and efficacy of synthetic meshes because of the high occurrence of late complications. These include vaginal erosion, dyspareunia, mesh exposure, and postoperative stress urinary incontinence [6]. In the Cochrane library, the recurrence rate was less likely with transvaginal mesh surgery compared to vaginal hysterectomy (RR 0.71, 95% CI 0.52 to 0.96) [7]. In this study, we compared the anatomical and functional outcomes between transvaginal mesh surgery and vaginal hysterectomy with McCall culdoplasty in POP patients.

2. Materials and methods

All patients were assessed as anterior and/or apical prolapse POP-Q (Pelvic Organ Prolapse Quantification System, International Continence Society) stage > 3. Those with genital malignancies, mental, psychiatric or neurological diseases, or who had undergone previous pelvic reconstructive surgery were excluded from the study. All patients were examined with a Sims speculum during a Valsalva maneuver in the supine position and the degree of prolapse was determined using the POP-Q system. Transvaginal ultrasonography was conducted for the differential diagnosis of uterus and adnexal diseases in all patients before surgery. The anatomical results were determined as the primary outcome, with POP-Q stage II or less considered a success regardless of patient's symptoms related with uterine prolapse. All patients filled out three questionnaires: the Pelvic Floor Distress Inventory (PFDI-20), the Pelvic Floor Impact Questionnaire (PFIQ-7), and the Pelvic Organ Prolapse/Urinary Incontinence Sexual Questionnaire (PISQ-12). The patients were explained both the pros and cons of the two surgeries, and the patient decided the surgical procedure. A first-generation cephalosporin was administered just prior to surgery. All surgical procedures were performed by one surgeon. The transvaginal mesh surgeries were performed according to the surgical technique (Seratom) previously de-

Table 1. Patient characteristics.

	Transvaginal mesh operation (n = 74)	Vaginal hysterectomy with McCall culdoplasty (n = 80)	P
Age (years)+	67.7 ± 8.7 (63.8–68.3)	66.0 ± 8.9 (64.9–70.0)	0.963
Parity	3.33 ± 1.37 (2.97–3.67)	3.30 ± 1.3 (2.93–3.69)	0.980
BMI (kg/m^2)	24.8 ± 2.78 (24.0–25.4)	23.96 ± 2.56 (23.2–24.7)	0.859
Menopause age	49.24 ± 10.37 (46.4–51.6)	48.0 ± 10.37 (44.9–50.1)	0.622
Operation time	66.93 ± 15.41 (62.57–71.67)	67.59 ± 11.81 (64.66–70.66)	0.236
Hospital days	7.66 ± 2.32 (7.03–8.33)	6.69 ± 1.27 (6.38–7.04)	0.009
Duration of pelvic organ prolapse (month)	32.43 ± 71.59 (16.61–53.46)	54.30 ± 99.27 (27.2–87.2)	0.045
Diabetes	10 (13.5%)	18 (22.5%)	0.149
Hypertension	34 (45.9%)	59 (73.8%)	0.010

Data are presented as Mean ± SD (95% CI) or n (%).

Table 2. Distribution of POP stages.

	Transvaginal mesh operation (n = 74)	Vaginal hysterectomy with McCall culdoplasty (n = 80)	P
POP-Q stage			0.416
III	62 (83.7%)	62 (77.5%)	
IV	12 (16.3%)	18 (22.5%)	
Type of prolapse			0.574
Anterior compartment	61 (82.4%)	63 (78.7%)	
Apical compartment	13 (17.6%)	17 (21.3%)	

scribed by Bermester *et al.* and the uterus was preserved in all patient [8]. Vaginal hysterectomy with McCall culdoplasty was performed in accordance with the surgical technique described previously by Zimmerman *et al.* [9].

All patients had follow-up at one month, 6 months, one year, and each year thereafter following surgery. At each visit, all patients were examined vaginally by the POP-Q system. Postoperative strees urinary incontinence (POSUI) is a de novo SUI that newly occured after surgery. If urine leakage is present in a situation where abdominal pressure increases such as coughing or laughing, and positive for cough stress test, it is diagnosed as POSUI. Urgency urinary incontinence(UUI) was diagnosed with symptoms of urgency and urinary leakage. Overactive bladder(OAB) was diagnosed with urgency, frequency, and nocturia with or without urine leakage. Also, the urine analysis did not show infection and postvoid residual urine volume (PVR) was normal range. If the postoperative POP-Q stage was greater than II based on the most dependent point and occurrence at the primary site or at a new location, it was defined as a recurrence. This study was approved by the Institutional Review Board of Human Research for our institution, and informed consent was obtained from all participants (Chonnam National University Hospital IRB-2019-306).

Statistical analysis was performed with SPSS 20.0 for Windows (SPSS, Inc., Chicago, IL, USA). Fisher's exact test was used to compare the qualitative variables. Paired sample *t*-test was used for intragroup comparison. Chi-square test was used to compare quantitative variables between two groups. A *P*-value of less than 0.05 was considered statistically significant.

3. Results

We reviewed the functional and anatomical outcomes of 154 women with symptomatic POP who underwent transvaginal mesh surgeries or vaginal hysterectomy with McCall culdoplasty at a single tertiary center between January 2009 and December 2016. A total of 74 patients underwent transvaginal mesh surgery with partially absorbable mesh (Seratom®), while 80 patients underwent vaginal hysterectomy with McCall culdoplasty and anterior and posterior colporrhaphy. The total follow-up duration was 2 years for each surgical group. No significant differences were detected between the two groups for mean age, parity, mean menopausal age, and the duration of pelvic organ prolapse before surgery (Table 1). In the transvaginal mesh group, the procedures in 4 patients were conducted with transobturator tape (TOT) due to stress urinary incontinence (SUI). In the vaginal hysterectomy with McCall culdoplasty group, 9 patients underwent TOT procedures due to SUI. The mean operative time was not significantly different between the two groups. Table 2 shows the distribution of POP stages in the study population. The majority of patients were POP-Q stage III (83.7% and 77.5%, respectively, in the transvaginal mesh group and the vaginal hysterectomy with McCall culdoplasty group), and in the majority of patients the anterior compartment was prolapsed (82.4% and 78.7%, respectively, in the transvaginal mesh group and the vaginal hysterectomy with McCall culdoplasty group).

Postoperative stress urinary incontinence (POSUI), urgency urinary incontinence (UUI), and recurrence were not statistically different between the groups (Table 3). Surgical outcomes were similar between the two groups. However, at all follow-up periods the postoperative total vaginal length

Table 3. Postoperative complications.

	Transvaginal mesh operation (n = 74)	Vaginal hysterectomy with McCall culdoplasty (n = 80)	P
Recurrence	6 (12.3%)	2 (2.5%)	0.155
POSUI (Postop stress incontenence)	13 (17.5%)	18 (22.5%)	0.651
Urgency urinary incontinence	7 (9.4%)	7 (8.7%)	0.48
Overactive bladder	3 (4.0%)	8 (10.0%)	0.147
Urinary tract infection	0 (0%)	2 (2.5%)	0.21
Bladder injury	0 (0%)	0 (0%)	0.49

Data are presented as n (%).

(TVL) was longer in the transvaginal mesh group than in the vaginal hysterectomy with McCall culdoplasty group (Table 4). A total of 6 patients experienced recurrence following transvaginal mesh surgery, while two patients had a recurrence after vaginal hysterectomy with McCall culdoplasty. In the transvaginal mesh group with recurrence, one patient underwent a vaginal hysterectomy with anterior and posterior coloporrhaphy, one underwent abdominal hysterectomy with colposacropexy, and 4 patients were followed-up without surgery. In the vaginal hysterectomy with McCall culdoplasty group, two patients with recurrence were followed-up without surgery. The quality-of-life questionnaire after one-year of follow-up showed continued improvement in both groups, but without statistically significant differences (Table 5).

4. Discussion

As the adult population grows older, the prevalence of POP has gradually increased [3, 10]. If not properly treated, problems can arise such as urinary disorders, sexual disorders, and frequent urogenital infections. For these reasons, many types of surgery have been performed to treat POP. However, a high rate of recurrence was reported with earlier POP surgeries [3]. Therefore, surgery using synthetic mesh has been widely used to treat POP and reduce the recurrence rate [7, 11]. However, the use of synthetic mesh is associated with a high incidence of complications, such as mesh exposure, vaginal erosion, de novo SUI, and bladder injury during surgery. For these reasons, the FDA has warned against the use of synthetic mesh in the treatment of POP [6].

Many studies have compared the anatomical outcomes from vaginal mesh surgery and native tissue repair, but few have evaluated the functional outcomes. In this study, the anatomical and functional outcomes were compared between two groups of POP patients treated at a single institution: those who underwent transvaginal mesh surgery and those who underwent vaginal hysterectomy with McCall culdoplasty. No differences were found between the two groups for anatomical outcomes, except with regards to total vaginal length on the POP-Q stage. In the transvaginal mesh group, total vaginal length was longer than in the vaginal hysterectomy with McCall culdoplasty group. Presumably, this was due to differences in the fixation point for each type of surgery. In transvaginal mesh surgery, the vaginal apex fixation level is at the ischial spine, which is more proximal than

the fixation point in vaginal hysterectomy with McCall culdoplasty [8–10]. This may be related to TVL and sexual function. However, there were no statistical differences between the groups in the PISQ-12. Furthermore, this study showed no statistical differences for the recurrence and reoperation rates between the transvaginal mesh surgery and vaginal hysterectomy with McCall culdoplasty groups. Complications, such as POSUI, UUI, recurrences, and bladder injuries were also not significantly different between the two groups.

Many studies have reported techniques to treat POP. Some studies have reported a maximum recurrence rate of 50% when native tissue repair was performed [2, 3]. Others have reported a higher success rate and lower recurrence or re-operation rate with vaginal mesh surgery compared to native tissue repair [12, 13]. Another study reported that de novo SUI was lower in the anterior colporrhaphy group (1.4%, 1/68 patients) compared to the mesh group (8.5%, 6/70 patients). However, the results of another study showed that the recurrence rate for mesh surgery was lower than that of native tissue repair [14]. Another study reported that sexual function may be problematic with vaginal hysterectomy [15].

However, some studies have reported good anatomical and functional outcomes following McCall culdoplasty with transvaginal hysterectomy [16, 17]. Paz-levy et al. reported a high success rate with native tissue repair in anterior compartment-prolapsed patients and showed good results for anatomical and functional outcomes and quality of life [18]. Pieternel et al. reported no significant anatomical or composite benefit for partially absorbable mesh over native tissue repair [19].

In the present study, no significant differences in anatomical and functional outcomes, operative time, or complications were observed between the two surgical groups. While the US FDA has warned against the use of synthetic mesh, surgery using native tissue is not inferior to transvaginal mesh surgery. The limitations of this study include its retrospective design, small sample size and short follow-up duration. And we only considered anatominal outcomes when diagnosing recurrence without considering patient's symptomes. Moreover, partially absorbable mesh was investigated and not other types of mesh. However, the strengths of the study are that all surgery was performed by one surgeon, functional and anatomical outcomes were compared between the two types of surgery.

Table 4. Objective results of operation.

	Preoperative			postop 1 month			postop 6 months			postop 12 months			postop 24 months		
	Group 1 (n = 74)	Group 2 (n = 80)	P	Group 1 (n = 74)	Group 2 (n = 80)	P	Group 1 (n = 74)	Group 2 (n = 80)	P	Group 1 (n = 74)	Group 2 (n = 80)	P	Group 1 (n = 74)	Group 2 (n = 80)	P
Point Aa (cm)	2.5 ± 0.6	2.6 ± 1.1	0.29	-2.3 ± 0.8	-2.7 ± 0.4	< 0.001	-2.1 ± 0.9	-2.3 ± 0.6	0.05	-2.1 ± 0.7	-2.1 ± 0.6	0.15	-2.1 ± 0.9	-2.2 ± 0.6	0.243
Point Ba (cm)	3.6 ± 0.9	3.38 ± 1.5	0.22	-2.3 ± 0.8	-2.7 ± 0.4	< 0.001	-2.1 ± 0.9	-2.3 ± 0.7	0.138	-2.1 ± 0.8	-2.1 ± 0.6	0.1	-2.0 ± 1.2	-2.2 ± 0.6	0.26
Point C (cm)	2.0 ± 1.8	1.78 ± 2.4	0.12	-6.2 ± 1.4	-6.8 ± 0.7	0.001	-5.3 ± 2.4	-6.4 ± 0.8	< 0.001	-5.8 ± 1.8	-5.5 ± 3.3	0.378	-5.7 ± 2.3	-6.1 ± 0.9	0.167
Total vaginal length (cm)	6.9 ± 0.4	7.0 ± 0.4	0.58	7.5 ± 0.6	7.0 ± 0.6	0.06	7.1 ± 2.1	6.8 ± 0.7	0.283	7.3 ± 1.1	6.8 ± 0.6	0.45	7.2 ± 0.9	6.6 ± 0.9	0.85
Genital hiatus (cm)	4.6 ± 0.9	4.0 ± 0.7	0.04	3.7 ± 0.6	2.9 ± 0.2	< 0.001	3.7 ± 0.6	2.8 ± 0.9	0.17	3.5 ± 0.6	3.0 ± 0.2	< 0.001	3.5 ± 0.6	3.0 ± 0.3	0.01

Data are presented as Mean ± SD (95% CI).

Group 1: Transvaginal mesh operation.

Group 2: Vaginal hysterectomy with McCall culdoplasty.

Table 5. Changes in quality-of-life scores.

	Preoperative			Postoperative		
	Group 1 (n = 74)	Group 2 (n = 80)	P	Group 1 (n = 74)	Group 2 (n = 80)	P
PFDI-20	141.5 ± 15.1	146.7 ± 27.0	0.311	110.0 ± 14.3	106.4 ± 19.5	0.213
POPDI-6	58.6 ± 6.4	59.0 ± 14.4	0.210	33.2 ± 5.7	31.9 ± 9.0	0.325
CRADI-8	43.2 ± 8.1	47.5 ± 8.0	0.415	37.2 ± 16.2	39.0 ± 10.0	0.131
UDI-6	49.4 ± 3.1	47.5 ± 12.0	0.324	36.1 ± 8.2	27.0 ± 48.2	0.102
PFIQ-7	114.2 ± 57.1	114.5 ± 65.7	0.217	31.4 ± 46.5	37.5 ± 50.2	0.041
POPIQ-7	43.1 ± 11.0	41.3 ± 20.3	0.153	11.2 ± 12.2	13.6 ± 19.0	0.234
CRAIQ-7	33.1 ± 12.3	31.1 ± 25.3	0.632	11.1 ± 15.9	12.6 ± 20.7	0.221
UIQ-7	33.5 ± 15.2	40.3 ± 24.8	0.113	13.1 ± 12.1	11.1 ± 16.3	0.351
PISQ-12	13.1 ± 18.1	12.8 ± 13.7	0.342	8.5 ± 11.5	9.3 ± 7.8	0.081

Data are presented as Mean ± SD (95% CI).

CRADI, Colorectal-Anal Distress Inventory; CRAIQ, Colorectal-Anal Impact Questionnaire; PFDI, Pelvic Floor Distress Inventory; PFIQ, Pelvic Floor Impact Questionnaire; PISQ, Pelvic Organ Prolapse/Urinary Incontinence Sexual Questionnaire; POPDI, Pelvic Organ Prolapse Distress Inventory; POPIQ, Pelvic Organ Prolapse Impact Questionnaire; UDI, Urogenital Distress Inventory; UIQ, Urinary Incontinence Questionnaire.

Group 1: Transvaginal mesh operation group, Group 2: Vaginal hysterectomy with McCall culdoplasty group.

5. Conclusions

In the advanced stages of anterior and apical compartment pelvic organ prolapse, vaginal hysterectomy with McCall culdoplasty and transvaginal mesh surgery showed no differences in anatomical and functional outcomes. Therefore, although transvaginal mesh has been removed from the market in many countries the hysterectomy and McCall culdoplasty remains a viable option.

Author contributions

CHK designed the research study. HBC and MKC performed the research. All authors contributed to editorial changes in the manuscript. All authors read and approve the final manuscript.

Ethics approval and consent to participate

This study was approved by the Institutional Review Board of Human Research for our institution and informed consent was obtained from all participants (CNUH IRB-2019-306).

Conflict of interest

The authors declare no conflict of interest.

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