Original Article

Improvement in Quality of Life after Laparoscopic or Robotic-assisted Sacrocolpopexy with a Single Anterior Mesh in Patients with Pelvic Organ Prolapse: A Retrospective Analysis from a Single Institution

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Abstract

Objectives: Pelvic organ prolapse (POP) is a significant health-care problem for older women. We have treated POP surgically using laparoscopic sacrocolpopexy (LSC) or robotic-assisted sacrocolpopexy (RSC). The original LSC and RSC procedures were done with anterior and posterior meshes; however, the use of the single mesh procedure is increasing because of its simplicity and safety. There have been few reports about the change in quality of life (QOL) using the single mesh procedure. Therefore, the present study aimed to retrospectively evaluate the change in QOL by LSC and RSC using a single anterior mesh for women without posterior compartment prolapse.

Materials and Methods: We performed LSC or RSC using a single anterior mesh in 52 patients who had POP without posterior vaginal wall prolapse between August 2018 and October 2022. We assessed the QOL before and after surgery using prolapse-QOL (P-QOL) questionnaires.

Results: All patients who received LSC or RSC with a single anterior mesh left the hospital as scheduled without severe perioperative complications. There were no instances of wound infection or vaginal mesh extrusion. The recovery rate of questionnaires was 63.5% (33/52). All QOL score domains improved significantly, and there were no questionnaire parameters that worsened.

Conclusion: LSC or RSC using only a single anterior mesh improves P-QOL with a low incidence of surgical complications for POP patients who did not have posterior vaginal wall prolapse. LSC or RSC with a single anterior mesh may be a prospective new procedure for POP.

Keywords: Laparoscopic sacrocolpopexy, pelvic organ prolapse, quality of life, robotic-assisted sacrocolpopexy, single anterior mesh

Introduction

Pelvic organ prolapse (POP) is a significant health-care problem for older women. Previous studies have reported that the prevalence of POP ranges from 3% to 50% in the general population, and from 11% to 19% of patients with POP have undergone surgical treatment.[1,2] POP can be associated with lower urinary tract or bowel problems, sexual dysfunction, and reduction in the quality of life (QOL). Most patients with POP hope to undergo surgery to improve their low QOL. Recently, laparoscopic sacrocolpopexy (LSC) or robotic-assisted sacrocolpopexy (RSC) has become more prevalent for POP surgeries. Previous study showed that there were no significant differences in the surgical complication rates and postoperative recurrence rates between LSC and native tissue repair.[3] The use of double mesh (anterior and posterior) in LSC and RSC

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has been standard.[4-7] However, the double mesh procedure is prone to complications; in particular, the posterior-placed mesh can cause severe complications including rectal mesh exposition. Minimizing the number of meshes reduces the occurrence of mesh infections and erosion. It has been reported that highly skilled surgical technique is required for limiting the surgical field of LSC and RSC.[8,9] There are some reports about the efforts to safely perform these difficult procedures. For example, Kotani *et al*. reported that the use of preoperative contrast-enhanced computed tomography and perioperative ultrasonography is useful for the safety sutures in the presacral area in LSC.[10] Furthermore, reducing the number of steps in these procedures could lead to improved surgical safety. As a result, recently some facilities have adopted single anterior mesh LSC and RSC, omitting the posterior mesh.[11] It was reported that there was no difference in postoperative pain, hospital stay, blood loss, or the risk of recurrent POP between single mesh and double mesh procedures and single mesh procedure required less operative time than double mesh procedure.[11,12] In our hospital, we use only a single anterior mesh in LSC and RSC in patients with no posterior compartment prolapse. To date, only a few studies assessing postsurgical QOL by this procedure have been reported. Therefore, the present study aimed to retrospectively evaluate the effect of a single anterior mesh LSC or RSC on QOL in our hospital.

Materials and Methods

This study was approved by the Research and Ethics Committee of our hospital (approval no. 4288) and followed the Helsinki Declaration. We obtained the written informed consent from all patients. We recruited patients who suffered from severe POP; their POP quantification (POP-Q) level was classified as Stage 2 or higher. When patients request surgery for POP in our hospital, we select the LSC or RSC procedure instead of native tissue repair for those who suffer from pelvic organ problems such as uterine leiomyomata or ovarian tumor, and for those who want to preserve sexual function. These patients do not have severe complications such as uncontrolled diabetes mellitus (glycated hemoglobin >7.0%), or severe glaucoma. We had performed LSC or RSC with a single anterior mesh on 52 patients with POP without posterior vaginal wall prolapse between August 2018 and October 2022. For these patients, we assessed the QOL before and after surgery using prolapse-QOL (P-QOL) questionnaires. Thirty-three patients responded about their QOL changes by the surgery, and we retrospectively evaluated them. There were 12 patients in POP-Q Stage 2, 19 patients in Stage 3, and 2 patients in Stage 4. Fifteen patients underwent LSC, and 18 patients underwent RSC [Table 1].

Table 1: Patients characteristics and perioperative outcomes

Age (years)	65.5 (44-78)
BMI	24.4 (19-32)
Parity	2.2 (0-5)
Previous hysterectomy	1
Uterine leiomyomata	11
Ovarian tumor	3
POP-Q stage	
Stage 1	0
Stage 2	12
Stage 3	19
Stage 4	2
Procedure	
LSC	15
RSC	18
Operative time (min)	204 (135-339)
Operative bleeding (ml)	10 (5-100)
Hospitalization days	6.8 (6-8)
Blood transfusion	0
Bladder injury	0
Rectal injury	0

Number of cases/average (range). BMI; body mass index, LSC; laparoscopic sacrocolopopexy, RSC; robotic-assisted sacrocolpopexy

We performed either LSC or RSC using four or five trocars, respectively. We used single monofilament polypropylene mesh (3 cm × 15 cm) for anterior corrections. Placing trocars, we opened the vesicouterine fossa and dissected it until the depth of the transition from the urethra to the bladder. Next, we performed a supracervical hysterectomy and bilateral salpingo-oophorectomy. We performed a total hysterectomy in two patients and bilateral salpingectomy in three patients. One patient with a previous hysterectomy underwent bilateral salpingo-oophorectomy. For mesh placement, we first opened the presacral peritoneum and made the subperitoneal tunnel at the right side of the rectum. Second, we sutured the mesh to the deepest point of the anterior vaginal wall and then sutured the midpoint of the mesh to the amputated cervix or stump of the vagina. Third, we sutured the top of the mesh to the promontory after lifting it through the tunnel. Finally, we completed the peritonization of the mesh.

In our institute, after LSC or RSC, patients are usually removed urinary catheter and allowed to walk the day after surgery. In generally, the postoperative hospital stay is 4 days in LSC and 5 days in RSC.

We assessed the change in patient QOL by LSC or RSC with a single anterior mesh as the primary outcome of this study. We used our language's version of the P-QOL questionnaire,[13] which was introduced by Digesu *et al*.[14] and has been translated into multiple languages.[13,15-17] The P-QOL questionnaire comprises a total of 20 questions in nine QOL domains covering general health, prolapse impact, role limitations (cleaning, shopping, and daily activities outside the home), physical limitations (e.g., walking, running, and

travel), social limitations (ability to socialize, visit friends), personal relationships (sex life, family life), emotional problems (e.g., feelings of depression, anxiety), sleep/energy disturbance, and measurements of symptom severity. Severity measurement questions include the use of, for example, tampons and pads to help with symptoms, manually pushing up the prolapse, pain/discomfort, and avoidance of standing. In addition, there are 18 questions about symptoms relating to bladder, bowel, and sexual functions. If a symptom was present, a four-point scoring system was applied to each item. Scores in each QOL domain were calculated using the formula provided by the author of the original paper and range between 0 and 100. A lower score indicates a better QOL in each domain (0 is best, 100 is worst).[14] For the 18 questions, we chose to allocate points as follows: zero point to "not applicable or more than once a day" checkboxes, one point to "none or once a day" checkboxes, two points to "a little or once every 2 days" checkboxes, three points to "moderately or once every 3 days" checkboxes, and four points to "a lot or once a week or more" checkboxes as in a previous report.[13]

With respect to statistical analysis, we compared P-QOL scores before and after surgery by the Wilcoxon rank sum test. $P < 0.05$ was considered statistically significant. Twenty-three of 33 patients did not give appropriate answers for the personal relationships domain of the P-QOL questionnaire. We decided the domain was not suitable to analyze and excluded the domain from the analysis. Only 20 of 33 patients answered the question, "vaginal bulge which gets in the way of sex," and so we used the *T* value for analysis of this questionnaire.

Results

The characteristics and perioperative outcomes of 33 patients are summarized in Table 1. The average age was 65 years, and the average body mass index was 24. One patient had a past history of abdominal hysterectomy because of adenomyosis. Eleven patients had uterine leiomyomata (size: 2–5 cm), and three patients had an ovarian tumor (size: 1–7 cm). Thirty patients underwent a supracervical hysterectomy with LSC or RSC. Furthermore, two patients, one with abnormal cervical cytology and the other with a suspected endometrial tumor, received a total hysterectomy. The mean operation time was 204 min. None of the patients required a blood transfusion, and there were no instances of bladder injury or rectal injury. All patients left the hospital as scheduled; the average hospital stay was 6.8 days.

None of the patients experienced postoperative infection, mesh erosion, or mesh extrusion. One patient had a recurrence of prolapse worse than POP-Q Stage 2, but she did not need surgical repair because she was asymptomatic. We detected *de novo* stress urinary incontinence (SUI) in two patients. SUI in one patient was not severe and resolved after taking clenbuterol hydrochloride for a few months. Another patient had more severe SUI, and we suggested urinary surgery, but she refused. After approximately a year, the symptoms improved without intervention [Table 2].

The recovery rate of questionnaires was 63.5% (33/52). There were no QOL domains or items regarding symptoms of bladder, bowel, or sexual functions that were worse after surgery. Scores of all QOL domains after LSC or RSC showed significant decreases compared with those before surgery [Table 3]. Of 18 items regarding symptoms of bladder, bowel, and sexual functions, scores of 15 items decreased significantly after surgery. Scores of the other three items did not show significant changes [Table 4].

Discussion

In the present study, we found that most of the domains and items of the P-QOL questionnaire were improved by LSC or RSC using only a single anterior mesh. Our result was similar to the results in the previous report of LSC with anterior and posterior meshes.[18] In addition, by using the pelvic floor impact questionnaire, it has been reported that the QOL in women who underwent sacrocolpopexy with a single anterior mesh was improved significantly compared with that in women who were treated with anterior and posterior meshes.[11] As shown here, the preoperative POP-Q stage was not severe in many patients (only 2 of 33 patients classified as Stage 4), and none of the patients had posterior prolapse. P-QOL improvement after surgery was excellent, showing that LSC or RSC using a single mesh procedure could be recommended for many patients.

The P-QOL questionnaire has been translated into multiple languages and used in many countries.[13-17] The linguistic validity of the Japanese version of P-QOL we used has been

Table 2: Postoperative complications and outcomes in patients

	No. of cases (%)
Infection	0 (0)
Mesh erosion/extrusion	0 (0)
Postoperative POP-Q stage	
Stage 0	6 (18.2)
Stage 1	26 (78.8)
Stage 2	1 (3.0)
Stage 3	0 (0)
Stage 4	0 (0)
De novo SUI	2 (6.1)

POP-Q; pelvic organ prolapse quantification, SUI; stress urinary incontinence

confirmed, and it has been used in published reports.[13,16,17] As indicated in the materials and methods section, only 10 of 33 patients gave appropriate answers for the personal relationships domain of the P-QOL questionnaire. The domain includes a relationship with a partner and sex life. In our country, middle-aged women have lower sexual activity than those in other countries.[19] Our country's people are typically not as open about their private lives and might feel hesitant to answer the questions.

Symptoms of bladder, bowel, and sexual functions showed no worsening after surgery. No significant changes were found in the three of the 18 items after surgery [Table 4]. One of the items was about sexual function; only 20 of 33 patients answered the questions both before and after surgery. Five patients answered the item only before surgery. A long follow-up period may be necessary to evaluate this item. The other two items were both about the conditions of the bowels.

Table 3: Comparison for scores of quality of life domains before and after surgery

	Before surgery	After surgery	*P*	*n*
General health perceptions	75 (50-75)	25 (0-25)	<0.001	31
Prolapse impact	67 (33-100)	0 (0-33)	<0.001	29
Role limitaions	50 (33-83)	0 (0-0)	<0.001	32
Physical limitations	33 (33-83)	0 (0-4)	<0.001	31
Social limitations	14 (0-25)	0 (0-0)	<0.001	28
Emotions	44 (33-70)	0 (0-22)	<0.001	32
Sleep/energy	33 (2-50)	0 (0-0)	<0.001	29
Severity measures	42 (25-67)	0 (0-8)	<0.001	29

Median (interquartile ranges; IQR)

In this study, all patients underwent LSC or RSC with only an anterior mesh because they did not have posterior vaginal wall prolapse. There were six items related to the conditions associated with the bowel, and each score of the items was significantly improved or not changed. It suggests that anterior single mesh LSC or RSC might be adequate for bowel disorder of patients with POP who do not have an observed posterior prolapse. All seven items of urinary function were significantly improved after surgery.

Recently, minimally invasive surgical procedures have widely expanded in many surgical specialties because of their advantages, including reduction of postoperative pain, less blood loss, and shorter hospital stays. It has been reported that LSC and RSC have become popular procedures for POP because of the lower risk of recurrence of these minimally invasive procedures.[4,5] A recent study showed similar anatomical and functional results between the use of a single anterior mesh and both anterior and posterior mesh in abdominal sacrocolpopexy, LSC, or RSC for patients with POP having only minor or no posterior prolapse.[11] In addition, the single anterior mesh reduces the risk of mesh erosion/extrusion and offers significant improvement in the QOL.[11]

We showed that LSC or RSC with single anterior mesh procedures for patients with POP who do not have posterior vaginal wall prolapse can result in a low complication rate, good anatomic outcome, and significant improvement in the P-QOL questionnaire score. None of the patients required transfusion and none experienced bladder or rectal injury,

Table 4: Comparison for scores of items of symptoms regarding bladder and bowel, and sexual function before and after surgery

	Before surgery	After surgery	*P*	*n*
Going to the toilet to pass urine very often.	3 (2-3)	1 (0-1)	<0.001	33
Urgency: A strong desire to pass urine	2 (1-3)	0 (0-1)	<0.001	33
Urge incontinence; urinary leakage associated with a strong desire to pass urine	1 (1-2)	1 (0-1)	0.002	31
Stress incontinence; urinary leakage associated with coughing	2 (1-3)	1 (0-1)	0.001	30
Feeding a bulge/lump from or in the vagina	3 (2-4)	0 (0-1)	<0.001	30
Heaviness or dragging feeling as the day gose on from the vagina or the lower abdomen	2 (2-3)	0 (0-1)	<0.001	32
Vaginal bulge interfering with your emptying your bowels	2 (1-3.5)	0 (0-1)	<0.001	31
Discomfort in the vagina which is worse when standing and relieved by lying down	2.5 (2-4)	0 (0-1)	<0.001	32
Poor urinary stream	2 (2-3)	0 (0-1)	<0.001	33
Straining to empty your bladder	2 (1-3)	0 (0-1)	<0.001	33
Urine dribbles after emotying your bladder	1 (0-2)	0 (0-1)	0.005	32
Bowels do not feel completely empty after opening	2 (1-2)	1 (0-1)	0.001	33
Constipation; difficulty in emptying	2 (1-2)	1 (0-2)	0.002	32
Straining is open your bowels	2 (1-2.25)	1 (0-2)	0.002	31
Vaginal bulge which gets in the way of sex	1 (0-1)	0 (0-1)	NS	20
Lower backache worsens with vaginal discomfort	1 (0-1)	0 (0-1)	0.045	33
Do you help empty your bowels with your fingers	1 (0-1)	0 (0-1)	NS	31
How often do you open your bowels	1 (1-2)	1 (0.75-2)	NS	27

Median (IQR). NS; not significant

perioperative infection, or mesh erosion/extrusion. In the present study, the rate of *de novo* SUI was 6.1%, similar to the rates in previous reports.[11,18] In addition, we showed that the subjective cure rate (<POP-Q Stage 2) was 97%, and this rate was comparable to the result of a recent review of POP; Barber and Maher reported that the rate by LSC and RSC was 90.5% and 93%, respectively.[20] We showed that the reoperation rate for prolapse or SUI was 0%, although further studies are needed to determine whether the high success rates are sustainable for longer follow-up periods and maintained in many patients. In the present study, the average number of total hospitalization stay was 6.8 days. In our institute, usually patients come to the hospital the day before operative day and they are discharged from the hospital on the 4th (LSC) and 5th (RSC) postoperative day. In other reports, the average number of postoperative hospitalization stays was 1.5–4 days.[2,18,21] In our country, health insurance for treatments of LSC and RSC became available in 2014 and 2020, respectively; and we began offering the treatments in 2018 and 2021, respectively. Because LSC and RSC are newer procedures at our institute, hospitalization stays were still long and became shorter gradually, along with the improvement in the surgical techniques. In fact, the postoperative hospitalization is shorter in LSC than in RSC. Usually in our institute, patients after native tissue repair or abdominal surgery are discharged on the 7th postoperative day. The short hospital stay is one of the main benefits of LSC and RSC.

There are some limitations to the present study. Nineteen of 52 patients who underwent LSC or RSC did not answer the P-QOL questionnaire. One of the reasons might be the complexity of the questionnaire. To increase the number of participants, using only nine QOL domains were planned. Furthermore, the number of subjects was small and reflected the results of a single institution. Because this study did not have a control group, a randomized controlled trial is needed.

Conclusions

LSC or RSC with a single anterior mesh for patients with POP who do not have posterior vaginal wall prolapse improves P-QOL and coincides with satisfactory objective clinical outcomes. Because most women who have suffered symptoms from POP decide to receive surgery to improve their QOL, we believe that our results will encourage patients to consent to this surgery using a single anterior mesh.

Author contributions

Conceptualization, Riyo Kinouchi; Methodology, Riyo Kinouchi; Software, Riyo Kinouchi; Validation, Riyo Kinouchi, Kanako Yoshida, and Takeshi Kato; Formal Analysis, Riyo Kinouchi; Investigation, Riyo Kinouchi, Kanako Yoshida, and Takeshi Kato; Resources, Riyo Kinouchi; Data Curation, Riyo Kinouchi, Kanako Yoshida, Takako Kawakita, and Takeshi Kato; Writing – Original Draft Preparation, Riyo Kinouchi; Writing – Review & Editing, Riyo Kinouchi; Visualization, Riyo Kinouchi; Supervision, Riyo Kinouchi, Toshiyuki Yasui, and Takeshi Iwasa; Project Administration, Riyo Kinouchi. All authors have read and agreed to the final version of the manuscript.

Data availability statement

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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