

# Comparison of Surgical Results and Postoperative Recurrence Rates by Laparoscopic Sacrocolpopexy with Other Surgical Procedures for Managing Pelvic Organ Prolapse

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## Abstract

**Objectives:** Pelvic organ prolapse (POP) is relatively high for a gynecologic disease. Laparoscopic sacrocolpopexy (LSC) is currently the main surgical option for managing POP. The priority of the surgical treatment is preventing recurrence after the surgery. We presented the surgical outcome and recurrence rate of LSC and compared the data of LSC with that of other surgical procedures for managing POP to examine the effectiveness of LSC over other them.

**Materials and Methods:** We compared the results of 138 cases of LSC with other conventional procedures, namely 30 cases of total vaginal hysterectomy (TVH) combined with colporrhaphy anterior and posterior, 66 cases of the Manchester operation, and 68 cases of colpocleisis. We compared the age, body mass index, operative time, blood loss volume, postoperative hospital stay duration, rate of complications, recurrence rate, reoperation rate, and the cumulative recurrence rate after 10 years.

**Results:** The complication rate of LSC, TVH, the Manchester operation, and colpocleisis was 2.2%, 3.3%, 3.0%, and 4.4%; the recurrence rate 2.8%, 3.5%, 4.5%, and 8.7%; and the cumulative recurrence rate after 10 years 3.7%, 4.6%, 8.8%, and 18.2%. There was no significant difference between LSC and the other three groups.

**Conclusion:** LSC seems to be an effective surgical option that requires a higher skill level than other surgical methods and has a longer operative time, lesser operative invasion, and a lower long-term recurrence rate. We will actively recommend LSC to those when appropriate.

**Keywords:** Laparoscopy pelvic, organ prolapse, sacrocolpopexy

## INTRODUCTION

Pelvic organ prolapse (POP), which is becoming increasingly common in an aging society, is a disorder that adversely affects the quality of life (QOL) of women. The incidence of POP is high; it is experienced by one in four healthy women and 40% of those who underwent childbirth in Japan. The relative risk of undergoing surgery for this disorder is 11% which is relatively high for a gynecologic disease.<sup>[1]</sup>

Native tissue repair (NTR) has traditionally been common as a surgical treatment approach. Previously, surgical treatment in our hospital was mainly performed using

the NTR approach, such as the Manchester operation, colpocleisis, and total vaginal hysterectomy (TVH) with anterior and posterior colporrhaphy. However, a high postoperative recurrence rate of 10%–40% is associated with the conventional surgery.<sup>[1-4]</sup> Therefore, the surgical option was switched to using tension-free vaginal mesh (TVM), which has a low recurrence rate. The technique of using mesh during a vaginal surgery was developed in France in 2004.<sup>[5]</sup> However, serious postoperative complications were

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reported with TVM, and the Food and Drug Administration issued safety precautions.<sup>[6]</sup> Owing to the introduction of safety precautions regarding TVM, the laparoscopic sacrocolpopexy (LSC) procedure reported by Nezhat *et al.* in 1994 has drawn attention and becomes a widely performed surgical option worldwide.<sup>[7]</sup> Our institution introduced LSC in 2014, which is currently the main surgical option for managing POP.

Because POP is a disease that decreases QOL, the most important thing of the surgical treatment is to prevent recurrence after surgery.

In this report, we presented the surgical outcome and recurrence rate of LSC and compared the data of LSC with that of other surgical procedures for managing POP to examine the effectiveness of LSC over other them. In our range of literature research, there are no reports comparing the long-term prognosis of multiple surgical procedures in a single institution; therefore, we report one here.

## MATERIALS AND METHODS

Our department introduced LSC in 2014 and has implemented 138 procedures until 2019. From 2006 to 2019, we compared the results of LSC with other conventional procedures, namely 30 cases of TVH combined with colporrhaphy anterior and posterior, 66 cases of the Manchester operation, and 68 cases of colpocleisis. Table 1 shows the annual number of each surgical procedure performed. We compared the age, body mass index (BMI), operative time, blood loss volume, postoperative hospital stay duration, rate of complications, recurrence rate of POP-Q Stage III or higher, and reoperation rate. Recurrence was defined as POP-Q Stage III or higher, and the upper limit of the recurrence period was set at 10 years after surgery. Further, the cumulative recurrence

rate after 10 years was examined using the Kaplan–Meier method. We compared LSC with three other methods.

In this study, we chose vaginoplasty for patients over 80 years of age and those with poorly controlled underlying disease. As shown in Table 1, the other techniques we chose differed according to the time period. Our primary choice was Manchester surgery until 2013 when it was shifted to TVH plus vaginal wall plasty, and in recent years, it has been LSC that is performed by two endoscopy specialists.

This study was approved by the Institutional Review Board of Kindai University Faculty of Medicine (R02-020). All research was performed in accordance with Ethical Guidelines for Medical and Health Research Involving Human Subjects. All patient informed consent has been obtained for this study.

LSC is indicated for all POP patients with injury at Level I of DeLancey.<sup>[8]</sup> LSC is a good indication, especially, for young people to conserve their sexual activity. In principle, it is performed for patients with a favorable performance status and no uncontrollable medical conditions, such as diabetes.

A closed approach was used to establish pneumoperitoneum through the umbilicus, and a trocar with a camera was inserted to observe the inside of the abdominal cavity. A 12-mm trocar was inserted in the lower left region of the abdomen, and 5-mm trocars were inserted in the center and the lower right regions of the abdomen. A Free Jaw clip® (Kyocera Medical, Osaka, Japan) was placed on the epiploic appendix along the sigmoid colon, and the intestines were lifted and placed on the upper left abdomen to establish the surgical view. An Ethibond® (Johnson and Johnson Japan, Tokyo, Japan) suture (No. 0) was inserted through the anterior longitudinal ligament and left untied. The retroperitoneum was cut on the medial side of the right uterosacral ligament, and a subtotal hysterectomy and bilateral adnexectomy were then performed. The uterus was removed using a morcellator. The rectovaginal space was exposed, and a posterior colporrhaphy was performed using a V-Loc® (No. 2-0) (Covidien Japan, Tokyo, Japan) suture.<sup>[9]</sup> The vesicovaginal space was separated, and a piece of mesh (Gynemesh®, Johnson and Johnson Japan, Tokyo, Japan) was inserted and placed on the anterior wall of the vagina. The mesh was sutured with seven stitches using Ethibond® sutures (No. 3-0) on the vaginal wall and the cervix of the uterus, which was then lifted for stitching with a premade untied suture in the anterior longitudinal ligament. The peritoneum was fully closed using an absorbable suture to complete the surgery.

In general, patients were ambulatory and began oral intake of food on postoperative day 1, underwent urethral catheter removal on postoperative day 2, and were discharged on postoperative day 4.

**Table 1: Annual transition of each surgery**

|       | LSC | TVH | Manchester | Colpocleisis |
|-------|-----|-----|------------|--------------|
| 2006  | 0   | 0   | 16         | 8            |
| 2007  | 0   | 0   | 10         | 12           |
| 2008  | 0   | 0   | 6          | 3            |
| 2009  | 0   | 0   | 12         | 5            |
| 2010  | 0   | 0   | 5          | 7            |
| 2011  | 0   | 0   | 6          | 2            |
| 2012  | 0   | 1   | 6          | 7            |
| 2013  | 0   | 6   | 4          | 2            |
| 2014  | 1   | 12  | 1          | 3            |
| 2015  | 10  | 2   | 0          | 5            |
| 2016  | 28  | 4   | 0          | 4            |
| 2017  | 24  | 3   | 0          | 2            |
| 2018  | 45  | 0   | 0          | 2            |
| 2019  | 30  | 2   | 0          | 6            |
| Total | 138 | 30  | 66         | 68           |

LCS: Laparoscopic sacrocolpopexy, TVH: Total vaginal hysterectomy

The Kaplan–Meier method was used to evaluate the cumulative recurrence rates. The comparison between LSC and the other three groups was performed using the log-rank test. The *t*-test and Bonferroni correction were used to compare the difference between the averages of LSC and the other procedures. The comparison of rates between the procedures was performed using the Chi-square test. For all the tests,  $P < 0.017$  was considered statistically significant.

## RESULTS

The surgical results are shown in Table 2. The mean age of patients undergoing LSC, TVH, the Manchester operation, and colpocleisis was 69, 70, 63, and 75 years, respectively, and was significantly higher and lower in the LSC group than in the Manchester operation and colpocleisis groups, respectively. The BMI was 26.0, 24.1, 23.6, 23.6, respectively, and there was no significant difference between the LSC and any other group. The operative time was 226 min, 128 min, 94 min, and 81 min, respectively, and was significantly higher in the LSC group than in any other surgical group. The blood loss volume was 29 ml, 136 ml, 73 ml, and 58 ml, respectively, and was significantly lower in the LSC group than in TVH and Manchester operation groups. The complication rate was 2.2%, 3.3%, 3.0%, and 4.4%. There was no significant difference between LSC and the other three groups.

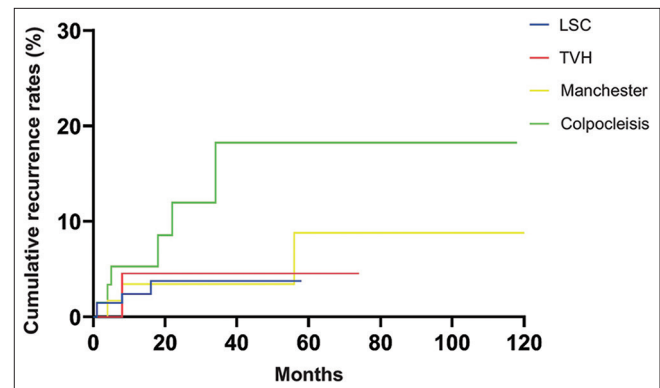
The recurrence rate, reoperation rate, and the cumulative recurrence rate are shown in Table 3. The recurrence rate was 2.8%, 3.5%, 4.5%, and 8.7% and reoperation rate was 1.5%, 0%, 3.0%, and 2.9%, respectively, with no significant difference between LSC and the other three groups. The cumulative recurrence rate after 10 years using the Kaplan–

Meier method was 3.7% in LSC, 4.6% in TVH, 8.8% in the Manchester operation, and 18.2% in vaginal closure groups. The log-rank test showed no significant difference between LSC and the other three groups [Figure 1].

## DISCUSSION

Various surgical methods have historically been practiced for managing POP. Our hospital mainly selected the Manchester operation in 2006 according to the direction policy, TVH in 2013, and LSC in 2015. Colpocleisis has been traditionally opted for the elderly aged  $\geq 80$  years and for those with poor general condition regardless of age.

LSC has preferentially been used in recent years and provides many advantages, such as reduced bleeding during surgery and a shorter hospital stay.<sup>[10–12]</sup> In addition, its postoperative recurrence rate is less than those of conventional methods.<sup>[10]</sup> However, the setbacks include the long operation hours and



**Figure 1:** Cumulative recurrence rate after 10 years. The cumulative recurrence rate after 10 years using the Kaplan–Meier method was 3.7% in laparoscopic sacrocolpopexy, 4.6% in total vaginal hysterectomy, 8.8% in the Manchester operation, and 18.2% in vaginal closure groups

**Table 2: Surgical results by surgical procedure**

|                                    | LSC (n=138)                                      | TVH (n=30)           | Manchester (n=66)                                | Colpocleisis (n=68)                 |
|------------------------------------|--------------------------------------------------|----------------------|--------------------------------------------------|-------------------------------------|
| Age (years)                        | 69.3±8.0                                         | 70.3±5.3             | 63.7±8.9                                         | 75.1±6.7                            |
| <i>P</i>                           | -                                                | 0.49                 | <0.01                                            | <0.01                               |
| BMI (kg/m <sup>2</sup> )           | 26.0±17.0                                        | 24.1±3.5             | 23.6±3.1                                         | 23.6±3.4                            |
| <i>P</i>                           | -                                                | 0.54                 | 0.25                                             | 0.25                                |
| Operative time (min)               | 229±47                                           | 129±38               | 94±29                                            | 83±33                               |
| <i>P</i>                           | -                                                | <0.01                | <0.01                                            | <0.01                               |
| Blood loss (ml)                    | 34±48                                            | 133±128              | 73±94                                            | 56±140                              |
| <i>P</i>                           | -                                                | <0.01                | <0.01                                            | 0.10                                |
| Postoperative hospital stay (days) | 4.7±2.0                                          | 9.8±3.1              | 13.2±2.7                                         | 11.0±30                             |
| <i>P</i>                           | -                                                | <0.01                | <0.01                                            | <0.01                               |
| Complication rate                  | 2.2% (3/138)                                     | 3.3% (1/30)          | 3.0% (2/66)                                      | 4.4% (3/68)                         |
|                                    | Port site hernia 1<br>Ileus 1<br>Rectal injury 1 | Urination disorder 1 | Intrauterine infection 1<br>Urination disorder 1 | hematometra 2<br>Vaginal bleeding 1 |
| <i>P</i>                           | -                                                | 0.70                 | 0.71                                             | 0.37                                |

LSC: Laparoscopic sacrocolpopexy, BMI: Body mass index, TVH: Total vaginal hysterectomy

**Table 3: Postoperative prognosis by surgical procedure**

|                                            | <b>LSC (n=138)</b>         | <b>TVH (n=30)</b>  | <b>Manchester (n=66)</b>          | <b>Colpocleisis (n=68)</b>        |
|--------------------------------------------|----------------------------|--------------------|-----------------------------------|-----------------------------------|
| Observation period (months), median (rang) | 17 (0-58)                  | 17 (1-74)          | 33 (1-120)                        | 13 (1-118)                        |
| Recurrence rate                            | 2.8% (4/138)               | 3.5% (1/30)        | 4.5% (3/66)                       | 8.7% (6/69)                       |
|                                            | Cystocele 2<br>Rectocele 2 | Vaginal prolapse 1 | Uterine prolapse 2<br>Cystocele 1 | uterine prolapse 2<br>Cystocele 4 |
| <i>P</i>                                   | -                          | 0.90               | 0.55                              | 0.07                              |
| Reoperation rate                           | 1.5% (2/138)               | 0% (0/30)          | 3.0% (2/66)                       | 2.9% (2/69)                       |
|                                            | Colporrhaphy posterior 2   |                    | LSC 1<br>Colpocleisis 1           | TVM 2                             |
| <i>P</i>                                   | -                          | 0.51               | 0.45                              | 0.48                              |
| Cumulative recurrence rate (%)             | 3.7                        | 4.6                | 8.8                               | 18.2                              |
| <i>P</i>                                   | -                          | 0.78               | 0.32                              | 0.48                              |

LSC: Laparoscopic sacrocolpopexy, TVM: Tension-free vaginal mesh

the higher skill level required.<sup>[10]</sup> Further, complications including mesh erosion, rectal, and/or bladder injury have been reported.<sup>[10]</sup> Therefore, we compared the surgical results and recurrence rates of the conventional surgical procedures with LSC performed in our hospital, although the cases may present with some differences over the course of years. In the range of our literature research, there was no report that compared the surgical outcomes and long-term prognosis of multiple surgical procedures in a single institution.

Regarding the recurrence after LSC, Ganatra *et al.* reported that the rate was 8% and the reoperation rate was 1.6%.<sup>[10]</sup> Bacle *et al.* reported the recurrence rate of 11.5% and the reoperation rate of 1.0%.<sup>[13]</sup> Compared to other techniques, LSC has been reported to have a low recurrence rate.<sup>[10]</sup> However, LSC itself has variations such as cases in which mesh is used in the anterior and posterior vaginal walls and other cases where it is used in the anterior vaginal wall only. Approximately 50 cases of LSC performed earlier. In our institution, mesh was used only in the anterior vaginal wall only and the posterior vaginal wall was not sutured with V-Loc®. In some of these cases, recurrence occurred in the posterior vaginal wall, and colporrhaphy posterior was performed for the descending rectal masses. Therefore, in the later cases, the posterior vaginal wall has been sutured with V-Loc®, and almost no recurrences have been observed.

Comparison of the recurrence rate after LSC with other techniques performed at our institution showed no significant difference, but the recurrence rate after LSC is currently the lowest of all procedures. As for colpocleisis, the recurrence rate was the highest of the four procedures, although there was no statistically significant difference. The cases included many patients aged >80 years and those with underlying diseases, such as diabetes. Colpocleisis presents advantages including a shorter operating time and reduced bleeding in the elderly. The high recurrence rate is likely to be due to suture failure specifically related to their age and underlying diseases.

## CONCLUSION

In conclusion, LSC seems to be an effective surgical option that requires a higher skill level than other surgical methods and has a longer operative time, lesser operative invasion, and a lower long-term recurrence rate. We will actively recommend LSC to those when appropriate. However, caution is required owing to the serious complications previously mentioned.

In conclusion, the purpose of this study was to investigate whether LSC was more effective than other techniques. However, this is a retrospective study, the selected surgical procedure changed over time, and the length of the observation period varied, all of which constitute a limitation of this study. The four surgical techniques may not be validly compared and evaluated. In fact, however, this study is a preliminary study for a future large-scale prospective study designed on the basis of the results of this study. To date, there is no prospective study that evaluated the results of different surgical procedures including LSC for POP. A possible clarification regarding the choice of procedure for pelvic organ prolapse will facilitate a pertinent choice, contributing to the reduction of the recurrence rate.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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