

REVIEW ARTICLE

COMPARISON OF LAPAROSCOPIC AND ABDOMINAL SACROCOLPOPEXY FOR POST HYSTERECTOMY VAGINAL VAULT PROLAPSE REPAIR: META ANALYSIS

Fariska Zata Amani^{1*}, Azami Denas^{2,3}, Hari Paraton^{2,3}, Gatut Hardianto^{2,3}, Eighty Mardiyani^{2,3}, Tri Hartono^{2,3}

¹ Departement of Obstetrics and Gynecologic, Medical Faculty of Universitas Nahdlatul Ulama Surabaya

² Departement of Obstetrics and Gynecologic, Medical Faculty of Universitas Airlangga - Dr.Soetomo General Hospital, Surabaya

³ Departement of Obstetrics and Gynecologic, Dr.Soetomo General Hospital, Surabaya

ARTICLE INFO

Article history:

Received :

February 10, 2021

Received in revised form :

August 04, 2021

Accepted :

August 24, 2021

Keywords:

vaginal vault prolapse,

post hysterectomy,

laparoscopic sacrocolpopexy

abdominal sacrocolpopexy

*Correspondent Author:

dr.fariska@unusa.ac.id

ABSTRACT

Background: Comparing the clinical outcomes of laparoscopic and abdominal sacrocolpopexy in vaginal vault prolapse post-hysterectomy patients.

Method: Systematic search data is performed on a medical database (PUBMED, Cochrane Database) using keywords:(1) vault prolapse [title] AND (2) laparoscopic[title] AND sacrocolpopexy[title]. Inclusion criteria:(1) randomized controlled trial and observational studies, (2) women with vaginal vault prolapse post hysterectomy, (3) intervention studied: laparoscopic (LSC) and abdominal sacrocolpopexy (ASC), (4) the entire fully accessible papers can be accessed and data can be accurately analyzed. Comparison about clinical outcomes of LSC and ASC was performed using narrative analysis and meta-analysis (RevMan).

Results: Three studies compared clinical outcomes of LSC and ASC with a total of 243 samples (118 in LSC and 125 in ASC group). There was no significant difference in the incidence of complications between LSC and ASC (OR 1.10;95% CI 0.58-2.08). LSC was associated with less blood loss (MD 111.64 mL,95%CI-166.13 - -57.15 mL) and shorter length of hospital stay (MD -1.82 days;95%CI -2.52- -1.12 days) but requires a longer operating time (MD 22.82 minutes,95%CI 0.43-45.22 minutes). There was no statistically significant difference to anatomical outcomes (measurement of point C on POP-Q), subjective outcomes measured by PGI-I and reoperation numbers (repeat surgical interventions) for prolapse recurrence between LSC and ASC groups after one year of follow-up.

Conclusions: LSC showed similar anatomic results compared to ASC with less blood loss and shorter length of hospital stay in management patient with vaginal vault prolapse.

Medical and Health Science Journal

Introduction

Pelvic organ prolapses (POP) is a condition commonly encountered by women, and incidence increases after menopause¹. This prolapse condition is not a life-threatening condition but women with POP often experience uncomfortable symptoms such as urinary incontinence, sexual dysfunction and overall, it decreases the quality of life². Definition of vaginal vault prolapse according to The International Continence Society is decreasing the vaginal peak or vaginal cuff below 2 cm below the total vaginal length above the hymen³. The vaginal peaks correspond to point C on the determination according to Pelvic Organ Prolapse Quantification (POP-Q). The main risk factor for vaginal vault prolapse is if there was pre-existing pelvic organ prolapse during hysterectomy³. The prevalence of vaginal vault prolapse was 11.4% when hysterectomy was performed on an indication of uterine prolapse, and by 1.8% when indications of hysterectomy due to benign disease³.

There are two main routes in pelvic reconstructive surgery: abdominal approach (Laparotomy or laparoscopy) and vaginal. Abdominal Sacrocolpopexy via laparotomy route (ASC) is considered the gold standard in the management of apical prolapse surgery with long-term success rate of 78-100% and satisfaction rate of 75-100%⁴. Laparoscopic Sacrocolpopexy (LSC) was first introduced in the early 1990s, which rapidly became a routine gynaecological procedure.

According to a Barber study in 2013⁷, LSC is as effective as ASC with decreased blood loss and length of stay in the hospital. The objective of this study was to compare the clinical outcomes of LSC and ASC that performed in patients with vaginal vault prolapse post hysterectomy.

Methods

Data Search Strategy

Systematic literature searches have been conducted using PubMed and Cochrane Database using the keywords: "Vaginal vault prolapse, Laparoscopic Sacrocolpopexy and Abdominal Sacrocolpopexy". Duplicate titles are omitted. Abstracts of each journal are assessed according to the inclusion criteria.

Inclusion Criteria

Inclusion criteria in this study were: (1) randomized controlled trial (RCT) and observational studies, (2) women with vaginal vault prolapse (apical compartment prolapse post hysterectomy), (3) interventions studied: LSC and ASC, (4) the entire fully accessible papers can be accessed and analyzed accurately.

Study Quality Assessment

The validity of each study was assessed by criteria listed on the Cochrane Handbook for Systematic Reviews of Interventions⁸. Each study was grouped and assessed according to the quality category: low, high, or, unclear risk of bias. It can be seen in Figure 2 and 3.

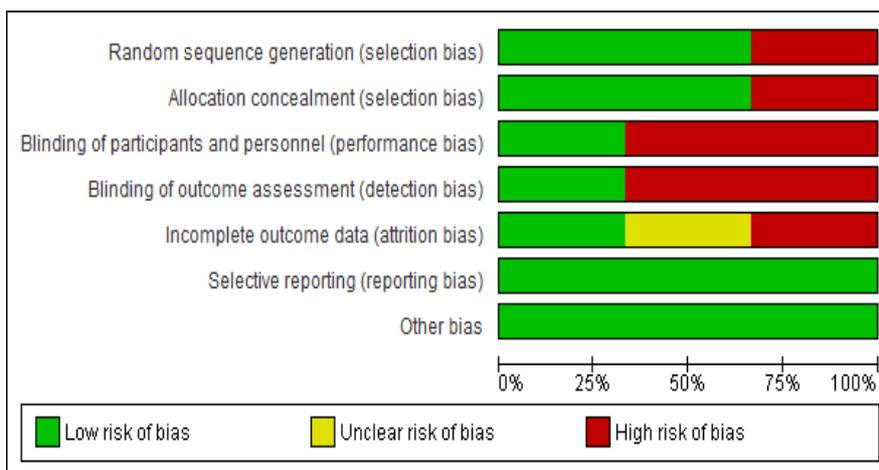


Figure 1. The conclusion of the risk stratification of bias for each study

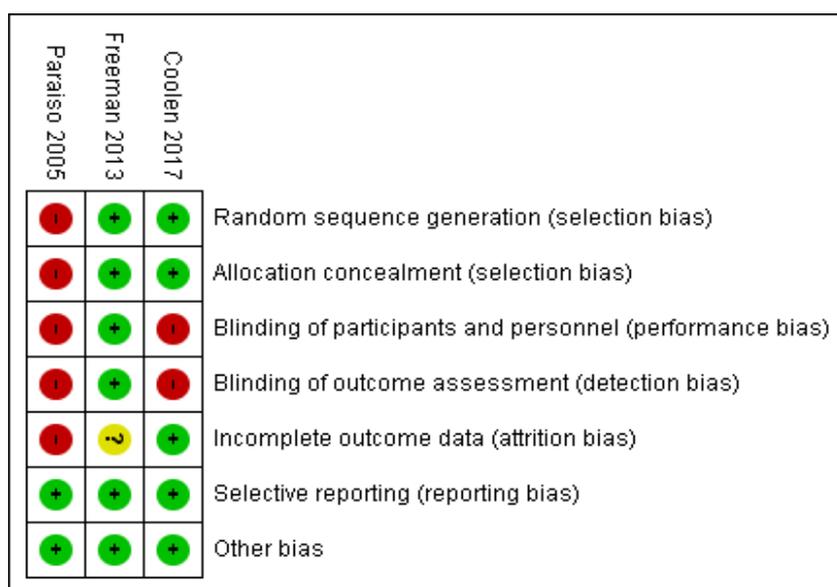


Figure 2. Assessment of the author's risk of bias for each study included.

Statistical Analytic and Meta-Analysis

The clinical outcomes that compared in this study were: duration of surgery, LOS (length of stay), EBL (Estimated Blood Loss), effectiveness as a vaginal vault prolapse management (objectively by point C measurements in POP-Q and re-surgery or repeat surgical intervention, subjectively by presence of symptoms of prolapse and prolapse recurrence rates during follow-up period). Surgery complications were also noted to assess the safety of procedures.

Meta-analysis was arranged using Review Manager (RevMan) version 5.3. For categorical outcomes, Odds Ratio (OR) was calculated using the Mantel-Haenszel method. For continuous variables, the mean difference (MD) was derived from the mean and standard deviation and used when the reported results had an identical scale. The confidence interval used was 95% and the p value <0.05 (two-tailed) was statistically significant.

Results

Study Selection

Data search in PubMed and Cochrane library resulted in 314 articles. There were 196 duplicated articles that were omitted. Screening based on inclusion criteria, obtained a total of three articles inclusion for meta-analysis^{5,6}. Illustration of screening and selection process using a PRISMA flowchart can be seen in Figure 3.

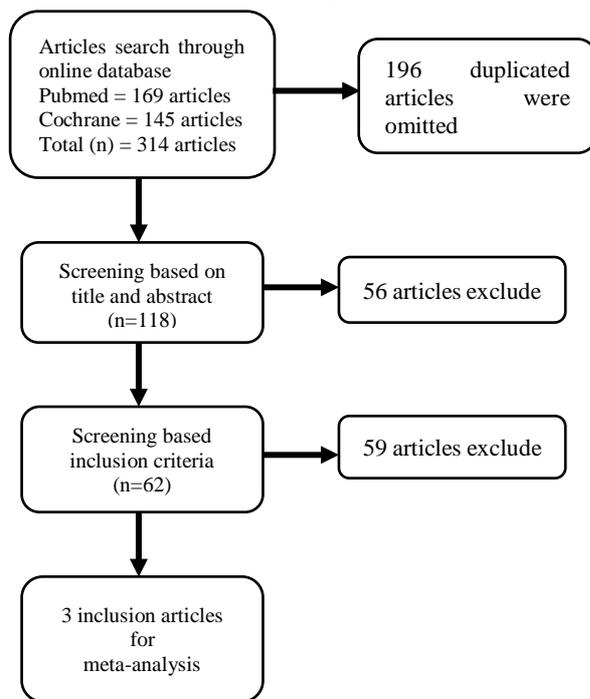


Figure 3. Flowchart of the study selection process using PRISMA flowchart

Our study included three articles with a total of 243 samples who underwent post hysterectomy vaginal peak prolapse with or without cystocele or rectocele. A total of 118 LSC samples and 125 others underwent ASC. Two studies^{5,7} were randomized controlled trials that had a follow-up time of one year. The other 11 were retrospective cohort studies with a follow-up range of 13.5 months for LSC and 15.7 months for ASC. The success criteria of two studies^{5,6} for surgery were different. One study did not mention the success criteria⁸. The characteristics of three inclusive studies are summarized in Table 1.

Table 1. The Characteristic of Included Articles

Article	Country	Study Design	Population (LSC/ASC)	Prolapse Grading	Primary Outcome	Success Criteria	Success Rate (LSC/ASC)	Subjective Outcome Measurement	Subjective Outcome Result	Reintervention	Surgeon experience
Coolen et al ⁹	Netherlands	RCT	36/37	POP-Q	Disease-specific quality of life	No prolapse beyond hymen, no bothersome bulge symptom, and no repeat surgery or pessary use for recurrent prolapse within 12 months	83.8%/89.2%	UDI, DDI, IIQ, PGI-I	No different	4 LSC/1 ASC	Experienced

Freeman et al¹⁰	UK	RCT	26/27	POP-Q	Test the clinical equivalence of open (ASCP) and laparoscopic (LSCP) sacrocolpopexy using objective and subjective outcomes	Point C on the POP-Q and subjective complaint	No Significant different	PGI-I,P-QOL, SF36	Not mentioned	1 LSC	Experienced
Paraiso et al¹¹	US	Comparative cohort	56/61	unclear	Compare laparoscopic and open sacral colpopexies for efficacy and safety	Not mentioned	Not mentioned	Not mentioned	Not mentioned	6 LSC/3 ASC	Some in learning curve

Duration of Operation

This analysis was carried out on three inclusive studies involving a total of 118 women who underwent LSC and 125 underwent ASC. The estimated mean difference (MD) for operating time was 22.82 minutes and the 95% CI was 0.43 - 45.22 minutes ($p = 0.05$) (Figure 4a). The results of this analysis indicate that the duration of surgery in the LSC group was longer than the ASC.

Blood Loss during Surgery

The analysis from three studies with a total of 243 samples found that the average difference estimation (MD) for blood loss during surgery was 111.64 mL with 95% CI -166.13 to -57.15 mL ($p < 0.00001$) (Figure 4b). These results suggest that surgical blood loss in the LSC group was significantly lower than that in the ASC group.

Length of Stay (LOS)

Based on the three included studies, LSC was associated with a lower LOS in hospital compared to ASC. The estimated mean difference (MD) was -1.82 days with 95% CI -2.52 to -1.12 days ($p < 0.00001$) (Figure 4c).

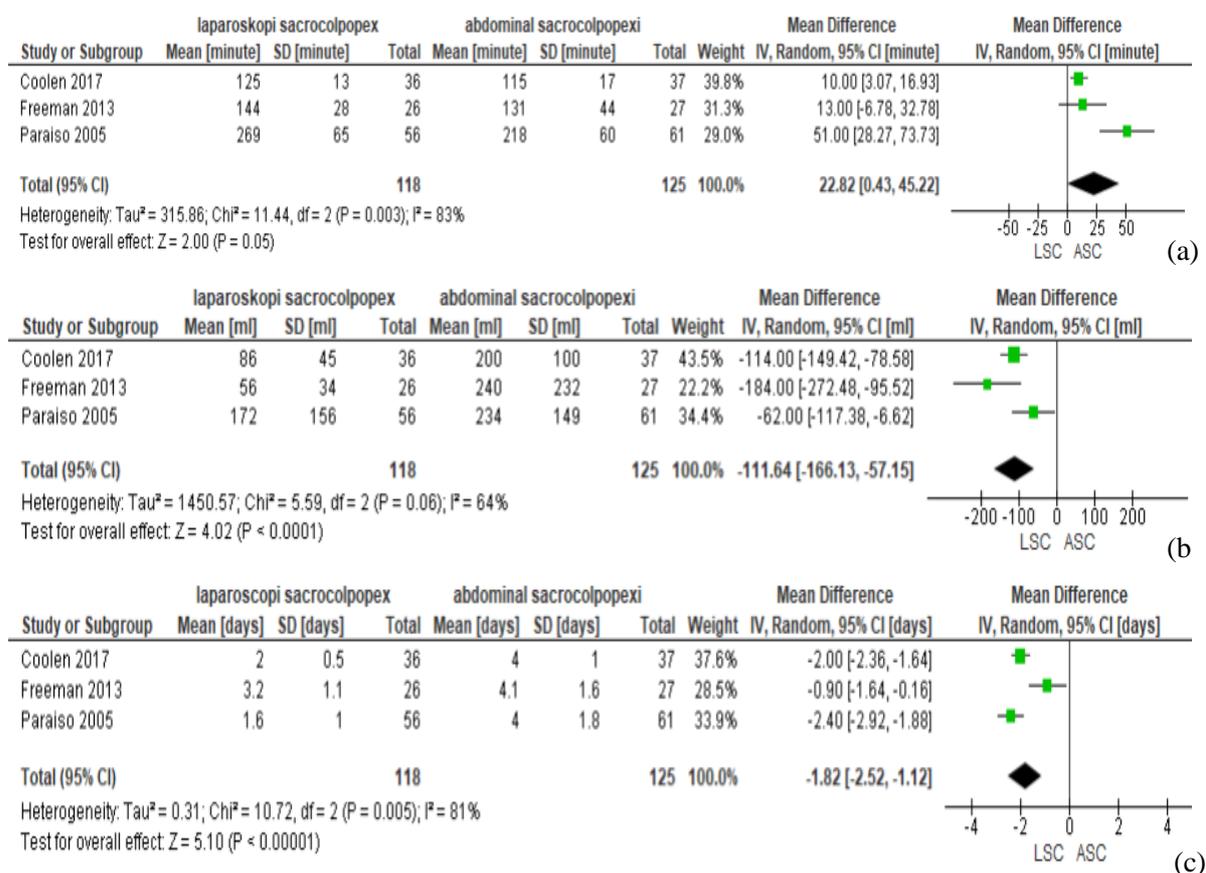


Figure 4. The Forest Plot of (a) Operating Time, (b) Blood Loss During Surgery, (c) Length of Stay in Hospital between LSC and ASC Group. SD, standard deviation; CI, confidence interval; df, degrees of freedom

Complications Incidence of Surgery

We analysed the intra and postoperative complications incidence between LSC and ASC group. From the three studies analysed, it was found that the incidence of total complications was the same between LSC and ASC group (26 cases in each group). There was no significant difference in the number of total incidence of complications between the LSC and ASC groups (OR 1.10; 95% CI 0.58-2.08; p = 0.77) (Figure 5a). Table 2 describes the details of complications

in the LSC and ASC groups. In the study of Freeman et al⁹, there were no cases of LSC that experienced conversion to the abdominal surgery. There was one case of LSC group in Paraiso et al's 11 study that converted to abdominal due to excessive bleeding during surgery. In Coolen et al's study⁷, there were found two cases of LSC that converted to abdominal surgery (one case was due to bladder lesions and the other was due to bleeding).

Table 2. Comparison Details of LSC and ASC Complications

Complications		Coolen et al ⁹		Freeman et al ¹⁰		Paraiso et al ¹¹	
		LSC (n=36)	ASC (n=37)	LSC (n=26)	ASC (n=27)	LSC (n=56)	ASC (n=61)
Intraoperative	Bladder injury	1	0	1	0	6	2
		(conversion to abdominal)					
	Bowel injury	1	1	0	1	1	2
		(conversion to abdominal)					
	Bleeding		0	0	1	1	0
						(conversion to abdominal)	
	Opening of vaginal			1	0		
Postoperative	Wound dehiscence	0	2				
	Lung emboli	0	1				
	Ileus	0	3			0	2
	SBO*					1	2
	Surgery Site Infection	1	0			6	2
	Pyelonephritis	1	0				
	DVT**					1	1
	Needed for transfusion					1	1
	Cardiac complication					0	2
	Ventralis Hernia					1	2
Mesh Erosion					2	1	

*Small Bowel obstruction; **Deep Vein Thrombosis

Incidence of postoperative ileus and simple bowel obstruction (SBO)

The incidence of postoperative ileus and SBO was higher in the ASC group, but not statistically significant (OR 0.21; 95% CI 0.03 - 1.23; $p = 0.08$) (Figure 5b). In the study of Paraiso et al⁹, there was one case of postoperative SBO in the LSC group and two cases in the ASC group. In two studies^{7,9}, there were a total of five cases of ileus in the ASC group and no incidence of ileus in the LSC group.

The study by Freeman et al¹⁰ did not report specifically on the incidence of ileus and SBO.

Bowel injury

There was no significant difference in the number of bowel injury cases between women who underwent LSC and ASC (OR 0.4; 95% CI 0.08-2.17, $p = 0.30$) (Figure 5c). In Coolen et al's study, one patient in the ASC group died postoperatively from multiorgan failure due to sepsis after bowel perforation.

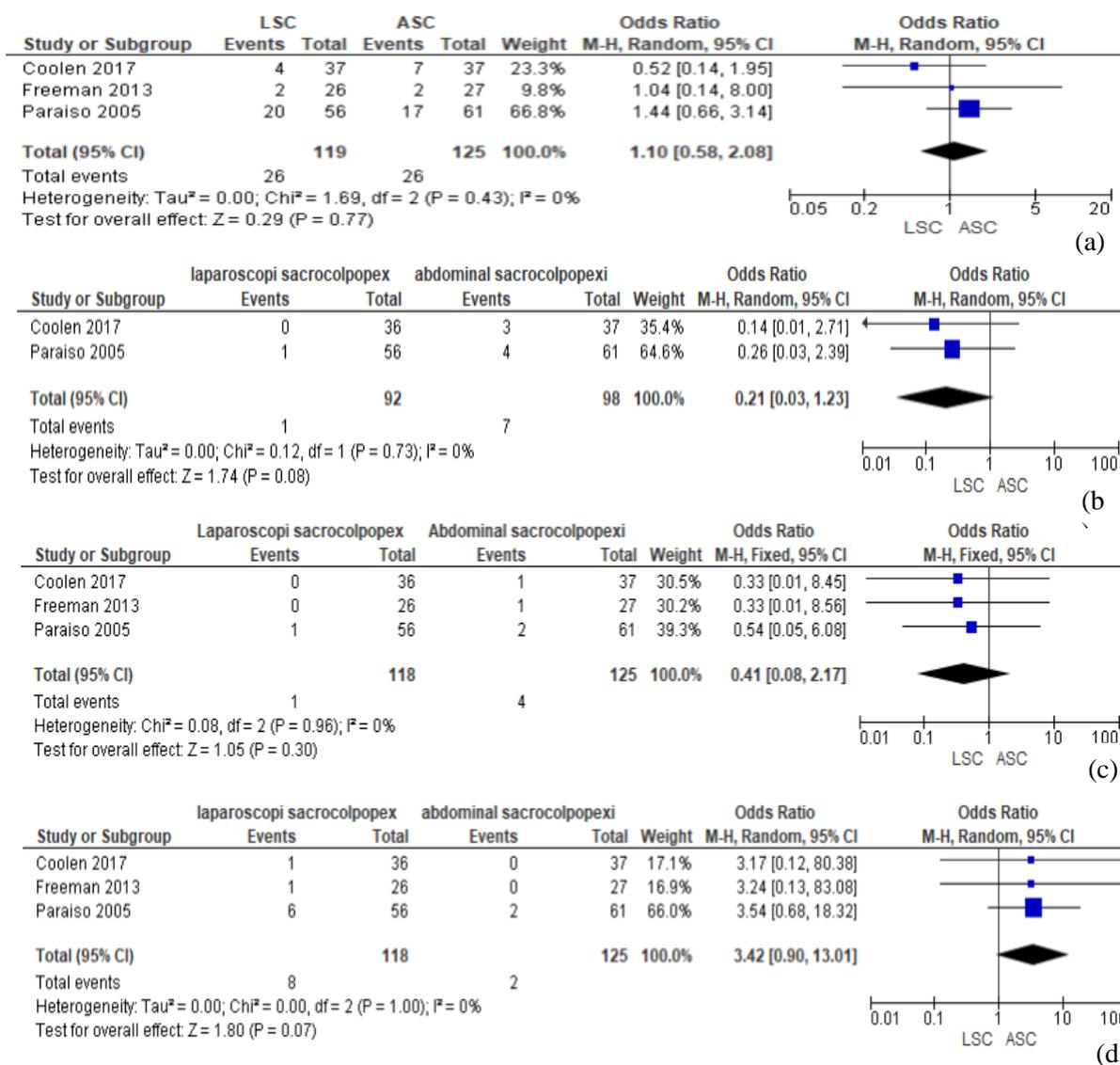


Figure 5. The Forest Plot of (a) Total Complication Incidence, (b) Ileus and SBO Incidence, (c) Bowel Injury Incidence, (d) Bladder Injury Incidence. SD, standard deviation; CI, confidence interval; df, degrees of freedom.

Bladder injury

There were no significant differences in the incidence of bladder injury between women who underwent LSC and ASC (OR 3.42; 95% CI 0.90-13.01, p = 0.07) (Figure 5d). In all studies, it was found that the number of bladder injuries was higher in the LSC group than in ASC.

Surgery Outcomes

PGI-I (within 1 year)

There was no significant difference in the measurement of the PGI-I questionnaire (the sample gave a “very much better” score) within one year after surgery between the LSC and ASC groups (OR 0.90; 95% CI 0.35 - 1.85; p = 0.61) (Figure 6a).

Measurement point C on POP-Q

Only two studies compared POP-Q measurement after surgery as an objective measure. Freeman et al⁸ found no significant difference in point C measurements for POP-Q after 1 year of doing LSC or ASC. Coolen et al⁸ also reported no significant difference between the two groups in the anatomical results based on POP-Q within 12 months after surgery. When included in the analysis as shown in Figure 6b, there was no significant difference at point C POP-Q after one

year of LSC or ASC (MD 0.06 cm, 95% CI -0.49 to 0.61, p = 0.83).

Reoperation for POP

There was no statistically significant difference regarding reoperation (repeat surgical intervention) for pelvic organ prolapse between the LSC and ASC groups (MD 2.92; 95% CI 0.95-8.98; p = 0.06). The results of this analysis based on three studies found 11 cases in the LSC group and 4 cases in the ASC group requiring re-surgical intervention for POP recurrence (Figure 6c).

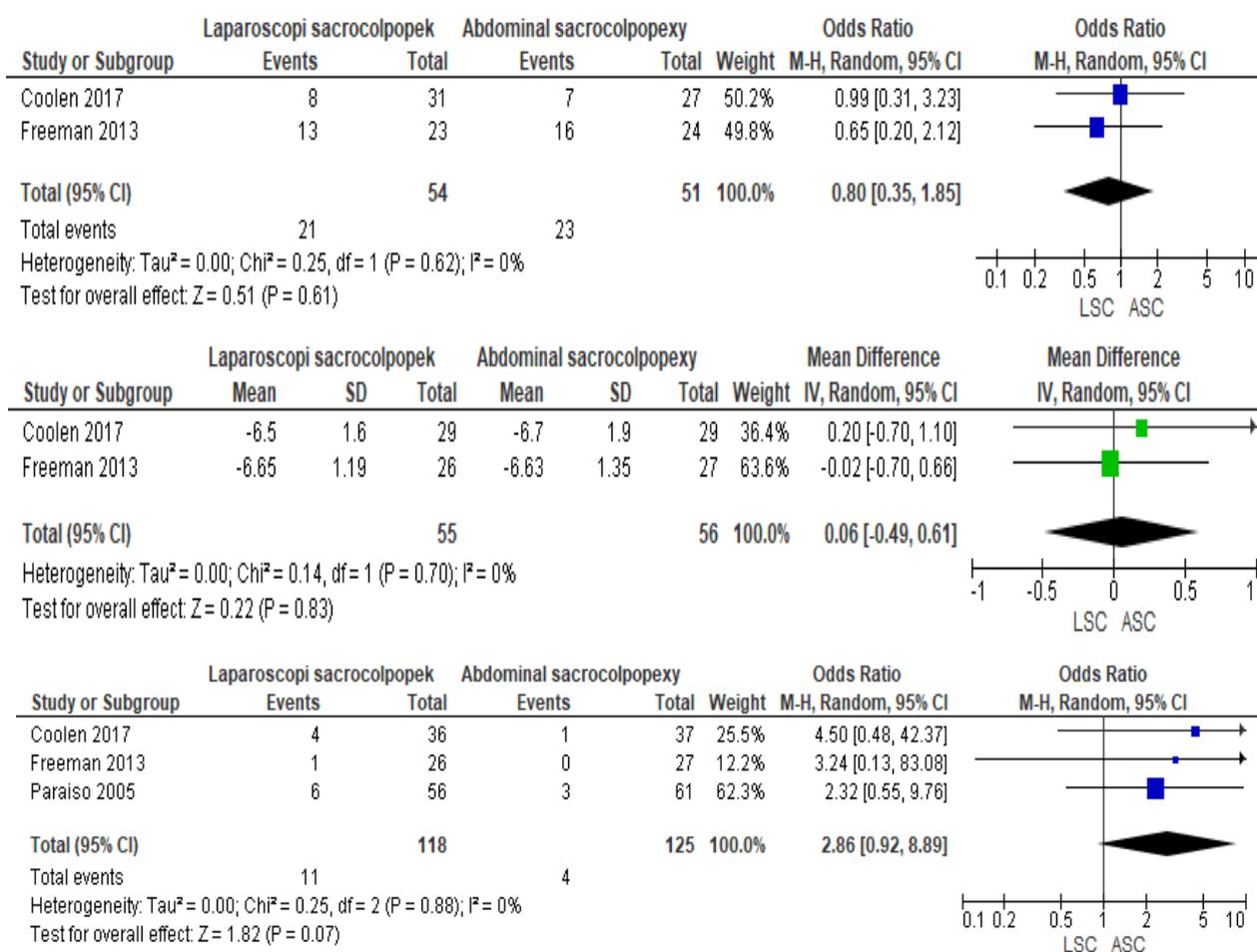


Figure 6. The Forest Plot of (a) PGI-I Questionnaire, (b) Point C Measurement in POP-Q Within 1 Year After Surgery, (c) Reoperation for POP between LSC and ASC Group. SD, standard deviation; CI, confidence interval; df, degrees of freedom.

Discussion

Hysterectomy is one of the most common gynecological surgery procedures worldwide in women of reproductive age. As life expectancy increases, the incidence of vaginal vault prolapse post-hysterectomy increases with an average of 60 years¹⁰. Sacrocolpopexy is the gold standard to overcome the vaginal vault prolapse with the success rate of 78-100%¹¹. Abdominal approach of sacrocolpopexy (ASC) is superior to the vaginal approach with fewer recurrent prolapse numbers, but vaginal access is faster with better cosmetic results and shorter LOS. The development of laparoscopic surgery presents the advantage of better pelvic anatomical vision due to the magnification of endoscopic video, better cosmetic results and lower LOS¹². Several research studies have demonstrated the effectiveness and safety of laparoscopic approaches to the treatment of vaginal vault prolapse that provide good outcomes in long-term anatomy and functional and high levels of satisfaction^{6,12}. The LSC bridges these gaps and is expected to produce outcomes like ASC with advantages such as the vaginal approach. From the results of our meta-analysis, we found that LSC was significantly associated with longer duration of surgery but fewer duration of blood loss during surgery and shorter LOS than ASC group. This is in accordance with the meta-analyses performed by Coolen *et al*¹⁸ and Campbell *et al*¹². The risk of complications such as bladder injury, bowel injury and ileus did not differ significantly between LSC and ASC. However, the incidence of ileus was higher in ASC group (five cases) while in the LSC group there was no ileus incidence. When viewed from

overall complications, there were more complications in the LSC group than ASC but statistically did not differ significantly. This contrasts with the meta-analysis performed by Coolen *et al*¹⁸ where the rate of complications was higher in the ASC group although it also did not differ significantly statistically. From the results of our study, LSC complications are most prevalent in Paraiso *et al*⁸ study, this is because some laparoscopies are performed by operators in the learning process. It is said in his journal that the expertise, experience and learning process of the surgeon plays a role in the occurrence of a bladder injury in the LSC group.

The Effectiveness of Surgical Treatment of Vaginal Vault Prolapses

The effectiveness of surgical treatment of vaginal vault prolapse is assessed through subjective and objective outcomes. The objective outcomes are anatomical outcome (the measurement of point C in POP-Q more than 1 cm above the hymen) and the prolapse recurrence rate requiring reoperation during the follow-up period. Subjective outcome is the absence of symptoms or complaints after the procedures that assessed through the PGI-I (Patient Global Impression of Improvement) questionnaire¹². Only two studies have measured the point C on POP-Q as the objective outcome of vaginal vault prolapse surgery. Both studies are RCT studies. Paraiso *et al*¹¹ in the study did not include POP-Q measurements as a comparison because it was a retrospective cohort study in which POP-Q pre and postoperative data were incomplete (only in 60% of laparoscopic groups). From two RCT studies^{5,12,13}, showed no statistically significant differences in anatomical outcomes and reoperation (repeat surgical

intervention) for recurrence of pelvic organ prolapse between LSC and ASC groups after one year of follow-up. Our meta-analysis also found no statistically significant difference in subjective outcomes during the one-year follow-up between LSC and ASC groups assessed through the PGI-I questionnaire.

Conclusion

Meta-analysis in this study concludes that LSC compared to ASC has a longer duration of surgery but is associated with less duration of bleeding during surgery, shorter length of stay in hospital. LSC and ASC have similar objective and subjective outcomes for vaginal vault prolapse management. The effectiveness of LSC and ASC as vaginal vault prolapse management cannot be concluded in this meta-analysis because the number of inclusion studies has not been adequate as the preparation of clinical recommendations. Therefore, the authors suggest a further investigation of large-scale studies in this patient population.

Conflict of Interest

The author stated there is no conflict of interest

References

1. Masenga, G. G., Shayo, B. C. & Rasch, V. Prevalence and risk factors for pelvic organ prolapse in Kilimanjaro, Tanzania: A population based study in Tanzanian rural community. *PLoS One* **13**, e0195910 (2018).
2. Zheng, Y., Zhou, H., Dunstan, C. R., Sutherland, R. L. & Seibel, M. J. The role of the bone microenvironment in skeletal metastasis. *J. Bone Oncol.* **2**, 47–57 (2013).
3. Austin, P. F. et al. The standardization of terminology of lower urinary tract function in children and adolescents: Update report from the standardization committee of the international children's continence society. *J. Urol.* **191**, 1863-1865.e13 (2014).
4. Mearini, L., Nunzi, E., Di Biase, M. & Costantini, E. Laparoscopic Management of Vaginal Vault Prolapse Recurring after Pelvic Organ Prolapse Surgery. *Urol. Int.* **97**, 158–164 (2016).
5. Paraiso, M. F. R., Jelovsek, J. E., Frick, A., Chen, C. C. G. & Barber, M. D. Laparoscopic compared with robotic sacrocolpopexy for vaginal prolapse: A randomized controlled trial. *Obstet. Gynecol.* **118**, 1005–1013 (2011).
6. Coolen, A. L. W. M. et al. The treatment of post-hysterectomy vaginal vault prolapse: a systematic review and meta-analysis. *Int. Urogynecol. J.* **28**, 1767–1783 (2017).
7. Coolen, A.-L. W. M. et al. Laparoscopic sacrocolpopexy compared with open abdominal sacrocolpopexy for vault prolapse repair: a randomised controlled trial. *Int. Urogynecol. J.* **28**, 1469–1479 (2017).
8. Paraiso, M. F. R., Jelovsek, J. E., Frick, A., Chen, C. C. G. & Barber, M. D. Laparoscopic Compared With Robotic Sacrocolpopexy for Vaginal Prolapse: A Randomized Controlled Trial. *Obstet. Gynecol.* **118**, (2011).
9. Freeman, R. M. et al. A randomised controlled trial of abdominal versus laparoscopic sacrocolpopexy for the treatment of post-hysterectomy vaginal vault prolapse: LAS study. *Int. Urogynecol. J.* **24**, 377–384 (2013).
10. van der Ploeg, J. M., van der Steen, A., Zwolsman, S., van der Vaart, C. H. & Roovers, J. P. W. R. Prolapse surgery with or without incontinence procedure: a systematic review

-
- and meta-analysis. *BJOG An Int. J. Obstet. Gynaecol.* **125**, 289–297 (2018).
11. Parkes, I. L. & Shveiky, D. Sacrocolpopexy for Treatment of Vaginal Apical Prolapse: Evidence-Based Surgery. *J. Minim. Invasive Gynecol.* **21**, 546–557 (2014).
12. Bacle, J. et al. Laparoscopic promontofixation for pelvic organ prolapse: A 10-year single center experience in a series of 501 patients. *Int. J. Urol.* **18**, 821–826 (2011).
13. Campbell, P., Cloney, L. & Jha, S. Abdominal Versus Laparoscopic Sacrocolpopexy: A Systematic Review and Meta-analysis. *Obstet. Gynecol. Surv.* **71**, (2016).