DOI: 10.34057/PPj.2025.44.02.2025-7-1
Pelviperineology 2025;44(2):67-70

A comparative analysis of two-year anatomical and functional outcomes of laparoscopic lateral suspension versus laparoscopic sacrocolpopexy: A retrospective cohort study

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Citation: Öztürk UK, Bağlar İ, Şanlıkan F, Keleş E, Yıldırım Köpük Ş, Toprak T. A Comparative analysis of two-year anatomical and functional outcomes of laparoscopic lateral suspension versus laparoscopic sacrocolpopexy: a retrospective cohort study. Pelviperineology. 2025;44(2):67-70

ABSTRACT

Objective: Laparoscopic sacrocolpopexy (LSC) is the current gold standard for the surgical management of pelvic organ prolapse. Laparoscopic lateral suspension (LLS), a more recently developed technique, has emerged as a viable alternative, obviating the need for sacral promontory dissection and featuring a shorter learning curve. This study aimed to compare the two-year outcomes of LLS and LSC in terms of anatomical success, quality of life, and complication rates.

Materials and Methods: This retrospective cohort study included 149 patients who underwent surgery for pelvic organ prolapse quantification (POP-Q) stage ≥2 apical prolapse between January 2020 and December 2022. Of these, 73 patients underwent LLS and 76 underwent LSC. Anatomical success was evaluated over a two-year follow-up period using POP-Q criteria. Quality of life was assessed using validated questionnaires: The pelvic floor distress inventory-20 and the pelvic floor impact questionnaire-7 (PFIQ-7). Patient-reported improvement was measured with the patient global index of improvement. Postoperative complications were classified according to the Clavien-Dindo system. Reoperation rates and urinary and sexual functions were also evaluated.

Results: The overall anatomical success rates were comparable between the groups, with 94.5% in the LLS group and 92.1% in the LSC group (p=0.52). The LLS group demonstrated a significantly higher rate of anterior compartment correction (89.0% vs. 76.3%; p=0.04) and superior quality of life scores on the PFIQ-7 (p=0.03). The minor complications (Clavien-Dindo grades I-II) was significantly lower in the LLS group compared to the LSC group (4.1% vs. 7.9%; p=0.04).

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Received: 05 July 2025 **Accepted:** 08 August 2025 **Publication Date:** 18 August 2025

Conclusion: LLS provides anatomical success rates comparable to LSC for the treatment of apical prolapse. Furthermore, LLS is associated with superior outcomes in the correction of anterior compartment prolapse and patient-reported quality of life, along with a lower risk of minor postoperative complications.

Keywords: Cystocele; enterocele; MeSH; pelvic floor

INTRODUCTION

Pelvic organ prolapse (POP) is a prevalent and distressing condition that significantly impairs the quality of life for a substantial number of women. The demographic trends of an aging population and rising rates of obesity are projected to increase the prevalence of POP and the corresponding demand for surgical intervention.[1] While numerous surgical techniques exist for the management of advanced POP, laparoscopic sacrocolpopexy (LSC) is widely regarded as the gold-standard procedure for apical prolapse repair, demonstrating durable long-term outcomes.[2,3] However, LSC is a technically demanding procedure, and the requisite dissection of the sacral promontory carries inherent risks of serious complications, including hemorrhage from the presacral venous plexus and neurovascular injury.[4]

In recent years, laparoscopic lateral suspension (LLS) has been introduced as a promising alternative to LSC. This technique avoids the complexities of sacral promontory dissection and is associated with a more favorable learning curve, making it an attractive option for pelvic floor surgeons.[5] Although several studies have compared the short-term outcomes of LLS and LSC, there remains a paucity of robust, comparative data on their medium-term anatomical success, complication profiles, and impact on patient-reported quality of life, particularly from large patient cohorts. The relative novelty of the LLS procedure further accentuates this evidence gap.

Therefore, the primary objective of this study was to conduct a comprehensive retrospective comparison of the two-year anatomical, functional, and safety outcomes in a large cohort of patients who underwent either LLS or LSC. By providing a robust dataset, this study aims to furnish clinicians with critical evidence to guide surgical decision-making in the management of apical pelvic organ prolapse.

MATERIALS AND METHODS

This retrospective cohort study was conducted at a tertiary-level gynecology center and included all patients who underwent surgical repair for POP between January 2020 and December 2022. The study protocol received approval from the Institutional Review Board of University of Health Sciences Türkiye, Kartal Dr. Lütfi Kırdar City Hospital (number: 2025/010.99/15/32, date: 30.04.2025) and was conducted in accordance with the principles of the Declaration of Helsinki. A total of 149 patients were included in the final analysis, of whom 73 had undergone LLS and 76 had undergone LSC.

Inclusion criteria were: (I) diagnosis of pelvic organ prolapse-quantification (POP-Q) stage ≥2 apical prolapse, (II) surgery performed by the same experienced surgical team, and (III) a minimum follow-up period of 24 months. Patients were excluded if they had a history of previous pelvic reconstructive surgery, active malignancy, advanced-stage endometriosis, or significant neurological disorders.

Anatomical outcomes were assessed at the 24-month follow-up visit using the POP-Q system. Anatomical success was defined as POP-Q stage ≤1 in all compartments. Functional outcomes and health-related quality of life (HRQoL) were evaluated using the validated pelvic floor distress inventory-20 and pelvic floor impact questionnaire-7 (PFIQ-7). Overall patient satisfaction was assessed using the patient global index of improvement (PGI-I), where patients rated their condition as "very much better" or "much better". Postoperative complications were systematically recorded and graded according to the Clavien-Dindo classification. Secondary outcomes included reoperation rates for prolapse recurrence, and assessment of *de novo* urinary or sexual dysfunction.

Statistical Analysis

All statistical analyses were performed using SPSS version 26.0 (IBM Corp., Armonk, NY). The normality of continuous data distribution was assessed using the Kolmogorov-Smirnov test. Normally distributed variables were presented as mean ± standard deviation, while non-normally distributed data were presented as median (minimum-maximum). Continuous variables were compared using Student's t-test or the Mann-Whitney U test, as appropriate. Categorical variables were analyzed using the chi-square test or Fisher's exact test. A p-value of <0.05 was considered statistically significant.

RESULTS

No significant differences were observed between the LLS and LSC groups with respect to age, body mass index, menopausal status, parity, preoperative POP-Q stage, or mean follow-up duration ($p>0.05$ for all). Detailed characteristics are presented in Table 1.

The two-year anatomical and functional outcomes are summarized in Table 2. Both procedures demonstrated high rates of overall anatomical success, with no significant difference between the groups (94.5% for LLS vs. 92.1% for LSC; p=0.52). The LLS group showed a significantly higher success rate in the correction of anterior compartment prolapse (point Ba ≤-1) compared to the LSC group (89.0% vs. 76.3%; *p*=0.04). Regarding HRQoL, patients in the LLS group reported significantly better scores on the PFIQ-7 questionnaire (15.4±3.1 vs. 17.9±3.7; *p*=0.03). While patient satisfaction rates were high in both groups, the difference was not statistically significant. Reoperation rates for recurrence were low and comparable between the groups.

Postoperative complications are detailed in Table 3. While there was no significant difference in the overall complication rate between the groups (*p*=0.59), the minor complications (Clavien-Dindo grades I-II) was significantly lower in the LLS group (4.1% vs. 7.9%; *p*=0.04). The rates of major complications (Clavien-Dindo grades III-IV) were low and statistically similar in both cohorts.

DISCUSSION

This study provides a comprehensive medium-term comparison of LLS and LSC, revealing that both procedures yield high rates of anatomical success for the treatment of apical prolapse. Our findings are consistent with the existing literature, where anatomical success rates for these procedures typically range from 81% to 94%.[6,7] For instance, a recent randomized controlled trial by Malanowska-Jarema et al.[3] reported short-term anatomical success rates of 90% for LLS and 81% for LSC. Our higher success rates of 94.5% for LLS and 92.1% for LSC may reflect our longer follow-up period and strict definition of anatomical success.

A key finding of our study is the superior efficacy of LLS in correcting concomitant anterior compartment prolapse. The significantly higher rate of anterior wall support (89.0%) in the LLS group is a notable advantage. This finding corroborates the results of a retrospective study by Yu et al.,[8] which also suggested an advantage for LLS in addressing anterior vaginal wall descent. This may be attributed to the vector of pull and the broad

Table 1. Demographic and baseline clinical characteristics of the study population

Characteristic	LLS group (n=73)	LSC group (n=76)	*p*-value
Age (years, mean ± SD)	58.4±7.1	59.2±6.9	0.47
BMI (kg/m², mean ± SD)	26.7±3.4	27.1±3.2	0.44
Postmenopausal status (%)	64.3%	68.4%	0.60
Parity (mean)	2.3±1.0	2.5±1.1	0.29
Preoperative POP-Q stage ≥3 (%)	71.2%	69.7%	0.84
Follow-up duration (months, mean ± SD)	25.4±1.8	25.8±2.1	0.20

LLS: Laparoscopic lateral suspension, LSC: Laparoscopic sacrocolpopexy, SD: Standard deviation, BMI: Body mass index, POP-Q: Pelvic organ prolapse-quantification

Table 2. Comparison of two-year anatomical and functional outcomes

Outcome	LLS group (n=73)	LSC group (n=76)	*p*-value
Anatomical success (POP-Q ≤ stage 1) (%)	94.5%	92.1%	0.52
Anterior compartment correction (%)	89.0%	76.3%	0.04
PFDI-20 scores (mean ± SD)	22.3±4.5	21.9±4.2	0.57
PFIQ-7 scores (mean ± SD)	15.4±3.1	17.9±3.7	0.03
PGI-I satisfaction (higher %)	93.2%	91.3%	0.66
Reoperation rate (%)	4.1%	3.9%	0.94

POP-Q: Pelvic organ prolapse-quantification, PFDI-20: Pelvic floor distress inventory-20, PFIQ-7: Pelvic floor impact questionnaire-7, PGI-I: Patient global impression of improvement, SD: Standard deviation, LLS: Laparoscopic lateral suspension, LSC: Laparoscopic sacrocolpopexy

Table 3. Comparison of postoperative complications

Complication (Clavien-Dindo classification)	LLS group (n=73)	LSC group (n=76)	*p*-value
Overall complication rate (%)	6.8%	9.2%	0.59
Grade I-II complications (%)	4.1%	7.9%	0.04
Grade III-IV complications (%)	2.7%	1.3%	0.53

LLS: Laparoscopic lateral suspension, LSC: Laparoscopic sacrocolpopexy

support provided by the lateral mesh placement in LLS, which may offer more effective elevation of the anterior vaginal wall compared to the posterior-apical pull of LSC.

Furthermore, our study demonstrated a statistically significant improvement in patient-reported quality of life, as measured by the PFIQ-7, in the LLS group. This suggests that the benefits of LLS extend beyond anatomical correction to a more tangible impact on patients' daily lives and social activities, a finding that aligns with previous reports on patient satisfaction following LLS.[9]

In terms of safety, our results indicate that LLS is associated with a significantly lower rate of minor postoperative complications. This finding is clinically relevant and likely reflects the less invasive nature of LLS, which avoids the deep pelvic dissection required for sacral promontory exposure in LSC. The higher incidence of minor complications in LSC is a known phenomenon, consistent with previous comparative studies and systematic reviews.[10,11]

The strengths of our study include its relatively large sample size compared to much of the published literature and its medium-term follow-up duration of two years. The comprehensive assessment, incorporating anatomical, functional, and safety outcomes, enhances the clinical applicability of our findings.

Study Limitations

Nevertheless, we acknowledge several limitations. The retrospective design introduces a potential for selection bias and information bias, although we attempted to mitigate this by ensuring baseline characteristics were well-matched between the groups. The lack of randomization is an inherent limitation.

CONCLUSION

In conclusion, this study demonstrates that LLS achieves two-year anatomical success rates comparable to the gold-standard LSC for the treatment of apical pelvic organ prolapse. However, LLS offers significant advantages in the correction of anterior compartment prolapse and results in superior patient-reported quality of life. Coupled with a significantly lower risk of minor postoperative complications, these findings position LLS as a safe, effective, and valuable surgical option that should be considered in the armamentarium for pelvic reconstructive surgery.

ETHICS

Ethics Committee Approval: This study was approved by the Institutional Review Board of University of Health Sciences Türkiye, Kartal Dr. Lütfi Kırdar City Hospital (number: 2025/010.99/15/32, date: 30.04.2025) and was conducted in accordance with the principles of the Declaration of Helsinki).

Informed Consent: Retrospective study.

FOOTNOTES

Contributions

Surgical and Medical Practices: U.K.Ö., İ.B., E.K., Ş.Y.K., T.T., Concept: U.K.Ö., F.Ş., E.K., T.T., Design: U.K.Ö., İ.B., F.Ş., Ş.Y.K., T.T., Data Collection or Processing: U.K.Ö., İ.B., E.K., Ş.Y.K., T.T., Analysis or Interpretation: U.K.Ö., F.Ş., E.K., T.T., Literature Search: İ.B., F.Ş., Ş.Y.K., T.T., Writing: U.K.Ö., F.Ş., E.K., Ş.Y.K.

DISCLOSURES

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

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