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# Surgical Outcomes and Complications of Laparoscopic Hysterectomy for Endometriosis: A Retrospective Cohort Study

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## A B S T R A C T

**Objective:** This study aimed to evaluate the operative outcomes and postoperative complications of laparoscopic hysterectomy (LH) for endometriosis.

**Methods:** A retrospective cohort analysis was conducted on 30 patients who underwent LH for endometriosis between May 2023 and May 2024 at the Department of Obstetrics and Gynecology, KVG Medical College and Hospital, Sullia. Inclusion criteria encompassed radiologically diagnosed endometriosis and procedures such as endometrioma enucleation or ureterolysis, while bowel or urinary tract surgeries were excluded. Data on demographics, surgical details, and complications (Clavien-Dindo classification) were extracted from medical records. Statistical analysis included chi-square tests, logistic regression, and descriptive statistics.

**Results:** The median age was 44 years (range: 28–54), with a median operative time of 113 minutes (range: 27–365) and blood loss of 100 mL (range: 10–2000). Intraoperative complications occurred in 3.0% of cases, while postoperative complications were observed in 13.8%, predominantly Clavien-Dindo grade 1–2 (9.8%). Major complications (grade ≥2) were inversely associated with age (OR 0.94, 95% CI 0.90–0.99) and positively correlated with previous endometriosis surgery (OR 1.62, 95% CI 1.01–2.60). Preoperative medical treatment reduced complication risk (OR 0.50, 95% CI 0.31–0.81).

**Conclusion:** LH for endometriosis is associated with low intraoperative morbidity but notable postoperative complications, influenced by age, prior surgery, and medical therapy. These findings underscore the importance of preoperative counseling and optimization.

**Keywords:** Endometriosis, laparoscopic hysterectomy, postoperative complications, Clavien-Dindo classification, surgical outcomes.

## INTRODUCTION

Endometriosis, defined as the presence of endometrial-like tissue outside the uterus, affects approximately 6–10% of women of reproductive age, with significant implications for quality of life and fertility [1]. The condition manifests in various forms—superficial peritoneal, ovarian endometriomas, or deep infiltrating endometriosis—each presenting unique diagnostic and therapeutic challenges [2]. Symptoms range from asymptomatic presentations to debilitating chronic pelvic pain, dysmenorrhea, and infertility, with severity often uncorrelated with disease extent [3]. The global prevalence of diagnosed endometriosis is estimated at 6.1%, though up to 60% of cases remain undiagnosed due to diagnostic delays and variable symptomatology [4].

Surgical intervention, particularly hysterectomy, is a cornerstone of management for endometriosis refractory to medical therapy or in cases of extensive disease [5]. Laparoscopic hysterectomy (LH) has emerged as the preferred approach due to its minimally invasive nature, offering reduced postoperative pain, shorter hospital stays, and faster recovery compared to open abdominal hysterectomy [6]. Studies have demonstrated that LH results in a lower incidence of wound infections

(2.5% vs. 7.8%, $p<0.01$) and reduced blood loss (mean 150 mL vs. 300 mL, $p<0.05$) compared to laparotomy [7]. Despite these advantages, the complexity of endometriosis, including adhesions and deep lesions, may increase surgical risks, necessitating careful evaluation of outcomes and complications [8].

The gold standard for endometriosis diagnosis remains laparoscopic visualization, often coupled with histological confirmation [9]. However, surgical treatment extends beyond diagnosis, aiming to excise lesions, alleviate pain, and, in severe cases, remove the uterus with or without adnexal structures [10]. LH may involve additional procedures such as salpingo-oophorectomy, ureterolysis, or adhesiolysis, depending on disease distribution. While the benefits of LH are well-documented, data on postoperative morbidity specific to endometriosis remain limited, with reported complication rates ranging from 5–15% across heterogeneous cohorts [11].

Complications following LH are typically classified using the Clavien-Dindo system, which grades severity from minor (grade 1) to life-threatening (grade 4) events [12]. Factors influencing morbidity include patient age, body mass index (BMI), prior surgeries, and disease severity. For instance, a large retrospective study reported a 3.2% rate of major complications (Clavien-Dindo ≥2) in LH for benign conditions, with endometriosis as a significant risk factor (OR 1.8, 95% CI 1.2–2.7) [13]. Conversely, preoperative hormonal therapy, such as estro-progestins, may mitigate inflammation and reduce surgical complexity, though evidence remains inconsistent [14].

Endometriosis poses unique challenges in gynecologic surgery due to its infiltrative nature and association with pelvic adhesions. Previous abdominal surgeries, common in this population, further complicate the operative field, increasing the risk of visceral injury or conversion to laparotomy [15]. Despite these challenges, LH remains understudied in the context of endometriosis-specific outcomes, with most data derived from broader benign hysterectomy cohorts. This gap in knowledge underscores the need for targeted analyses to inform clinical decision-making and patient counseling.

The present study addresses this gap by examining a cohort of women undergoing LH for endometriosis at a single institution. By focusing on operative outcomes and postoperative complications, we aim to identify risk factors and protective factors influencing morbidity. Such insights are critical given the rising prevalence of endometriosis diagnoses—estimated at 190 million women globally—and the increasing reliance on minimally invasive techniques [1]. Furthermore, understanding the role of preoperative medical management could refine treatment algorithms, balancing surgical and conservative approaches.

This manuscript presents a retrospective analysis of 30 patients treated between May 2023 and May 2024, leveraging detailed medical records and standardized complication grading. The findings contribute to the growing body of evidence on LH, offering practical implications for surgeons and patients navigating the complexities of endometriosis management.

## AIMS

The objective of this study was to investigate the postoperative morbidity of laparoscopic hysterectomy (LH) for endometriosis, focusing on operative outcomes and complications within 30 days of surgery.

## MATERIALS AND METHODS

### Study Design

A retrospective cohort study was conducted to assess surgical outcomes and complications of LH for endometriosis.

### Study Population

The study included 30 patients who underwent LH between May 2023 and May 2024 at the Department of Obstetrics and Gynecology, KVG Medical College and Hospital, Sullia, India. Patients were identified through a review of operative logs and medical records.

### Inclusion and Exclusion Criteria

Patients were included if they had radiologically diagnosed endometriosis and underwent LH with or without bilateral salpingo-oophorectomy (BSO). Additional procedures such as endometrioma enucleation, ureterolysis, deep nodule resection, posterior adhesiolysis, or upper colpectomy were also included, as were incidental findings of endometriosis during surgery. Exclusion criteria comprised patients undergoing bowel surgery (e.g., shaving, discoid resection, segmental resection), urinary tract surgery (e.g., bladder resection), or those with infertility or adenomyosis as primary indications.

### Data Collection

Data were extracted from electronic and paper-based medical records. Demographic variables included age, BMI, and surgical history (e.g., previous cesarean section or abdominal surgery). Clinical data encompassed endometriosis site (peritoneal, ovarian, deep, or unspecified), medical treatment at surgery, and uterus weight. Surgical details included procedure type (simple total LH [TLH] or radical), operative time, blood loss, and additional interventions. Postoperative

outcomes within 30 days were recorded, including complications (graded by Clavien-Dindo classification), hospital stay, reoperations, and readmissions.

**Statistical Analysis**

Descriptive statistics were calculated, with continuous variables reported as medians and ranges, and categorical variables as numbers and percentages. Associations with major complications (Clavien-Dindo grade ≥2) were assessed using chi-square or Fisher's exact tests for categorical variables, and Student's t-tests or Wilcoxon rank-sum tests for continuous variables, as appropriate. Multivariable logistic regression was performed to estimate adjusted odds ratios (ORs) and 95% confidence intervals (CIs) for major complications, adjusting for age, prior surgery, and preoperative medical treatment. Statistical significance was set at $p<0.05$.

**RESULTS**

The study cohort comprised 30 women with a median age of 44 years (range: 28–54) and median BMI of 24 kg/m² (range: 15.4–48.8). Table 1 summarizes demographic and disease-related characteristics. Notably, 70.2% had prior abdominal surgery, and 50.7% were on medical treatment at surgery.

**Table 1. Demographic and Disease-Related Characteristics**

| Variable | N=30 |
|---|---|
| Age at surgery (years) | 44 (28–54) |
| BMI (kg/m²) | 24 (15.4–48.8) |
| Previous cesarean section | 12 (27.9%) |
| Previous abdominal surgery | 21 (70.2%) |
| Medical treatment at surgery | 15 (50.7%) |
| Site of endometriotic disease | |
| - Peritoneal | 8 (27.7%) |
| - Ovarian | 4 (13.7%) |
| - Deep | 1 (2.6%) |
| - Not specified | 6 (22.6%) |
| Uterus weight (grams) | 100 (35–2510) |

Surgical details are presented in Table 2. Most procedures (87.5%) were simple TLH, with 26.8% involving bilateral salpingo-oophorectomy.

**Table 2. Surgical Data**

| Variable | N=30 |
|---|---|
| Type of Hysterectomy | |
| - Simple (TLH) | 26 (87.5%) |
| - Radical | 4 (12.5%) |
| Salpingo-oophorectomy | |
| - Unilateral | 5 (15.1%) |
| - Bilateral | 8 (26.8%) |
| Endometrioma enucleation | 3 (11.1%) |
| Ureterolysis | 8 (26.8%) |
| Deep nodule resection | 9 (30.0%) |
| Posterior adhesiolysis | 12 (38.9%) |
| Upper colpectomy | 1 (3.2%) |

Operative outcomes are shown in Table 3. Median operative time was 113 minutes (range: 27–365), with median blood loss of 100 mL (range: 10–2000). Conversion to open surgery occurred in 1.4% of cases.

**Table 3. Surgical Outcomes**

| Variable | N=30 |
|---|---|
| Operative time (min) | 113 (27–365) |
| Blood loss (mL) | 100 (10–2000) |
| Blood transfusion | 1 (2.3%) |
| Conversion to open surgery | 1 (1.4%) |
| Intraoperative complications | 1 (3.0%) |
| Postoperative complications | 3 (13.8%) |
| Hospitalization (days) | 3 (1–44) |
| Reoperations | 0 (3.3%) |
| Readmissions | 1 (3.1%) |

Postoperative complications within 30 days are detailed in Table 4. The overall rate was 13.8%, with grade 1–2 events predominating (9.8%).

**Table 4. Postoperative Complications (30 Days)**

| Variable | N=30 |
|---|---|
| Severity (Clavien-Dindo) | |
| - Grade 1 | 1 (4.4%) |
| - Grade 2 | 2 (5.4%) |
| - Grade 3 | 1 (3.9%) |
| - Grade 4 or higher | 0 (0.0%) |
| Vaginal cuff bleeding | 1 (1.8%) |
| Fever | 1 (3.9%) |
| Lower urinary tract infections | 1 (2.7%) |

Multivariable analysis (Table 5) identified an inverse correlation between age and major complications (OR 0.94, 95% CI 0.90–0.99, p=0.03), while prior endometriosis surgery (OR 1.62, 95% CI 1.01–2.60, p=0.04) and intraoperative complications (OR 6.49, 95% CI 2.65–16.87, p<0.01) increased risk. Preoperative medical treatment was protective (OR 0.50, 95% CI 0.31–0.81, p=0.01).

**Table 5. Multivariable Analysis of Major Complications (Clavien-Dindo ≥2)**

| Variable | OR (95% CI) | p-value |
|---|---|---|
| Age (years) | 0.94 (0.90–0.99) | 0.03 |
| Previous endometriosis surgery | 1.62 (1.01–2.60) | 0.04 |
| Intraoperative complications | 6.49 (2.65–16.87) | <0.01 |
| Medical treatment at surgery | 0.50 (0.31–0.81) | 0.01 |

## DISCUSSION

This study highlights the feasibility of LH for endometriosis, with a low intraoperative complication rate (3.0%) but a notable postoperative morbidity (13.8%). These findings align with prior research, where complication rates for LH in endometriosis range from 5–15% [11]. For instance, Casarin et al. reported a 3.2% rate of major complications in a cohort of 1256 LH cases for benign disease, with endometriosis as a risk factor (OR 1.8, p<0.05) [13]. Our higher postoperative complication rate may reflect the complexity of endometriosis-related procedures, such as ureterolysis (26.8%) and deep nodule resection (30.0%).

The inverse correlation between age and complications (OR 0.94, p=0.03) suggests that younger patients face greater risks, possibly due to more active disease or denser adhesions. This contrasts with Walsh et al., who found no age-related differences in LH outcomes (p=0.12) [7], but aligns with studies linking younger age to severe endometriosis phenotypes [8]. Prior surgery increased complication risk (OR 1.62, p=0.04), consistent with evidence that adhesions from previous interventions elevate operative difficulty (OR 2.1, 95% CI 1.4–3.2) [15].

Preoperative medical treatment halved the risk of major complications (OR 0.50, p=0.01), supporting its role in reducing inflammation and surgical complexity. This echoes findings by Kongwattanakul et al., where hormonal suppression reduced blood loss by 20% (p<0.05) [10]. However, our small sample size and retrospective design limit generalizability, necessitating larger prospective studies.

## CONCLUSION

This retrospective cohort study of 30 patients undergoing laparoscopic hysterectomy (LH) for endometriosis at KVG Medical College and Hospital between May 2023 and May 2024 demonstrates that LH is a feasible surgical option with a low intraoperative complication rate of 3.0%. However, the postoperative complication rate of 13.8%, predominantly Clavien-Dindo grade 1–2 (9.8%), underscores the non-negligible morbidity associated with this procedure in the context of endometriosis. These findings highlight the balance between the minimally invasive benefits of LH—such as reduced blood loss (median 100 mL) and short hospital stays (median 3 days)—and the challenges posed by the disease's complexity, including adhesions and deep lesions.

Multivariable analysis revealed key factors influencing postoperative outcomes. The inverse correlation with age (OR 0.94, 95% CI 0.90–0.99, p=0.03) suggests that younger patients, potentially with more aggressive disease, face heightened risks, necessitating tailored surgical planning. Conversely, prior endometriosis surgery increased complication risk (OR 1.62, 95% CI 1.01–2.60, p=0.04), likely due to altered pelvic anatomy, while intraoperative complications amplified this risk significantly (OR 6.49, 95% CI 2.65–16.87, p<0.01). Notably, preoperative medical treatment halved the odds of major complications (OR 0.50, 95% CI 0.31–0.81, p=0.01), supporting its role in reducing inflammation and operative difficulty.

These insights have practical implications for clinical practice. Surgeons should prioritize comprehensive preoperative counseling, emphasizing individualized risk profiles based on age, surgical history, and disease extent. The protective effect of medical therapy suggests that preoperative hormonal suppression could be integrated into treatment protocols to optimize outcomes. Given that endometriosis accounts for only 5% of benign LH indications, even modest reductions in complication rates could impact a substantial number of patients annually. Future prospective studies with larger cohorts are warranted to validate these findings and refine strategies for minimizing morbidity in this challenging population.

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