



Fertility Outcome of Laparoscopic Treatment in Patients with Endometriosis

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ABSTRACT

Background

Endometriosis is a chronic estrogen-dependent condition causing infertility through pelvic inflammation, anatomical distortion, and impaired endometrial function. Laparoscopy is the gold standard for diagnosis and treatment, with proven fertility benefits in high-resource settings. However, data from low-resource contexts like Nepal are limited. This study aims to evaluate fertility outcomes following laparoscopic management of endometriosis among reproductive-age women in a tertiary hospital in eastern Nepal.

Methods

A descriptive cross-sectional study was conducted at Birat Medical College Teaching Hospital, Nepal, from January to December 2024, involving 22 women with laparoscopically confirmed endometriosis who underwent treatment during diagnostic hysterolaparoscopy for subfertility. Of these, 11 women were successfully contacted, consented, and provided information on their fertility outcomes, forming the final study sample. Women with comorbidities affecting fertility or those lost to follow-up were excluded. Data were collected from hospital records and telephone interviews conducted at least one year after surgery. Descriptive statistics were used for data analysis.

Results

Among the 104 women who underwent diagnostic hysterolaparoscopy for subfertility, 22 were diagnosed and treated for endometriosis. Eleven women responded to follow-up and were included in the final analysis. The participants had a mean age of 31.7 years, with most belonging to Janajati ethnicity. Following laparoscopic surgery, 2 women (18.2%) achieved conception and live birth via in-vitro fertilization (IVF), both delivered by cesarean section. The remaining 9 participants had not conceived at the time of follow-up.

Conclusions

Laparoscopic management of endometriosis shows promising fertility outcomes, supporting its value in fertility care even in resource-limited settings.

Keywords: endometriosis; fertility; health services; laparoscopy; outcomes.

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INTRODUCTION

Endometriosis is a chronic, estrogen-dependent condition characterized by the presence of endometrial-like tissue outside the uterus, affecting 10-15% of women of reproductive age globally.^{1,2} It is a significant cause of infertility, impacting up to 50% of infertile women.¹ The pathophysiology of endometriosis is multifactorial, involving distorted pelvic anatomy, inflammation, impaired folliculogenesis, altered immune responses and reduced endometrial receptivity.² Laparoscopy is the gold standard for diagnosing and treating endometriosis, offering both diagnostic and therapeutic benefits.^{3,4} While studies from developed countries suggest improved fertility outcomes following laparoscopic management, there is limited data from resource-constrained settings like Nepal, where differences in disease presentation and healthcare access may affect outcomes. Further a study from eastern Nepal demonstrates laparoscopy's diagnostic and therapeutic value in Nepalese settings, but lacks outcome data on fertility.⁵ Hence, this study aims to assess the fertility outcomes following laparoscopic management of endometriosis of reproductive age women attending a tertiary hospital in eastern Nepal.

METHODS

A descriptive cross-sectional study was conducted from January to December 2024, at Birat Medical College Teaching Hospital, Morang, Nepal. Prior to the initiation of the study, ethical approval was obtained from the Institutional Review Committee (IRC) of Birat Medical College Teaching Hospital (Ref. No. IRCPA-358/2023). Ethical principles were strictly followed throughout the research process. From the hospital's medical records, 104 patients who had undergone diagnostic hysterolaparoscopy (DHL) for subfertility between January 2021 to December 2023 were identified. Among these, 22 women had been diagnosed and treated for endometriosis through laparoscopic surgery. All 22 were contacted by telephone for follow-up, and 11 women responded and voluntarily provided informed consent to participate. These 11 women comprised the final

study sample for analysis of fertility outcomes. The study population included women aged 15 to 49 years who had a laparoscopically confirmed diagnosis of endometriosis, a documented history of subfertility prior to surgery, and a stated desire for future conception. All laparoscopic procedures were performed under general anesthesia using a standard four-port technique with one 10 mm umbilical port for the laparoscope and three 5 mm ancillary ports in the lower abdomen, one in right side of abdomen and two in left side. Primary port insertion was done by direct trocar entry. Depending on intraoperative findings, surgical interventions included adhesiolysis, excision or ablation of superficial peritoneal endometriotic implants, ovarian cystectomy for endometriomas using the stripping technique and paraureteric adhesiolysis done. Cyst size ranged from 2-6 cm, and lesions were most commonly located in the ovaries, uterosacral ligaments, and pelvic peritoneum. Adhesiolysis was performed with blunt dissection or monopolar cautery or harmonic, while implant excision/ablation was performed with bipolar energy. All surgeries were performed by a single senior gynecologic laparoscopic surgeon with over 15 years of experience, ensuring consistency in operative technique and minimizing inter-surgeon variability. Women with known comorbidities affecting fertility—such as polycystic ovarian syndrome (PCOS), untreated hypothyroidism, or hyperprolactinemia—were excluded. Additionally, patients who did not plan for future conception or could not be contacted during follow-up were also excluded.

Data were collected using a structured proforma developed in Google Forms. Information regarding sociodemographic variables (such as age, ethnicity, and contact number), clinical diagnosis, surgical details, and reproductive plans was extracted from hospital records. Follow-up interviews were conducted via telephone at least one year after laparoscopic surgery of the last patient to determine each patient's fertility outcome. Informed consent was obtained from all participants after explaining the purpose and procedures of the study, as well as ensuring confidentiality. Participation was entirely

voluntary, and participants were informed of their right to withdraw from the study at any time without any consequences to their medical care. The collected data were extracted into Microsoft Excel version 2016 for data management and cleaning. Descriptive statistical analysis, including calculation of frequencies, percentages, means, and standard deviations, was performed to summarize the findings and interpret the fertility outcomes among the study population.

RESULTS

A total of 104 women underwent diagnostic hysterolaparoscopy (DHL) for subfertility. Among them, 22 patients (21.2%) were diagnosed with endometriosis and underwent laparoscopic treatment during the same surgical procedure. Out of these, 11 women (50%) could be reached and consented to participate in the study. These 11 respondents formed the final sample for the analysis of fertility outcomes following laparoscopic intervention for endometriosis. Of the 11 women included in the analysis, 6 had ovarian endometriomas (2-6 cm), managed with laparoscopic cystectomy, 4 had superficial peritoneal lesions treated with excision/ablation, and 7 required adhesiolysis for pelvic adhesions involving the uterus, ovaries, or tubo-ovarian complex. Lesions were most frequently located in the ovaries, uterosacral ligaments, and pelvic peritoneum.

Regarding sociodemographic characteristics, the participants ranged in age from 27 to 40 years, with a mean age of 31.72 ± 3.37 years. In terms of ethnicity, 63.6% were Janajati (n=7), 27.3% were Brahmin/Chhetri (n=3), and 9.1% were Madhesi (n=1). The

Table 1. Sociodemographic characteristics. (n=11)	
Category	Fertility Outcome Frequency (%)
Age Range (in years)	
25-30 (n = 5)	2(40.0%)
31-35 (n = 5)	-
36-40 (n = 1)	-
Ethnicity	
Brahmin/Chhetri (n = 3)	1(33.3%)
Janajati (n = 7)	1(14.3%)
Madhesi (n = 1)	-

duration of marriage varied between 4.5 and 18 years. (Table 1).

Regarding fertility outcomes, out of the 11 participants, 2 women (18.2%) achieved successful conception and live birth following laparoscopic surgery. Both pregnancies were achieved through in-vitro fertilization (IVF) and culminated in cesarean section deliveries. Notably, both of these women were in the 25-30 years age group at the time of surgery. The remaining 9 participants (81.8%) had not conceived by the time of follow-up in March 2023. Among them, 2 women were planning to undergo IVF, while the remaining 7 were either attempting spontaneous conception or undecided about further fertility interventions (Table 2).

Table 2. Fertility outcomes among patients undergoing laparoscopic surgery for endometriosis. (n=11)	
Category	Fertility Outcome Frequency (%)
Mode of Conception	
IVF (n = 2)	2(100.0%)
Spontaneous (n = 0)	-
Mode of Delivery	
Cesarean section (n = 2)	2(100.0%)
Spontaneous vaginal (n = 0)	-

DISCUSSION

This study evaluated fertility outcomes following laparoscopic treatment of endometriosis among subfertile women at a tertiary care center in eastern Nepal. Among the 104 women who underwent diagnostic hysterolaparoscopy for subfertility, 22(21.2%) were diagnosed with endometriosis. The laparoscopic treatments in our cohort were predominantly ovarian cystectomy and excision of peritoneal implants, which are consistent with standard practice. However, absence of standardized staging (rASRM or EFI) limited stratified analysis of outcomes based on disease severity. A notable strength of this study is that all procedures were performed by a single surgeon with more than 15 years of laparoscopic experience, ensuring uniformity in technique and reducing operator-related variability. Out of these, only 11 women consented to follow-up for outcome analysis.

Among the followed participants, just two women (18.2%) achieved pregnancy postoperatively, both through in vitro fertilization (IVF), with no cases of spontaneous conception observed. The fertility success rate of 18.2% in our study is notably lower than those reported in studies from high-resource settings, where pregnancy rates following laparoscopic surgery range from 34% to 57% within the first year after the procedure.^{6,7} Several factors may account for this disparity, including differences in patient demographics, the severity of endometriosis, and access to fertility-enhancing technologies such as ART.

In cases of deep infiltrating endometriosis (DIE), which often involves the bowel or urinary tract, spontaneous conception rates remain particularly low-even after surgical excision-ranging between 2% and 10%.⁸ In contrast, women with mild to moderate disease (stages I/II and III/IV) show relatively better fertility outcomes, with clinical pregnancy rates of 38% and 34%, and live birth rates of 28% and 26%, respectively.⁹ Our inability to systematically classify disease severity using standard systems such as the revised ASRM or the Endometriosis Fertility Index (EFI) limits our ability to draw conclusions on the impact of staging on outcomes in these patients. Another major contributing factor is age. The mean age in our study was 31.7 years, with durations of subfertility extending to 18 years in some cases. Advanced maternal age and prolonged infertility duration are established negative predictors of post-surgical fertility, with age over 35 and infertility lasting more than three years significantly reducing pregnancy rates.⁶ Notably, the two women who achieved pregnancy in our study were both in the 25-30 years age group, aligning with the well-established observation that younger age confers a more favorable fertility prognosis following laparoscopy. The absence of spontaneous pregnancies suggests that laparoscopic surgery alone may be insufficient to restore fertility in older or more severely affected women. This aligns with current practice recommendations that advise early integration of assisted reproductive technologies

following surgery in these patient subsets.¹⁰ Additionally, studies indicate that endometriosis can negatively affect oocyte and embryo quality, even after surgical excision, which may further diminish the likelihood of natural conception and necessitate ART to optimize outcomes.¹¹ Even though 81.8% of participants remained infertile at follow-up, only two actively pursued IVF; the rest were either continuing to attempt natural conception or remained uncertain about their fertility plan. This pattern indicates substantial gaps in post-operative counselling and structured fertility pathways. In resource-limited contexts like ours, financial constraints, distance to IVF centers, and inadequate patient education further hinder ART uptake, delaying treatment and potentially eroding ovarian reserve over time.

These findings are echoed by Khraibet et al. in their prospective observational study of 100 infertile women, where laparoscopy-confirmed endometriosis was found in 12 (11.5%) patients; 66.7% of those who resumed ovulation post-surgery went on to achieve pregnancy, including spontaneous and ART-assisted conceptions.⁴ Their data particularly underscore the higher efficacy of laparoscopic intervention in younger women (average age 26–30) and highlight the importance of targeting surgical treatment to those most likely to benefit. Together, these results reinforce that while laparoscopy remains a valuable diagnostic and therapeutic tool-especially in younger women-it should be accompanied by timely ART planning, especially in older women or those with more severe disease, and supported by robust post-operative counseling and resource access.

While laparoscopy remains crucial for diagnosing and treating endometriosis, its success in enhancing fertility through spontaneous conception is strongly influenced by patient age, disease severity, and access to ART. Younger women with early-stage disease may achieve satisfactory fertility with surgery alone, but older women or those with complex pathology frequently require ART support. To improve fertility outcomes in low-resource settings, a multifaceted approach is essential. This includes early detection and referral of younger women with endometriosis,

routine use of standardized disease severity scores such as the Revised American Society for Reproductive Medicine (rASRM) score and the Endometriosis Fertility Index (EFI), and structured post-operative fertility counseling that provides realistic timelines and prognosis.

Several emerging studies further clarify how refined classification systems and surgical techniques influence fertility outcomes. First, the Endometriosis Fertility Index (EFI)-which uniquely accounts for both historical and surgical factors, has proven to be a stronger predictor of spontaneous and ART-related pregnancy than traditional systems like rASRM or Enzian.¹² In fact, cumulative non-ART pregnancy at 36 months was around 10% for those with low EFI (0-2), compared to nearly 69% for those scoring 9-10.¹³ These findings underscore the importance of implementing EFI in low-resource settings: for patients with low scores, early transition to ART should be strongly considered. Next, focusing on deep infiltrating endometriosis (DIE)-a population at particularly high risk of infertility-a meta-analysis reported an overall pregnancy rate of 44.8%, with approximately 30% achieving spontaneous conception after surgical resection.¹⁴ However, surgical approach matters: rectal resection was associated with significantly lower pregnancy rates than less invasive methods like shaving or disc excision (OR = 0.64), highlighting the need for tailored surgical planning that balances disease removal with fertility preservation.¹⁵ Additionally, timely transition to assisted reproductive technology (ART) is crucial, especially for women over 30 years of age or those with longstanding infertility. Policy and healthcare initiatives should focus on expanding access to ART through subsidized in vitro fertilization (IVF) programs, patient education, and mobile fertility clinics. Future research must involve larger, longitudinal studies with standardized staging that track both spontaneous and assisted pregnancies across diverse settings. These efforts will help refine management algorithms and ultimately improve reproductive outcomes for women with endometriosis worldwide.

Limitations

The small sample size and substantial loss to follow-up limited the statistical robustness of the study and may have introduced selection bias, as those who completed follow-up may differ systematically from those lost. The absence of standardized endometriosis staging further restricted the ability to assess the relationship between disease severity and fertility outcomes. Additionally, the single-center design in a resource-limited setting limits the external validity of the findings, making them less generalizable to broader or more diverse populations.

CONCLUSIONS

In our setting, laparoscopic treatment of endometriosis resulted in a modest fertility recovery rate. No spontaneous pregnancies were observed, and successful conceptions occurred only through IVF in younger patients. These findings underscore the importance of integrating assisted reproductive strategies and structured post-surgical counseling to improve fertility outcomes, particularly in resource-constrained environments and among older subfertile women.

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