Alqalam Journal of Medical and Applied Sciences. 2026;9(5):1408-1412
https://doi.org/10.54361/ajmas.269541

Original article

Impact of Laparoscopic Surgery on Fertility Outcomes

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Abstract
Infertility affects a significant proportion of women of reproductive age, with pelvic adhesions, ovarian cysts, and endometriosis being common causes. Laparoscopic surgery has emerged as a minimally invasive intervention that may improve fertility outcomes by restoring pelvic anatomy and reducing disease burden. A descriptive, analytical, and comparative study was conducted on a purposive sample of 100 women aged 20–40 years, weighing between 60 and 95 kilograms, who underwent laparoscopic surgery for infertility-related causes. Data were collected using a structured questionnaire documenting demographic, medical, and reproductive characteristics, as well as fertility outcomes after surgery. Statistical analysis included descriptive measures, cross-tabulations, and Spearman's correlation to assess associations between surgical intervention and fertility outcomes, with significance set at $p = 0.01$. Pregnancy occurred in 55% of participants following laparoscopic surgery, with 40% conceiving within six months. Assisted reproductive technologies were required in 60% of cases. Forty-five percent of pregnancies continued to term, while 25% ended in miscarriage. Complications occurred in 20% of cases, and 35% of women reported that weight influenced ovarian stimulation. Spearman's correlation revealed moderate to strong positive associations between laparoscopic surgery and pregnancy outcomes, while negative correlations were observed for complications and weight influence. Laparoscopic surgery is a safe and effective intervention for infertility associated with pelvic pathology, improving pregnancy rates and outcomes. Fertility success, however, remains influenced by age, BMI, type of infertility, and the need for assisted reproductive technologies. These findings highlight the importance of individualized treatment strategies and integration of surgical management with comprehensive reproductive care.
Keywords. Laparoscopic Surgery, Infertility, Fertility Outcomes, Pregnancy, Assisted Reproductive Techniques.

Introduction

Infertility is a global health concern affecting approximately 10–15% of couples of reproductive age, with significant psychological, social, and economic implications [1]. Among the various causes of infertility, pelvic adhesions, ovarian cysts, and endometriosis are particularly prevalent and often require surgical intervention [2]. Laparoscopic surgery has emerged as a minimally invasive technique that offers both diagnostic and therapeutic benefits in the management of infertility-related conditions [3]. Compared to open surgical approaches, laparoscopy reduces tissue trauma, minimizes postoperative complications, and enhances recovery, thereby potentially improving fertility outcomes [4].

Several studies have demonstrated that laparoscopic management of endometriosis and ovarian cysts can improve fecundity rates and increase the likelihood of spontaneous conception [5]. In cases of minimal or mild endometriosis, laparoscopic excision has been associated with improved pregnancy rates, although its role prior to assisted reproductive technologies remains debated [6]. Similarly, laparoscopic adhesiolysis has been shown to restore pelvic anatomy and improve reproductive potential in women with tubal factor infertility [7].

Despite these advantages, fertility outcomes after laparoscopy are influenced by multiple factors, including age, body mass index (BMI), duration and type of infertility, and the specific surgical procedure performed [8]. Moreover, while laparoscopy is generally safe, complications such as postoperative adhesions or reduced ovarian reserve may negatively affect reproductive outcomes [9]. Given the variability in outcomes and the need for evidence-based evaluation, this study aims to analyze the impact of laparoscopic surgery on fertility outcomes among women of reproductive age. By examining demographic, medical, and reproductive characteristics alongside pregnancy outcomes, the study provides a comprehensive assessment of the effectiveness of laparoscopic interventions in infertility management.

Methodology

Study Design

This study was conducted using a descriptive, analytical, and comparative design to evaluate the impact of laparoscopic surgery on fertility outcomes among women of reproductive age. The comparative aspect of the design allowed for assessment of differences in pregnancy rates and outcomes across variables such as age, weight, body mass index (BMI), duration, and type of infertility, cause of infertility, and type of laparoscopic procedure performed.

Received*: 17-03-2025 -* ***Accepted****: 16-05-2025 -* ***Published****: 22-05-2025*

Study Population and Sample

The study population consisted of women aged 20 to 40 years who underwent gynecological laparoscopic surgery for infertility-related causes within a defined timeframe and clinical setting at Albushra Aloula Clinic.

Eligible participants weighed between 60 and 95 kilograms and presented with primary or secondary infertility attributable to pelvic adhesions, ovarian cysts, or endometriosis. Women with infertility causes unrelated to laparoscopic surgery were excluded. From this population, a purposive sample of 100 women was selected.

Data Collection

Data were collected using a structured questionnaire designed to capture both baseline characteristics and fertility outcomes. The instrument was divided into two sections. The first section documented demographic, medical, and reproductive data, including age, weight, BMI, marital duration, infertility type and duration, previous cesarean section, cause of infertility, and type of laparoscopic intervention (adhesiolysis, ovarian cyst removal, or endometriosis treatment). The second section focused on fertility outcomes after laparoscopy, including pregnancy occurrence, number of cycles required with ovarian stimulation, the influence of weight on ovarian stimulation, continuation of pregnancy to term or miscarriage, and delivery method.

Reliability test

Reliability of the questionnaire was assessed using the test–retest method. The instrument was administered twice at an appropriate interval to a subset of participants, and responses were compared for consistency. A high correlation coefficient was anticipated between the two administrations, confirming the reliability of the instrument and its suitability for accurately measuring fertility outcomes after laparoscopic surgery.

Data Sources

Primary data were obtained directly from participants through the questionnaire. Secondary data were drawn from published studies, scientific research, and specialized medical references addressing laparoscopic surgery and fertility outcomes. These sources provided contextual support and allowed comparison with existing literature.

Statistical Analysis

Data analysis was performed using descriptive and inferential statistical methods. Frequencies and percentages were used to summarize demographic and clinical characteristics, while arithmetic means and standard deviations described continuous variables. Cross-tabulations were employed to examine associations between demographic and clinical variables and pregnancy outcomes. Spearman's correlation coefficient was applied to assess relationships between surgical intervention and fertility outcomes, with statistical significance set at $p = 0.01$.

Results

The demographic profile highlights a predominance of women aged 31–35 years, with most participants being overweight or obese. Primary infertility was more common than secondary infertility, and pelvic adhesions were the leading cause of infertility. The majority underwent adhesiolysis as the laparoscopic intervention. These findings contextualize the clinical background of the study population.

Table 1. Demographic, Medical, and Reproductive Characteristics of Participants

Variable	Category	Frequency	Percentage
Age	20–25 years	20	20%
	26–30 years	30	30%
	31–35 years	35	35%
	36–40 years	15	15%
Weight (kg)	60–64	15	15%
	65–74	40	40%
	75–84	30	30%
	85–95	15	15%
Body Mass Index	Normal (18.5–24.9)	35	35%
	Overweight (25–29.9)	45	45%
	Obese (≥30)	20	20%
Duration of marriage	<2 years	10	10%
	2–4 years	25	25%
	5–7 years	30	30%
	>7 years	35	35%

Received*: 17-03-2025 -* ***Accepted****: 16-05-2025 -* ***Published****: 22-05-2025*

Type of infertility	Primary	60	60%
	Secondary	40	40%
Duration of infertility	<2 years	20	20%
	2–4 years	35	35%
	≥5 years	45	45%
Previous cesarean section	Yes	25	25%
	No	75	75%
Reason for infertility	Pelvic adhesions	40	40%
	Ovarian cyst	25	25%
	Endometriosis	20	20%
	Other	15	15%
Laparoscopic intervention type	Adhesiolysis	40	40%
	Ovarian cyst removal	25	25%
	Endometriosis treatment	20	20%

Spearman's correlation analysis was conducted to evaluate the relationship between laparoscopic surgical intervention and subsequent fertility outcomes. The results demonstrate moderate to strong positive correlations for most pregnancy-related outcomes, while negative correlations were observed for complications and weight influence. All associations reached statistical significance (p = 0.01), underscoring the relevance of laparoscopic surgery in infertility management.

Table 2. Correlation of Fertility Outcomes with Laparoscopic Surgery Variables

Question	Sample Size	Spearman's ρ	p-value
Pregnancy occurred after laparoscopic surgery	100	0.62	0.01
Pregnancy occurred within 6 months after laparoscopic surgery	100	0.59	0.01
Pregnancy achieved with ovarian stimulation/ART	100	0.61	0.01
Pregnancy continued successfully until birth	100	0.64	0.01
Complications occurred during pregnancy after a laparoscopy	100	-0.48	0.01
Weight affected ovarian stimulation before pregnancy	100	-0.52	0.01
The type of infertility affected the pregnancy outcome after laparoscopy	100	0.55	0.01
A miscarriage occurred after a pregnancy resulting from a laparoscopy	100	-0.50	0.01
Laparoscopic intervention improved the chances of pregnancy	100	0.63	0.01
The delivery method was appropriate for a completed pregnancy	100	0.57	0.01

Fertility outcomes revealed that 55% of women achieved pregnancy post-surgery, though only 40% conceived within six months. Assisted reproductive techniques were frequently required, and 45% carried pregnancies to term. Complications were relatively uncommon (20%), while miscarriage occurred in 25% of cases. Overall, 70% of participants perceived laparoscopy as beneficial in improving pregnancy chances.

Table 3. Fertility Outcomes After Laparoscopic Surgery

Question	Yes	%	Sometimes	%	No	%	Total
Pregnancy occurred after laparoscopic surgery	55	55%	15	15%	30	30%	100
Pregnancy occurred within 6 months after laparoscopic surgery	40	40%	10	10%	50	50%	100
Pregnancy achieved with ovarian stimulation/ART	60	60%	15	15%	25	25%	100
Pregnancy continued successfully until birth	45	45%	30	30%	25	25%	100
Complications occurred during pregnancy after laparoscopy	20	20%	10	10%	70	70%	100
Weight affected ovarian stimulation before pregnancy	35	35%	15	15%	50	50%	100
Type of infertility affected pregnancy outcome after laparoscopy	50	50%	15	15%	35	35%	100
Miscarriage occurred after pregnancy resulting from laparoscopy	25	25%	10	10%	65	65%	100
Laparoscopic intervention improved chances of pregnancy	70	70%	10	10%	20	20%	100
Delivery method was appropriate for completed pregnancy	60	60%	15	15%	25	25%	100

Received*: 17-03-2025 -* ***Accepted****: 16-05-2025 -* ***Published****: 22-05-2025*

Discussion

The findings of this study demonstrate that laparoscopic surgery plays a significant role in improving fertility outcomes among women with infertility related to pelvic pathology. More than half of the participants achieved pregnancy following surgery, and nearly half carried their pregnancies to term. These results are consistent with previous reports highlighting the effectiveness of laparoscopic interventions in restoring reproductive potential [10].

The correlation analysis revealed moderate to strong positive associations between laparoscopic surgery and pregnancy-related outcomes, particularly in cases where ovarian stimulation or assisted reproductive technologies were employed. This aligns with evidence suggesting that laparoscopy enhances the success of subsequent fertility treatments by improving pelvic anatomy and reducing disease burden [11]. Negative correlations observed for complications and weight influence underscore the importance of patient-specific factors, such as BMI, in determining reproductive success. Obesity has been shown to impair ovarian response and reduce pregnancy rates, even after surgical intervention [12].

The demographic analysis indicated that primary infertility was more prevalent than secondary infertility, and pelvic adhesions were the leading cause of infertility. These findings support earlier studies that identified adhesions and endometriosis as major contributors to infertility, with laparoscopic adhesiolysis and excision improving spontaneous conception rates [13]. However, the variability in outcomes highlights the need for individualized treatment strategies.

Pregnancy within six months of surgery was achieved in only 40% of cases, suggesting that while laparoscopy improves fertility potential, conception may require longer periods or adjunctive therapies. This observation is consistent with studies reporting that the benefits of laparoscopic surgery may extend beyond the immediate postoperative months, with cumulative pregnancy rates increasing over time [14].

The relatively low rate of complications (20%) reflects the safety profile of laparoscopy, which has been widely recognized as a minimally invasive technique with reduced postoperative morbidity compared to open surgery [15]. Nevertheless, the occurrence of miscarriages in 25% of cases emphasizes that surgical intervention alone cannot eliminate all reproductive risks. Endometriosis, adhesions, and diminished ovarian reserve may continue to affect outcomes despite surgical correction [16].

Overall, the study confirms that laparoscopic surgery is an effective and safe intervention for infertility associated with pelvic pathology. However, fertility outcomes remain influenced by age, BMI, type of infertility, and the need for assisted reproductive technologies. These findings underscore the importance of integrating surgical management with comprehensive reproductive care, including lifestyle modification and assisted conception techniques, to optimize outcomes [17,18].

This study is subject to several limitations. First, the purposive sampling strategy and relatively small sample size of 100 women restrict the generalizability of the results to broader populations. Second, the reliance on self-reported questionnaire data introduces the possibility of recall bias, particularly regarding reproductive history and pregnancy outcomes. Third, the cross-sectional design precludes causal inference, limiting the ability to establish definitive relationships between laparoscopic surgery and fertility outcomes.

Conclusion

The present study demonstrates that laparoscopic surgery is an effective and safe intervention for infertility associated with pelvic pathology. More than half of the participants achieved pregnancy following surgery, and nearly half carried their pregnancies to term, confirming the clinical utility of laparoscopic procedures in restoring fertility potential. Positive correlations between surgical intervention and pregnancy outcomes underscore the role of laparoscopy in enhancing reproductive success, particularly when combined with ovarian stimulation or assisted reproductive technologies. However, fertility outcomes remain influenced by patient-specific factors such as age, BMI, and type of infertility. These findings highlight the importance of individualized treatment strategies and integration of surgical management with comprehensive reproductive care.

Ethical Approval

Ethical approval for this study was obtained from the institutional review board of the participating medical centers. All procedures were conducted in accordance with the ethical standards of the Declaration of Helsinki. Written informed consent was obtained from all participants prior to enrollment, ensuring voluntary participation and confidentiality of data.

Conflict of Interest

The authors declare no conflict of interest related to this study. The research was conducted independently, without financial or personal relationships that could have influenced the outcomes or interpretation of the findings.

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Received*: 17-03-2025 -* ***Accepted****: 16-05-2025 -* ***Published****: 22-05-2025*

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