

Frequency of Endometriosis on Diagnostic Laparoscopy in Females with Secondary Infertility

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ABSTRACT

Background: For endometriosis, one of the most common chronic diseases encountered in gynecological outdoors, laparoscopy, is considered as a gold-standard diagnostic tool because direct visualization of endometriotic lesions enables the medical practitioner to provide recommendations for future therapy. This study aimed to determine the frequency of endometriosis on diagnostic laparoscopy in females with secondary infertility.

Methods: A cross-sectional study among 92 females was conducted at the Department of Obstetrics & Gynecology, Sir Ganga Ram Hospital, Lahore, from December 2022 to June 2023. Females aged 20-45 years, presenting with secondary infertility and subjected to diagnostic laparoscopy were analyzed using a non-probability, consecutive sampling technique. Data regarding the age, BMI, residence, parity, duration of infertility, and menstrual cycle were recorded. The findings of laparoscopic diagnosis regarding endometriosis were labeled. SPSS vr26 was used. The chi-square test was used to see the impact of effect modifiers on the frequency of endometriosis, taking $p \leq 0.05$ as significant.

Results: Out of a total of 92 females, (mean age 36.66 ± 5.41 years), 65 (70.7%) females were aged between 35-45 years. The mean BMI was 24.6 ± 3.2 kg/m² and the secondary infertility mean duration was 22.05 ± 6.04 months while the mean parity was 2.09 ± 0.82 . Endometriosis was diagnosed among 28 (30.4%) females, in which 16 (57.1%) had a duration of infertility above 2 years ($p=0.013$) with parity <3 ($p=0.761$).

Conclusion: Using diagnostic laparoscopy, the frequency of endometriosis was found significant among females having secondary infertility. Laparoscopic evaluation can be helpful in the timely diagnosis and management of secondary infertility.

Keywords: Endometriosis, Infertility, Laparoscopy.

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INTRODUCTION

Infertility is a major issue affecting around 9% of couples globally¹. Secondary infertility is the inability of the female to conceive again, or to carry a pregnancy to term, following the birth of one or more biological children; provided that the birth of previous children did not involve any assisted reproductive technologies or fertility medications². If unprotected intercourse performed for one year does not bring about conception for the couple, then they should be evaluated for infertility³.

Infertility treatment is usually initiated with modalities suitable for the couple, knowing the underlined cause of infertility. Taking a brief history and offering a physical examination are substantial in assessing infertility, but there is a need for specific diagnostic tests as well. It is a common practice to test for male factors, ovulatory factors, uterotubal factors, and peritoneal factors because the causes of infertility might be multiple⁴. Semen analysis, serum progesterone level, and serum basal follicle-stimulating hormone level are only a few of the laboratory-based diagnostic tests available⁵.

Endometriosis is a common chronic disease encountered in females of reproductive age with a variety of presentations ranging from pelvic pain to subfertility⁶. Endometriosis prevalence is difficult to determine in the general population and is assumed to affect about 33% of women who experience pelvic pain and around 10% of adolescents and young adults suffer from severe dysmenorrhea, which is mainly estimated by laparoscopic visualization⁷. Moreover, it has been reported that the frequency of females presenting with infertility varies between 20-50%^{8,9}.

Laparoscopy, a minimally invasive technique, has been used to identify the cause of infertility and make future therapy recommendations. The gold standard for treating adhesions, endometriosis, ovarian, and tubal problems is still laparoscopy^{4,5,10}. Before any advanced infertility care, all patients with infertility can undergo laparoscopy evaluation because of its potential diagnostic and therapeutic benefits. Jain et al evaluating the diagnostic utility of laparoscopy in the diagnosis of infertility found the frequency of endometriosis as 6.1% of cases¹¹. Shetty et al revealed the frequency of endometriosis as 18.7% among females with secondary infertility¹².

There seems to be a variation in previously published literature about the occurrence of endometriosis in secondary infertility. Moreover, local data are scarce about the utilization of laparoscopic evaluation and frequency of endometriosis in secondary infertility. The present study will give us important information about the burden of endometriosis among females with secondary infertility which in

turn will assist our anticipation for timely diagnosis and management. The objective of this study was to determine the frequency of endometriosis on diagnostic laparoscopy in females with secondary infertility.

METHODS

This cross-sectional study was carried out in the Department of Obstetrics and Gynecology, Sir Ganga Ram Hospital, Lahore, from December 2022 to June 2023. Approval was acquired from the Institutional Ethics Committee from Fatima Jinnah Medical University, Lahore with reference # IRB/22/681. A sample size of 92 was calculated using the estimated frequency of endometriosis through laparoscopic diagnosis in secondary infertility cases as 18.7%¹² with an 8% margin of error. The inclusion criteria were females aged 20-45 years, presenting with secondary infertility and subjected to diagnostic laparoscopy. Diagnostic laparoscopy was done with 3 trocars with the main umbilical 10-mm port for laparoscope and 2.5-mm ancillary trocars in lower abdomen lateral to inferior epigastric artery. The exclusion criteria were females with adhesions due to previous surgeries (on clinical assessment), or known cases of infertility due to male factors (assessed through a thorough medical record). Secondary infertility was defined as females who were unable to conceive in the past year after having at least one birth at some point in the past. Informed and written consents were obtained from all the women participants. Non-probability, consecutive sampling technique was used.

All the necessary demographic information including age, body mass index, residence, parity, and duration of infertility were gathered. The procedure of diagnostic laparoscopy was done by a single senior gynecologist with a minimum of 3 years post-fellowship experience to avoid bias. The laparoscopic examination assessed endometriotic lesions, exhibiting a range of colors including white, yellow, non-pigmented, dark blue, powder-burn black, red, or brown. The identification of one or more lesions was categorized as indicative of endometriosis. A specific, predesigned proforma was used to record the study data.

Data analysis was performed through IBM-SPSS Statistics version 26.0. For numerical variables like age, body mass index (BMI), duration of secondary infertility, and parity, mean and standard deviation (SD) were calculated, while categorical data was represented by mentioning frequency and percentage. To address the impact of the effect modifiers, the data was stratified by age, body mass index, residence, parity, and duration of secondary infertility. After stratification, a chi-square test was used to see the impact of effect modifiers on the outcome (frequency of endometriosis) taking $p \leq 0.05$ as significant.

RESULTS

In a total of 92 females, the mean age was 36.66±5.41 years (ranging between 20 to 45 years) whereas 65 (70.7%) females were aged between 35-45 years. The mean BMI was 24.6±3.2 kg/m². The mean duration of secondary infertility was

22.05±6.04 months (ranging between 13 to 32 months), whereas the duration of secondary infertility was 1 to 2 years among 57 (62.0%) females. The mean parity was 2.09±0.82 (ranging between 1 to 3). Table 1 shows the characteristics of the females studied.

Table 1: Demographic characteristics of patients (n=92)

Characteristics		Frequency (%)
Age (years)	20-34	27 (29.4%)
	≥35	65 (70.6%)
Residence	Urban	31 (33.7%)
	Rural	61 (66.3%)
Body mass index (kg/m ²)	<25	54 (58.7%)
	≥25	38 (41.3%)
Infertility duration (years)	1-2	57 (62.0%)
	>2	35 (38.0%)
Parity	<3	57 (62.0%)
	≥3	35 (38.0%)

Endometriosis was diagnosed among 28 (30.4%) females. Among females diagnosed with endometriosis, 9 (32.1%) were 20-34 years old and 19 (67.9%) were aged 35 or more (p=0.697). Among females diagnosed with endometriosis, 16 (57.1%) had dura-

tion of infertility above 2 years (p=0.013). Among females diagnosed with endometriosis, 18 (64.3%) had parity < 3 (p=0.761). Table 2 shows the stratification of study variables concerning the frequency of endometriosis in females with secondary infertility.

Table 2: Comparison of study variables concerning endometriosis (n=92)

Variables		Endometriosis		p-value
		Yes (n=28)	No (n=64)	
Age (years)	20-34	9 (32.1%)	18 (28.1%)	0.697
	≥35	19 (67.9%)	46 (71.9%)	
Residence	Rural	14 (50.0%)	40 (62.5%)	0.263
	Urban	14 (50.0%)	24 (37.5%)	
Body mass index	<25	18 (64.3%)	36 (56.3%)	0.471
	≥25	10 (35.7%)	28 (43.7%)	
Infertility (years)	1-2	12 (42.9%)	45 (70.3%)	0.013
	>2	16 (57.1%)	19 (29.7%)	
Parity	<3	18 (64.3%)	39 (60.9%)	0.761
	≥3	10 (35.7%)	25 (39.1%)	

DISCUSSION

Infertility is known as the failure to conceive after a year or six months, respectively, for a woman under or over 35 years, despite having sufficient, frequent, unprotected sexual activity¹³. If there has been a change of partners during the last year, secondary

infertility is nonexistent and carries unique odds of infertility. The literature reflects endometriosis causes infertility in 30-50% of women¹⁴. Numerous explanations have been put forth to account for the correlation between endometriosis and infertility. These include deformed pelvic structure, irregularities

related to ovulation and endocrine systems, changes in peritoneal function, and modifications to the hormonal and cell-mediated processes in the endometrium^{15,16}. In line with typical laparoscopy findings, pelvic anatomical distortion and adhesions disrupt tubo-ovarian communication and tubal patency, which can delay oocyte release from the ovary, hinder ovum pickup, or obstruct ovum transport¹⁷.

In this study, the frequency of endometriosis on diagnostic laparoscopy in women having secondary infertility was found to be 30.4%. In a tertiary health setting analyzing infertile women over two years, the frequency of endometriosis was found in 24% of infertility cases. Dyspareunia and pelvic pain were found to be strongly associated with laparoscopic staging¹⁸. Local data by Memon et al from Karachi reported the frequency of laparoscopy-diagnosed endometriosis as 29.1%¹⁹. Shabir et al from Azad Kashmir analyzing infertile women (either primary or secondary) undergoing diagnostic laparoscopy revealed the frequency of endometriosis as 13.5%²⁰. The laparoscope has evolved into a necessary tool for both infertility diagnosis and therapy. Similar to hysteroscopy, laparoscopy enables direct visualization of the female reproductive canal using a long, lit device. To observe the outside (internal) surface of the uterus, ovaries, and fallopian tubes, a laparoscope is inserted into the bodily cavity (often through the umbilicus or naval). Typically, the laparoscope is needed to check for tubo-ovarian adhesions, pelvic adhesions, and pelvic endometriosis. Similar to the hysteroscope, surgical operations (e.g., lysis of pelvic adhesions and the ablation of endometriosis) can be carried out using the laparoscope's operating channel²¹. A recent study from Ireland reported the frequency of endometriosis among infertile women with the use of diagnostic laparoscopy as 37.2%²². The data shows that the risk estimation does not differ significantly between primary and secondary infertility ($p=0.54$)²³. Most of the literature has shown the diagnostic utility of laparoscopy among females irrespective of infertility status (both primary and secondary). The present study is one of the very few conducted analyzing females having secondary infertility which adds significant insights to the existing literature.

We found the mean age of the cases to be 36.66 ± 5.41 years. Community-based cross-sectional data from India showed the mean age of infertile women as 29.74 ± 5.9 years while the majority of primary infertile women (33.9%) were in the age group of 21-25 years, and secondary infertility was high (31.7%) among the 26-30-year age group²⁴. In another study reported by Verma, the mean age of infertile women was 28.72 ± 4.20 years, and for fertile women, it was 27.45 ± 4.04 years²⁵. A study among two tribal communities in central India showed the mean age of the infertile women as 31.3 ± 8.9 years

and 27.5 ± 9.2 years²⁶. The differences may be due to the parity of females as in the current study mean parity was found to be 2.09 ± 0.82 .

A single study setting and a small sample size are some limitations of this study. Further prospective trials involving a larger sample size and multiple centers should be conducted to further shed light on the burden of endometriosis and its relation to secondary infertility.

CONCLUSION

Endometriosis is a benign disease with an increasing prevalence due to increased diagnostic modality use along with better awareness of symptoms among reproductive age group patients. Laparoscopic is the gold standard diagnostic tool and can be helpful in the timely diagnosis and management of secondary infertility. This study not only underscores the importance of laparoscopic assessment in diagnosing endometriosis among females grappling with secondary infertility but also highlights the need for heightened attention to the duration of infertility as a potential indicator or precursor for this condition. Such insights could significantly impact the early detection and management strategies employed for individuals facing challenges with secondary infertility, potentially improving their prospects for successful fertility treatments

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

ETHICAL APPROVAL

Ethical approval for conducting this study was obtained from the Institutional Ethics Committee from Fatima Jinnah Medical University, Lahore with reference # IRB/22/681.

PATIENT CONSENT

Informed consent was taken from all patients before obtaining the data.

AUTHORS CONTRIBUTION

MAT did the study conception, write-up, critical review, and approval of the final version of the manuscript. SI and ZM contributed to data collection, data analysis, and literature review.

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