

Diagnostic Findings of Hysteroscopy, Laparoscopy, and Combined Hystero-Laparoscopy in Women with Female Subfertility: A Comparative Observational Study

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ABSTRACT

Background: Subfertility is a major public health problem, and it affects about 10 to 15% of reproductive-age couples. The prevalence of subfertile individuals is increasing worldwide. In Pakistan, the prevalence of subfertility is reported as 21.9%. This study aimed to determine whether combined hystero-laparoscopy detects additional abnormalities not identified by hysteroscopy or laparoscopy alone.

Methodology: It was a comparative observational study conducted at the Gynecology and Obstetrics Department of Hameed Latif Hospital from January 1, 2023 to June 30, 2024. A total of 1231 women aged 20 to 45 years, healthy women who are sexually active and seeking pregnancy, and women with unexplained infertility were included. To check the association between categorical variables, the Chi-Square test was performed. The level of significance was 5%.

Results: Out of 1231 women, laparoscopy was performed successfully in 449 (36.5%), hysteroscopy in 150 (12.2%), and the combined procedure was performed in 632 (51.3%) patients. The mean age of patients selected for these procedures was 31.29 ± 6.89 years. The prevalence of abnormalities on laparoscopy, hysteroscopy, and combined hystero-laparoscopy showed significant correlations with the type of subfertility ($p < 0.0001$).

Conclusion: Combined hystero-laparoscopy provided the most comprehensive diagnostic evaluation of women with female subfertility. Diagnostic findings differed significantly according to the type of subfertility, supporting its value in the assessment of underlying reproductive abnormalities.

Keywords: Laparoscopy; Hysteroscopy; Hysterosalpingography; Infertility; Uterine disease

INTRODUCTION

Subfertility is a major public health problem, and it affects about 10 to 15% of reproductive-age couples.¹ The prevalence of subfertile individuals is increasing worldwide. The inability to conceive causes enormous distress to the affected individuals and leads to considerable personal suffering and disruption of family life. In Pakistan, the prevalence of subfertility is reported as 21.9%.² Female factors of subfertility are more common, including anovulatory disorder, tubal factors, endometriosis, uterine and cervical factors.³ Routine examination and diagnostic procedures have only screening value, which is not sufficient

to evaluate the pelvic pathology of subfertile women. The ability to observe, examine, and treat the uterus, fallopian tubes, and ovaries during laparoscopy has made laparoscopy the gold standard for evaluating pelvic pathology.⁴ Simultaneous inspection of the uterine cavity and identification of any pathology found during hysteroscopy has made it an integral part of subfertility evaluation.⁵ It is important to note that the diagnostic rate of lesions through laparoscopy increased from 64.3 % to 76.6% when findings of hysteroscopy were included.⁶ After normal hysterosalpingography, it was observed that abnormal findings in 21.68% of subfertile couples were revealed through laparoscopy.² Tubo-peritoneal pathology is responsible for 40-50% of cases of subfertility. In greater than 90% of reports, pelvic inflammatory disease and endometriosis are still the two major reasons found for subfertility.⁷ An accurate diagnosis of uterine factors of female subfertility has now become an essential part of subfertility checkups. In women with subfertility, uterine factors contribute 2-3% of total subfertility cases; also, the occurrence of intrauterine lesions is a common finding in 40-50% of subfertile women.⁸ Endometrial receptivity is also affected by multiple structural deformities in the uterine cavity which include congenital Mullerian anomalies and intra-uterine lesions. This results in implan-

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tation failure, which is an important cause of subfertility and repeated pregnancy losses.⁹

Combined diagnostic hystero-laparoscopy should be a part of routine subfertility workup before starting the treatment. Both of these procedures are not only safe but also very useful and accurate tools for making the diagnosis. In case pathology is revealed, it can be operated on at the same time, for example, problems like adnexal adhesions, peritoneal endometriosis, and subseptate uterus, which are usually missed by other imaging techniques.⁵ Due to safety, low complication rates, fewer time requirements and minor effect on the postoperative course, combined hysteroscopy and laparoscopy should be performed in all patients with subfertility before the treatment begins. The findings of this combined procedure help make appropriate decisions in time for the use of assisted reproductive techniques (ART). This study assessed the value of combined diagnostic hystero-laparoscopy in subfertile women and evaluated the potential of this strategy for diagnosing coexisting causative factors. This approach has a beneficial role in the diagnosis of various causative factors in female subfertility and should be routinely performed in our population.

METHODOLOGY

It was a comparative observational study conducted in the Gynecology and Obstetrics Department of Hameed Latif Hospital from January 1, 2023 to June 30, 2024. The sample size was 1231, of which 794 suffered from primary subfertility and 437 from secondary subfertility. Women aged 20 to 45 years, healthy women who are sexually active and seeking pregnancy, and women who had unexplained subfertility were included in this study. Diabetic and hypertensive women, couples with male factors of subfertility, hormonal abnormalities like thyroid dysfunction, hyperprolactinemia, deranged LFTs and RFTs, and those who were not medically fit for anesthesia were excluded. Informed consent was obtained from the patient for undergoing laparoscopy and hysteroscopy. The ethics committee of Hameed Latif Hospital in Lahore approved this study with reference No. HLH/IRB/03. Patients were physically evaluated, and all preliminary hormonal testing was completed. Demographic data (name, age, address, and subfertility duration) were recorded, and baseline investigations were performed. Pre-operative assessment by the anesthetic was conducted. The procedure was performed during the follicular phase of the menstrual cycle under short general anaesthesia. Hysteroscopy was performed in the standard sequence using a Karl Storz 4 mm hysteroscope. Cavity distension was achieved with normal saline. The endocervical canal, the uterine cavity, its fun-

dus, and the anterior and posterior walls were examined for the presence of any polyp or myoma adhesion, uterine septum, endometrial hyperplasia and hypoplasia, and tubal ostia; all findings were recorded. At the same time, a laparoscopy was also performed. A Veress needle was placed via the intra-umbilical incision to administer carbon dioxide (CO₂), followed by a trocar. A Douglas pouch and the uterosacral ligaments were examined in the pelvis. Tubal blockage, peri-tubal and peri-ovarian adhesions, endometriotic deposits, polycystic ovaries, fibroids, presence of fluid in the pouch of Douglas, and any other pathology were seen. By injecting 10–15 ml of 0.5% methylene blue into the uterus and observing the dye fill and spill through the fimbrial ends and fallopian tubes, patency was assessed. All patients with abnormal findings on laparoscopy alone, hysteroscopy alone, and combined hysterolaparoscopy were noted. After the procedure, the patient was sent to the post-operative ICU for 4 hours of observation. If no problems arose in the ICU, the patient was discharged. All findings were carefully taken and recorded. All data were entered into the Statistical Package for the Social Sciences (SPSS) version 26. After analysis, the quantitative variables were represented as mean $\pm$ SD. To check the association between categorical variables, the Pearson Chi-Square test was performed. The level of significance was 5%.

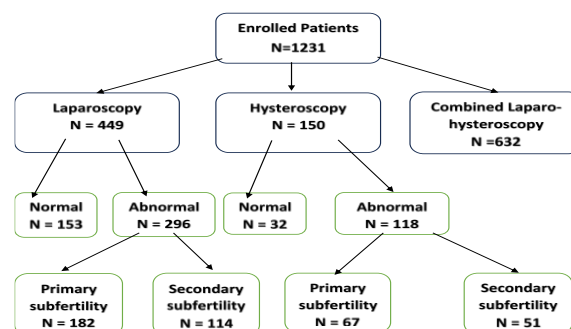


Figure 1: Flow chart of data stratification.

RESULTS

Out of 1231 women, the mean age was 31.29 ± 6.89 years. In most patients, duration of subfertility was more than 5 years (51.1%). Primary subfertility was present in 794 (64.5%) patients and secondary in 437 (35.5%). Laparoscopy was performed successfully in 449 (36.5%), hysteroscopy in 150 (12.2%), and the combined procedure was performed in 632 (51.3%) patients. Patients with primary subfertility, 182 (61.4%), had laparoscopic abnormalities, 67 (56.7%) had hysteroscopic abnormalities, and 359 (62%) had combined abnormalities meanwhile with secondary subfertility, 114 (38.5%) had laparoscopic abnormalities, 51 (43.2%) had hysteroscopic abnormalities and 213 (38%) had combined abnormalities with the

Table 1: Prevalence of Laparoscopy, hysteroscopy and combined hystero-laparoscopy abnormalities

Procedures	Type of subfertility [n (%)]			p-value
	Primary (n=794)	Secondary (n=437)	Total	
Laparoscopy	182 (61.4)	114 (38.5)	296	<0.0001
Hysteroscopy	67 (56.7)	51 (43.2)	118	
Combined	359 (62.)	213 (38)	572	
Total abnormal cases	608 (61.0)	378 (38.4)	986	

Table 2: Prevalence of laparoscopic abnormalities in women

Laparoscopic Abnormalities	Type of subfertility [n (%)]			p-value
	Primary (n=182)	Secondary (n=114)		
Peritubal Adhesion	13 (7.1)	10 (8.8)		<0.001
Endometriosis	54 (29.7)	29 (25.4)		0.73
PCO	62 (34.1)	30 (26.3)		0.54
Laparoscopic Fibroids	12 (6.6)	22 (19.3)		0.78
Tubal Blockage	31 (17)	18 (15.8)		0.05*
Ovarian Cysts	10 (5.5)	5 (4.4)		0.73

Chi-square test was used for the p-value.

*Significant values (p-value <0.05)

Table 3: Hysteroscopy abnormalities in women

Hysteroscopy Abnormalities	Type of subfertility [n (%)]			p-value
	Primary (n=67)	Secondary (n=51)		
Adhesion in cavity	20 (29.3)	18 (35.3)		0.01*
Endometrial Polyps	18 (26.9)	15 (29.4)		<0.001
Fibroids	8 (11.9)	4 (7.8)		0.57
Uterine Septum	8 (11.9)	6 (11.8)		0.01*
Cervical Stenosis	5 (7.5)	4 (7.8)		1.00
Endo Abnormalities	5 (7.5)	3 (5.9)		0.02*
Tubal Ostia	3 (4.5)	1 (2)		0.23

Chi-square test was used for the p-value,

*Significant values (p-value <0.05)

significant $p < 0.001$ (Table 1). When checked the laparoscopy abnormality for the type of subfertility, the most frequent pathology found in patients with primary subfertility was polycystic ovary (PCOs) 62 (34.1%), endometriosis was 54 (29.7%), the tubal blockage was 31 (17%), peritubal adhesion was 13 (7.1%), laparo-fibroids was 12 (6.6%), and the ovarian cyst was 10 (5.5%). In patients who had secondary subfertility, the most common laparoscopic abnormality was polycystic ovaries (PCOs), which were 30 (26.3%); endometriosis was found in 29 (25.4%), Laparo-fibroids were 22 (19.3%), tubal blockage was 18 (15.8), Peritubal adhesion was 10 (8.8%), and the ovarian cyst was 5 (4.4%). Peritubal adhesion and tubal blockage had significant correlations with the type of subfertility ($p < 0.001$, 0.05), respectively (Table 2). Patients with primary subfertility (20, 29.3%) had adhesion in the cavity, 81 (10.2%) had endometrial polyps, 8 (11.9%) had Fibroids, 8 (11.9%) had uterine septum, 5 (7.5%) had cervical stenosis, 5 (7.5%) had endometrial abnormalities, 3 (4.5%) had Tubal Ostia. In patients with secondary subfertility, 18 (35.3%) had adhesion in the cavity, 15 (29.4%) had endometrial polyps, 6 (11.8%) had uterine septum, 4 (7.8%) had fibroids, 4 (7.8%) had Cervical stenosis, 3 (5.9%) had endometrial abnormalities, and only 1 (2.0%) had tubal

ostia. Adhesion in the cavity, endometrial polyps, uterine septum, and endometrial abnormalities had a significant association with the type of subfertility. The number of exposed abnormalities exceeds the number of individuals with such abnormalities because numerous lesions were observed in some cases and are reported separately (Table 3).

DISCUSSION

In recent research, 70% of individuals were diagnosed with primary subfertility, while 30% had secondary subfertility; among the patients, 79% belonged to the age range of 20-30 years, with an average age of 26.5 years.¹⁰ Across all age categories, approximately 31% of women experienced some form of menstrual disorder. Our findings indicated that the majority of patients were between 26 and 35 years old. Age is a significantly linked factor associated with secondary subfertility.¹¹ The results of the study indicated that younger women faced a greater risk of secondary subfertility. These results were similar to another study where the majority of subfertile women (56.54%) were aged 25-34 years, relatively younger, highlighting the necessity for comprehensive services focused on the assessment and management of subfertility to

achieve positive outcomes.¹² Almost 31% of women had abnormal menstrual disorders in different age groups.¹³ Findings of the present study indicated that the majority of patients were 26 and 35 years old. Laparoscopy and hysteroscopy were significantly associated with age ($p < 0.001$ and $p < 0.001$, respectively). Laparoscopy revealed unusual findings in 41% of cases, including tuboperitoneal factors in 40%, ovarian factors in 34%, and uterine factors in 9%; the remaining 18% had normal laparoscopic findings.¹⁴ Hysteroscopy revealed abnormal pathology in 30% of cases, including myoma, endometrial hyperplasia, polyp, adhesions, and septum.¹⁵ This is similar to another study in which hysteroscopic abnormalities were significantly more common in patients with secondary subfertility (31%) than those with primary subfertility (18%).¹⁶ According to a study, Pelvic adhesions (22.6%) and endometriosis (20.2%) were the most common abnormalities detected at laparoscopy.¹⁷ Another study found laparoscopic pathologic abnormalities in 46 (80.7%) of the 57 individuals they evaluated with unexplained subfertility, as well as pelvic endometriosis in 36 (63.2%). In comparison, Peritubal adhesions were found in 5 cases (8.8%), with a significant difference in their occurrence.¹⁸ A previous study showed that ovarian abnormalities were only seen in primary subfertility, and there was a higher frequency of PCOS in primary subfertility than in secondary subfertility.¹⁹ Another study also found that tubal blockages were more frequently seen in secondary subfertility patients.²⁰ In the current study, the most common laparoscopy abnormality in primary subfertility was polycystic ovary, which was 34.1%, and in secondary subfertility it was 26.3%. Mild intrauterine adhesions were the most common hysteroscopic abnormality. Intrauterine adhesions were substantially more common in secondary subfertility patients than in primary subfertility cases.²¹ This outcome is consistent with the present viewpoint. Furthermore, it was shown that the incidence of intrauterine adhesions steadily rose with age, which might be linked to decreased ovarian function and endometrial reparability. Hysteroscopy often involves classifying and grading the location and severity of intrauterine adhesions.²² A study found that hysteroscopic abnormalities were significantly more prevalent in individuals with secondary subfertility (31%) compared to those with primary subfertility. Including routine diagnostic hysteroscopy in the subfertility evaluation process for both unexplained primary and secondary subfertility cases was important.²³

Uterine anomalies are thought to contribute to female infertility; thus, diagnostic hysteroscopy is essential for infertility screening. Given its low complication rate, minimal operating time and lack of impact on the post-operative course, hysteroscopy can safely be performed on all patients who undergo diagnostic laparoscopy for

infertility. In our study, hysteroscopic abnormalities were significantly more frequent in primary subfertility cases (56.7%). Most detected hysteroscopy abnormalities were endometrial polyps, adhesions, and uterine spectrum, which are significantly associated with the type of subfertility ($p < 0.05$). Our study shows that both hysteroscopy and laparoscopy are useful tools for diagnosing infertility and also have the added benefit of treating certain conditions.

Even with advancements being made recently in technology used to evaluate infertile women, no intervention was able to evaluate all areas of the female genital tract. Each procedure has disadvantages, risks, and misconceptions; therefore, there is a need to find an optimised diagnostic tool that will inconvenience the woman as little as possible and benefit her as much as possible.

CONCLUSIONS

Combined hystero-laparoscopy demonstrated a higher overall diagnostic yield than hysteroscopy or laparoscopy performed alone, enabling comprehensive evaluation of both intrauterine and pelvic pathologies in women with subfertility. The significant association between diagnostic abnormalities and the type of subfertility highlights the value of these procedures in identifying underlying causes and guiding appropriate clinical management.

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Author Contributions

RB: Conceptualization, Formal analysis.

FA: Conceptualization, Writing – original draft.

RG: Conceptualization, Data curation, Formal analysis.

SA: Drafting and manuscript writing

SJK: Formal analysis, Writing – original draft, Writing – review & editing.

YLK: Conceptualization, Formal analysis, Writing – original draft, Writing – review & editing, Final approval of the manuscript.

Artificial Intelligence (AI) Use Disclosure

No AI software was used during the preparation of manuscript.

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