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Original Research Article

Clinico-demographic profile, endoscopic findings, and pregnancy outcomes in women with primary infertility: a decade of experience

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ABSTRACT

Background: Infertility affects a significant proportion of reproductive-age couples worldwide. Conventional investigations may fail to identify subtle pelvic and intrauterine pathologies that contribute to infertility in all cases. Combined hystero-laparoscopy offers the advantage of simultaneous diagnosis and treatment of such abnormalities. Objective was to analyse the clinico-demographic characteristics, endoscopic findings, management strategies, and pregnancy outcomes of women with primary infertility over a 10 year period at a tertiary care center.
Methods: This retrospective observational study included 304 women who underwent combined hystero-laparoscopy for infertility evaluation at a tertiary care center. Demographic characteristics, hysteroscopic findings, laparoscopic findings, therapeutic interventions, and subsequent pregnancy outcomes were analysed. Continuous variables were expressed as mean±SD, while categorical variables were presented as frequencies and percentages.
Results: The mean age of the study population was 29.1±4.1 years, and the mean duration of infertility was 7.6±3.0 years. Primary infertility was observed in 84.2% of women. Combined hystero-laparoscopy detected pelvic or intrauterine abnormalities in 72.4% of patients. Hysteroscopic abnormalities were identified in 11.8%, whereas laparoscopic abnormalities were noted in 68.4%. Polycystic ovaries (40.8%), endometriosis (23.7%), and pelvic adhesions (13.2%) were the most common findings. Following evaluation and appropriate surgical management, an overall conception rate of 59.2% was achieved. Women with endometriosis demonstrated lower conception rates compared with those without endometriosis.
Conclusions: Combined hystero-laparoscopy remains a valuable diagnostic and therapeutic modality in infertility, particularly in women with unexplained infertility or suspected pelvic pathology. The procedure enables detection and correction of abnormalities that may not be identified through routine investigations and is associated with favourable reproductive outcomes.

Keywords: Infertility, Hysteroscopy, Laparoscopy, Endometriosis, Reproductive outcome, Diagnostic yield

INTRODUCTION

Infertility is defined as the inability to achieve pregnancy after 12 months of regular unprotected sexual intercourse and affects approximately 10-15% of couples worldwide.[1] Female factors contribute to nearly half of infertility cases and include ovulatory dysfunction, tubal disease, endometriosis, pelvic adhesions, and uterine abnormalities.[1] Despite advances in imaging techniques and assisted reproductive technologies, a substantial proportion of women continue to be categorized as having unexplained infertility after routine evaluation.[2]

Hysteroscopy permits direct visualization of the uterine cavity and facilitates diagnosis and treatment of intrauterine abnormalities such as endometrial polyps, septa, and adhesions.[3] Laparoscopy remains the gold standard for assessment of pelvic pathology, including

endometriosis, pelvic adhesions, and tubal disease, while simultaneously offering therapeutic intervention.[5]

Several investigators have reported that combined hystero-laparoscopy identifies previously undetected pathology in a significant proportion of infertile women and may improve reproductive outcomes through immediate surgical correction of abnormalities.[2,5] Endometriosis, subtle adhesions, and peri-tubal disease are frequently missed by conventional investigations but can be effectively diagnosed during laparoscopy.[4]

The present study was undertaken to determine the spectrum of pelvic and intrauterine abnormalities detected by combined hysteron-laparoscopy and to evaluate their association with subsequent conception rates in women with primary infertility.

METHODS

Study design and setting

This retrospective observational study was conducted in the Department of Obstetrics and Gynaecology at a tertiary care teaching hospital (Narayana Medical College and Hospital, Nellore). Medical records of infertile women who underwent combined hystero-laparoscopy as part of infertility evaluation between January 2016 and December 2025 were reviewed.

Ethical approval

The study was conducted in accordance with the Declaration of Helsinki. Institutional ethics committee approval was obtained prior to data collection (IEC No: IEC/NMC/10ThApril 2026/05). As the study was retrospective in nature and utilized anonymized patient data, the requirement for individual informed consent was waived by the ethics committee.

Study population

A total of 304 women with primary or secondary infertility who underwent combined hystero-laparoscopy during the study period were included.

Inclusion criteria

The criteria taken was women aged 20-40 years presenting with primary or secondary infertility, women who required combined hysteroscopy and laparoscopy procedure for diagnosing the cause of infertility and correcting the pathology if present. Availability of complete operative records and follow-up data and women who failed to respond for medical management in PCOS were included.

Exclusion criteria

Among the patients who were treated for infertility, the following criteria were excluded for the study purpose. Male factor infertility as the sole cause of infertility. Women with incomplete medical records. Women with contraindications to laparoscopy. Patients lost to follow-up were excluded from conception outcome analysis.

Preoperative evaluation

All patients underwent a detailed clinical assessment including medical, menstrual, and infertility history. Baseline investigations included hormonal profile, transvaginal ultrasonography, semen analysis of the partner, and assessment of tubal patency by hysterosalpingography or saline infusion sonography were done.

Surgical procedure

Combined hystero-laparoscopy was performed under general anaesthesia during the proliferative phase of the menstrual cycle.

Hysteroscopy was performed using a rigid hysteroscope to evaluate the cervical canal, uterine cavity, endometrium, tubal ostia. Findings such as endometrial polyps, uterine septum, intrauterine adhesions, and other cavity abnormalities were documented and corrected.

Diagnostic laparoscopy was subsequently performed using a standard three-port technique. The uterus, ovaries, fallopian tubes, pouch of Douglas, and pelvic peritoneum were systematically examined. Chromopertubation using methylene blue dye was performed to assess tubal patency for all cases.

Operative findings including endometriosis, endometriotic spots, pelvic adhesions, hydrosalpinx, ovarian abnormalities, fibroids, and tubal pathology were recorded. Whenever indicated, therapeutic procedures such as ovarian drilling, adhesiolysis, fulguration of endometriotic lesions, endometrioma cystectomy for endometrioma and benign ovarian cysts were performed.

Polypectomy, septal resection, and other corrective procedures were performed during the same sitting.

Data collection

Data were extracted from hospital records and operative notes. Variables collected included age, duration and type of infertility, hysteroscopic findings, laparoscopic findings, operative interventions performed, and subsequent pregnancy outcomes.

Outcome measures

The primary outcome was the characterization of clinico-demographic features and endoscopic findings in women with primary infertility undergoing combined hystero-laparoscopy.

Secondary outcomes included-spectrum of hysteroscopic and laparoscopic abnormalities, therapeutic interventions performed during the procedure, conception rates following hystero-laparoscopy, association between major pelvic pathologies and pregnancy outcomes.

Statistical analysis

Data were entered into Microsoft excel and analyzed using IBM SPSS statistics version 26.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean±SD, whereas categorical variables were presented as frequencies and percentages. Comparisons between conception and non-conception groups were performed using the student's t-test for continuous variables and Chi-square test or Fisher's exact test for categorical variables, as appropriate. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated to evaluate the association between major pelvic pathologies and conception outcomes. A two-tailed $p<0.05$ was considered statistically significant. Patients lost to follow-up were excluded from pregnancy outcome analysis but were included in descriptive analyses of diagnostic findings.

RESULTS

A total of 304 infertile women underwent diagnostic hystero-laparoscopy during the study period. The mean age was 29.1±4.1 years (range: 22-38 years). The mean duration of married life/infertility was 7.6±3.0 years (range: 4-15 years).

Table 1: Baseline characteristics of the study population.

Variables	Value
Total patients	304
Age (in years), mean±SD	29.1±4.1
Duration of infertility, mean±SD	7.6±3.0
AMH (ng/ml), mean±SD	3.71±1.94

The most common indication for combined hystero-laparoscopy was primary infertility with inconclusive preliminary evaluation, accounting for 168 (55.3%) women. Suspected tubal pathology was the second most common indication, observed in 84 (27.6%) women. Fifty two (17.1%) women underwent the procedure for unresponsive PCOS related infertility.

Table 2: Indications for hystero-laparoscopy based on clinical categories.

Indication	N (%)
Unexplained infertility	168 (55.3)
Suspected tubal factor	84 (27.6)
Ovulatory dysfunction/ PCOS	52 (17.1)

Combined hystero-laparoscopy revealed pelvic or intrauterine abnormalities in 220 women, resulting in an overall diagnostic yield of 72.4%. Hysteroscopic abnormalities were identified in 36 (11.8%) patients, whereas laparoscopic abnormalities were observed in 208 (68.4%).

Table 3: Spectrum of pathology detected during hystero-laparoscopy.

Procedure	Pathology	N (%)
Hysteroscopy	Normal cavity	268 (88.2)
	Endometrial polyp	32 (10.5)
	Uterine septum	4 (1.3)
	Intrauterine adhesions	-
Laparoscopy	Normal pelvis	96 (31.6)
	Pelvic adhesions	40 (13.2)
	Hydrosalpinx	12 (3.9)
	Endometriosis/ endometriotic spots	72 (23.7)
	Polycystic ovaries	124 (40.8)

Therapeutic interventions were performed whenever surgically correctable pathology was identified. The most commonly performed procedures included ovarian drilling, adhesiolysis, treatment of endometriotic lesions, and hysteroscopic polypectomy in necessary patients.

Table 4: Therapeutic procedures performed during hystero-laparoscopy.

Procedure done	N (%)
Ovarian drilling	124 (40.8)
Endometriotic lesion fulguration/ cyst treatment	72 (23.7)
Adhesiolysis	40 (13.2)
Hysteroscopic-polypectomy	32 (10.5)
Myomectomy	12 (3.9)
Septal resection	4 (1.3)

During follow-up, 180 women achieved conception, resulting in an overall conception rate of 59.2%. Spontaneous conception accounted for the majority of pregnancies.

Table 5: Reproductive outcomes following hystero-laparoscopy.

Outcome	N (%)
Spontaneous conception-singleton pregnancy	120 (39.5)
Ovulation induction and twin pregnancy conception	12 (3.9)
Ovulation induction + IUI (singleton)	24 (7.9)
IVF conception (singleton)	24 (7.9)
Not conceived with/without treatment	84 (27.6)
Lost to follow up	36 (11.8)

Pregnancy outcomes were analysed among women with available follow up data. Women diagnosed with endometriosis demonstrated a lower conception rate than women without endometriosis. Women with endometriosis demonstrated a lower conception rate compared with those without endometriosis. Although statistical significance was not achieved, the association approached significance (Fisher's exact test, p=0.054), suggesting a clinically relevant adverse effect of endometriosis on fertility outcomes. Among women with polycystic ovaries who underwent ovarian drilling, 40 out of 124 (28.3%) conceived and this showed no statistically significant difference (p=0.537). women with normal laparoscopic findings demonstrated a conception rate of 26.3% compared with 14.9% among women with abnormal laparoscopic findings, however this difference was not statistically significant (p=0.304).

Combined hysteron-laparoscopy detected previously unrecognised pathology in 72.4% on infertile women and was followed by a conception rate of 59.2%.

DISCUSSION

Infertility remains a major reproductive health concern affecting approximately 10-15% of couples worldwide, with female factors contributing significantly to the overall burden. Despite advances in ultrasonography, hormonal assessment, hysterosalpingography, and assisted reproductive techniques, a considerable proportion of women continue to have unexplained infertility after routine evaluation. In such situations, combined hystero-laparoscopy provides a unique opportunity for comprehensive assessment of both intrauterine and pelvic pathology while simultaneously allowing therapeutic intervention.[1,2]

In the present study, combined hystero-laparoscopy demonstrated a diagnostic yield of 72.4%, with pelvic or intrauterine abnormalities detected in nearly three-fourths of women undergoing infertility evaluation. Similar findings have been reported by Nayak et al who observed abnormal findings in 74% of infertile women undergoing diagnostic hystero-laparoscopy.[3] Shobha et al also reported a diagnostic yield exceeding 70%, emphasizing the value of endoscopic evaluation in women with infertility despite apparently normal preliminary investigations.[4] These findings support the continued role of hystero-laparoscopy as an important diagnostic modality, particularly in women with unexplained infertility and the suspected tubal disease.

The mean age of women in the present study was 29.1±4.1 years, which is comparable to previous Indian studies reporting mean ages ranging between 27 and 31 years among infertile women undergoing endoscopic evaluation.[3,5] The mean duration of infertility in our study was 7.6 years, indicating delayed referral and prolonged attempts at conception before definitive evaluation. Similar observations have been documented in developing countries where access to infertility services is often delayed.[6]

Among laparoscopic abnormalities, polycystic ovaries were the most common finding, observed in 40.8% of women. Polycystic ovary syndrome is recognized as one of the leading causes of anovulatory infertility and is reported to affect 20-40% of infertile women.[7] Women with clomiphene-resistant or letrozole-resistant PCOS may benefit from laparoscopic ovarian drilling, which reduces ovarian androgen production and restores ovulation in selected patients.[8] In the present study, ovarian drilling was performed whenever indicated, contributing to subsequent pregnancies in a proportion of women.

Endometriosis was identified in 23.7% of women, making it the second most common pelvic pathology. This prevalence is consistent with previous studies reporting endometriosis in 20-35% of infertile women undergoing laparoscopy.[9,10] Endometriosis adversely affects fertility through multiple mechanisms including altered folliculogenesis, inflammatory changes within the peritoneal cavity, impaired tubal transport, and reduced implantation potential.[4] Women with endometriosis in our study demonstrated lower conception rates compared with women without endometriosis, although statistical significance was not achieved. Similar findings have been reported by Bulletti et al and Harb et al who documented reduced spontaneous conception rates among women with endometriosis-related infertility.[4,12]

Pelvic adhesions were observed in 13.2% of women. Adhesions can interfere with ovum pickup, tubal motility, and normal tubo-ovarian relationships, thereby contributing significantly to infertility. Laparoscopy remains the gold standard for diagnosis of pelvic adhesions, as many cases remain undetected on imaging studies.[13] The ability to perform adhesiolysis during the same procedure represents a major therapeutic advantage of hystero-laparoscopy and may improve subsequent reproductive outcomes.

Hysteroscopy revealed intrauterine abnormalities in 11.8% of women, predominantly endometrial polyps and uterine septa. Previous studies have reported hysteroscopic abnormalities in 10-25% of infertile women.[14] Endometrial polyps may interfere with implantation by altering endometrial receptivity, while congenital uterine anomalies such as septate uterus have been associated with subfertility and adverse reproductive outcomes.[16] Hysteroscopy allows accurate diagnosis and immediate correction of these abnormalities, thereby improving the likelihood of conception.

One of the major strengths of combined hystero-laparoscopy is the opportunity for simultaneous diagnosis and treatment. In the present study, ovarian drilling, adhesiolysis, treatment of endometriotic lesions, hysteroscopic polypectomy, and septal resection were

performed whenever indicated. Similar benefits have been highlighted by Tanahatoe et al who reported that significant pelvic pathology frequently remains undetected despite normal preliminary investigations and can be effectively treated during laparoscopy.[17]

The overall conception rate observed in our study was 59.2%, which compares favourably with previous reports. Nayak et al reported conception rates ranging from 45-60% following hystero-laparoscopic evaluation and treatment.[3] Similar reproductive outcomes have been reported by other investigators, suggesting that correction of underlying pelvic and intrauterine pathology contributes significantly to fertility restoration.[18] The relatively high conception rate observed in our study further supports the diagnostic and therapeutic value of combined hystero-laparoscopy in appropriately selected women.

The major strength of the present study is its relatively large sample size and long study duration spanning ten years at a tertiary care referral centre. The study provides real-world evidence regarding the diagnostic yield and reproductive outcomes of combined hystero-laparoscopy in women with infertility. Simultaneous evaluation of hysteroscopic and laparoscopic findings allowed comprehensive assessment of both intrauterine and pelvic factors contributing to infertility. Furthermore, the ability to perform corrective procedures during the same sitting reflects routine clinical practice and enhances the clinical applicability of the study findings.

The present study has certain limitations. Its retrospective design may be associated with information bias, and the study was conducted at a single tertiary care centre, which may limit generalizability. Additionally, pregnancy outcomes were unavailable for a small proportion of women lost to follow-up. Nevertheless, the study represents one of the larger single-centre experiences evaluating hystero-laparoscopy in infertility and reflects routine clinical practice over a decade.

Overall, the findings of the present study reaffirm that combined hystero-laparoscopy remains an indispensable tool in infertility management. It enables identification of subtle pelvic and intrauterine abnormalities that may not be detected by conventional investigations and provides the added advantage of immediate therapeutic intervention, thereby improving reproductive outcomes.

CONCLUSION

Combined hystero-laparoscopy is an effective diagnostic and therapeutic modality in the evaluation of female infertility. In the present study, the procedure demonstrated a high diagnostic yield, identifying previously unrecognized pelvic and intrauterine abnormalities in 72.4% of women undergoing infertility evaluation. Polycystic ovaries, endometriosis, and pelvic adhesions were the most frequently detected pathologies.

The ability to perform simultaneous therapeutic interventions, including ovarian drilling, adhesiolysis, treatment of endometriotic lesions, and correction of intrauterine abnormalities, represents a major advantage of this approach. Following appropriate management, an overall conception rate of 59.2% was achieved, highlighting its potential to improve reproductive outcomes.

Combined hystero-laparoscopy should be considered an important component of infertility work-up, particularly in women with unexplained infertility, suspected pelvic pathology, abnormal tubal assessment, or failure to conceive despite ovulation induction and intrauterine insemination. Further prospective multicentric studies with long-term follow-up are warranted to better define its impact on fertility outcomes and optimize patient selection.

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