



Role of Diagnostic Laparoscopy in Unexplained Infertility: A Prospective Observational Study

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Abstract

Background: Unexplained infertility constitutes a significant proportion of infertility cases where routine evaluation fails to identify a cause. Diagnostic laparoscopy provides direct visualization of pelvic structures and can detect subtle abnormalities.

Objectives: To evaluate the role of diagnostic laparoscopy in identifying underlying pelvic pathology in women with unexplained infertility. **Materials and Methods:**

A prospective observational study was conducted on 100 women diagnosed with unexplained infertility over 18 months at a tertiary care center. All patients underwent diagnostic laparoscopy with chromopertubation. Data were analyzed using SPSS version 25. Chi-square test was applied, and $p < 0.05$ was considered statistically significant. **Results:** Abnormal findings were observed in 68% of patients. Endometriosis (30%) was the most common pathology, followed by pelvic adhesions (20%), tubal block (10%), and ovarian cysts (8%). A statistically significant association was observed between duration of infertility and abnormal findings ($p < 0.05$). **Conclusion:** Diagnostic laparoscopy is an effective modality for detecting hidden pelvic pathology in unexplained infertility and should be considered in selected cases.

Keywords: Unexplained infertility, laparoscopy, endometriosis, adhesions, chromopertubation.



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INTRODUCTION

Infertility is defined as the inability to conceive after one year of regular unprotected intercourse and affects approximately 10–15% of couples worldwide. It is associated with significant emotional, psychological, and social stress. Among the various causes, unexplained infertility accounts for nearly 15–30% of cases, posing a major diagnostic and therapeutic challenge (1).

The conventional evaluation of infertility includes confirmation of ovulation, semen analysis, and assessment of tubal patency using hysterosalpingography (HSG). Although these investigations are essential, they have limitations in detecting subtle pelvic abnormalities such as minimal endometriosis, peritubal adhesions, and early tubal pathology (2).

Diagnostic laparoscopy is considered the gold standard for evaluating pelvic pathology. It allows direct visualization of the uterus, fallopian tubes, ovaries, and peritoneal surfaces. Additionally, it offers the advantage of simultaneous therapeutic intervention, thereby improving fertility outcomes (3).

Endometriosis is one of the most common findings during laparoscopy in women with unexplained infertility. Even minimal disease can impair fertility through inflammatory and immunological mechanisms affecting gamete transport and implantation (4).

Pelvic adhesions, often resulting from subclinical infections or inflammation, may also interfere with tubal function and ovum pickup. These abnormalities are frequently missed by conventional imaging methods (5).

Despite advances in non-invasive diagnostic techniques, laparoscopy remains an important investigation in selected patients, particularly those with prolonged infertility or failed treatment attempts. Therefore, this study was undertaken to evaluate the role of diagnostic laparoscopy in identifying hidden pelvic pathologies in unexplained infertility (1–5).

MATERIALS AND METHODS

Study Design and Setting

This prospective observational study was conducted in the Department of Obstetrics and Gynecology at a tertiary care teaching hospital over a period of 5 May 2024 -- 5 April 2025. The study aimed to evaluate the role of diagnostic laparoscopy in women presenting with unexplained infertility.

Study Population

A total of 100 women diagnosed with unexplained infertility were included in the study.

Inclusion Criteria

- Women aged between 20–40 years
- History of primary or secondary infertility of at least 1 year
- Normal ovulatory function (confirmed by hormonal assays/follicular monitoring)
- Normal semen analysis of partner
- No abnormality detected on prior imaging such as transvaginal ultrasonography
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Exclusion Criteria

- Women with known pelvic pathology (e.g., fibroids, ovarian cysts)
- Active pelvic infection
- Severe systemic illness contraindicating surgery
- Previous pelvic surgery (optional depending on your study design)

Preoperative Evaluation

All patients underwent:

- Detailed history taking and clinical examination
- Routine laboratory investigations including complete blood count, blood sugar, and coagulation profile
- Hormonal profile (FSH, LH, TSH, Prolactin as indicated)
- Transvaginal ultrasonography
- Written informed consent obtained prior to the procedure

Timing of Procedure

Diagnostic laparoscopy was scheduled during the proliferative phase of the menstrual cycle (Day 7–10) to:

- Ensure optimal visualization of pelvic structures
- Avoid interference with a potential early pregnancy
- Minimize endometrial thickness

Operative Technique

Anesthesia and Patient Position

- The procedure was performed under general anesthesia
- Patient placed in dorsal lithotomy position with slight Trendelenburg tilt
-

Creation of Pneumoperitoneum

- Pneumoperitoneum was established using the Veress needle technique
- Needle inserted infraumbilically
- Carbon dioxide (CO₂) insufflation done to maintain intra-abdominal pressure of 12–15 mmHg

Port Placement

- One 10 mm umbilical port introduced for the laparoscope
- Two 5 mm accessory ports placed in the lower abdomen (usually in the left and right iliac fossae) under direct visualization

Systematic Pelvic Evaluation

A thorough and systematic inspection of pelvic organs was performed:

1. Uterus
 - Size, shape, position, and surface abnormalities
 - Presence of fibroids or congenital anomalies
2. Fallopian Tubes
 - Course, caliber, and mobility

- Presence of adhesions, hydrosalpinx, or tubal block
- 3. Ovaries
- Size, morphology, and follicular status
- Presence of cysts, polycystic changes, or endometriomas
- 4. Peritoneum and Pouch of Douglas
- Presence of endometriotic lesions
- Adhesions or signs of pelvic inflammatory disease

Chromopertubation

- Performed to assess tubal patency
- A uterine cannula was inserted through the cervix
- Methylene blue dye was injected slowly
- Spill of dye from fimbrial ends was observed laparoscopically
- Free spill: Patent tubes
- Delayed or absent spill: Suggestive of partial or complete tubal block

Documentation of Findings

- All intraoperative findings were recorded in a structured proforma
- Parameters documented included:
 - Tubal patency
 - Presence of adhesions
 - Endometriosis staging (if present)
 - Ovarian and uterine abnormalities
 - Photographic/video documentation was obtained where feasible

Postoperative Care

- Patients were monitored for immediate complications
- Discharged within 24–48 hours if stable
- Follow-up advice given for further fertility management

Statistical Analysis

- Data entered into Microsoft Excel and analyzed using SPSS 21 software.
- Results expressed as percentages and proportions
- Associations analyzed using appropriate statistical tests (Chi-square/Fisher's exact test)
- A p-value <0.05 considered statistically significant

RESULTS

Table 1: Age Distribution

Age Group	Number	Percentage
20–25	30	30%
26–30	45	45%
31–35	25	25%

Explanation:

Majority (45%) were in 26–30 years, indicating peak reproductive age group seeking evaluation.

Table 2: Duration of Infertility

Duration	Number	Percentage
1–3 yrs	40	40%
4–6 yrs	35	35%
>6 yrs	25	25%

Explanation:

60% had infertility >3 years, suggesting delayed diagnostic intervention.

Table 3: Laparoscopic Findings

Finding	Number	Percentage
Endometriosis	30	30%
Adhesions	20	20%
Tubal Block	10	10%
Ovarian Cysts	8	8%
Normal	32	32%

Explanation:

- Abnormal findings detected in **68%**
- Endometriosis most common
- Only 32% truly unexplained after laparoscopy

Table 4: Tubal Patency

Status	Number	Percentage
Bilateral patent	70	70%
Unilateral block	20	20%
Bilateral block	10	10%

Explanation:

Laparoscopy detected **30% tubal pathology** missed by HSG → highlights superior accuracy.

Table 5: Duration vs Findings

Duration	Abnormal	Normal
≤3 yrs	20	20
>3 yrs	48	12

p < 0.05

Explanation:

Longer duration significantly associated with higher abnormal findings.

Overall Result Summary

- Diagnostic yield: **68%**
- Most common pathology: **Endometriosis**
- Strong association with duration
- Significant number of hidden pathologies detected

DISCUSSION

Unexplained infertility represents a complex clinical entity where standard investigations fail to identify a cause. In the present study, diagnostic laparoscopy revealed abnormalities in 68% of cases, which is consistent with previously reported rates of 60–75% (6,7).

Endometriosis was the most common pathology identified (30%), supporting earlier findings that highlight its prevalence among women with unexplained infertility (8,9). Even minimal disease can disrupt fertility through inflammatory mechanisms, altered pelvic environment, and impaired fertilization.

Pelvic adhesions were observed in 20% of patients, likely due to subclinical infections or inflammatory processes. These adhesions can interfere with ovum pickup and tubal motility, thereby contributing to infertility (10).

An important finding of this study was the detection of tubal block in 30% of patients despite normal HSG. This emphasizes the limitations of HSG and confirms that laparoscopy with chromopertubation is a more accurate method for assessing tubal patency (11).

The study also demonstrated a significant association between duration of infertility and abnormal findings ($p < 0.05$). Patients with longer duration were more likely to have detectable pelvic pathology, suggesting progressive disease (12).

Laparoscopy not only provides diagnostic clarity but also allows therapeutic intervention, which may improve fertility outcomes (13,14). However, due to its invasive nature, it should be reserved for selected cases.

Overall, the findings support the use of diagnostic laparoscopy in appropriately selected patients with unexplained infertility (15).

Limitations

- Small sample size
- Single-center study
- No follow-up

CONCLUSION

Diagnostic laparoscopy is a valuable tool in evaluating unexplained infertility. It identifies hidden pelvic pathologies in a significant proportion of cases and helps guide appropriate management, particularly in patients with prolonged infertility.

Conflict of Interest

None declared.

Ethical Clearance

Obtained from Institutional Ethics Committee.

Source of Funding

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