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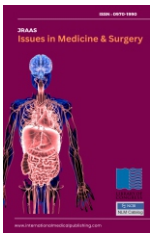

Case Report

Section: Obstetrics & Gynaecology

Missed on Imaging, Found on Laparoscopy: A Case of Primary Infertility

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HIGHLIGHTS

- Laparoscopy detects hidden causes
- Imaging misses subtle abnormalities
- Improves diagnostic accuracy
- Identifies congenital anomalies
- Enables diagnosis and treatment

Key Words:
Primary infertility
Bicornuate uterus
Diagnostic laparoscopy
Hysterosalpingography
Genital tuberculosis
Unexplained infertility

ABSTRACT

Introduction: Infertility is a significant global reproductive health concern, affecting approximately 10–15% of couples, with female factors contributing to nearly half of cases. Although imaging modalities such as ultrasonography and hysterosalpingography (HSG) are widely used as first-line diagnostic tools, they may fail to detect subtle uterine anomalies, tubal pathologies, or peritoneal conditions. As a result, a considerable number of patients are categorized under unexplained infertility. Diagnostic hysterolaparoscopy has emerged as gold standard for comprehensive infertility evaluation, as it allows direct visualization of pelvic organs along with opportunity for simultaneous therapeutic intervention. **Aim & Objective:** To emphasize the diagnostic value of laparoscopy in identifying pelvic and uterine abnormalities that are not detected by conventional imaging techniques in patients with long-standing primary infertility. **Case Presentation:** This case involves a 30-year-old woman presenting with primary infertility of eight years' duration. Preliminary investigations, including hormonal assays, transvaginal ultrasonography, and partner semen analysis, were within normal limits. HSG findings suggested bilateral cornual block. To further evaluate the underlying cause, the patient underwent diagnostic hysterolaparoscopy with chromopertubation under anesthesia. **Results:** Hysteroscopic examination was inconclusive due to a markedly narrow (pinpoint) internal os, which limited proper uterine cavity assessment. However, laparoscopic evaluation revealed a bicornuate uterus with a non-communicating rudimentary horn-an anomaly not identified in previous imaging studies. Additionally, intra-abdominal findings raised suspicion of abdominal tuberculosis. These combined findings led to a significant revision of the initial diagnosis and influenced subsequent management planning. **Conclusion:** Diagnostic laparoscopy plays a pivotal role in uncovering hidden pelvic and uterine abnormalities in infertility cases where non-invasive modalities yield inconclusive or misleading results. Early implementation of hysterolaparoscopy, particularly in long-standing infertility, enhances diagnostic accuracy, enables timely intervention, supports more effective, individualized treatment strategies.

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INTRODUCTION

Infertility is a complex clinical condition affecting approximately 10–15% of reproductive-age couples worldwide and poses significant psychological, social, and economic challenges. In India, the prevalence is estimated to be slightly higher, ranging between 12–18%, largely due to factors such as pelvic infections, tuberculosis, and delayed healthcare access. Female factors contribute to nearly 40–50% of infertility cases, necessitating a thorough and systematic evaluation to identify underlying causes [1,2].

The initial workup for female infertility typically includes hormonal assays, ultrasonography, and hysterosalpingography (HSG). These non-invasive modalities are widely used due to their accessibility, cost-effectiveness, and ability to provide preliminary information about ovarian function, uterine structure, and tubal patency [3]. However, despite these advancements, approximately 10–20% of women continue to be categorized as having unexplained infertility. This highlights the limitations of routine imaging in detecting subtle pelvic abnormalities [4].

Congenital uterine anomalies, such as bicornuate uterus, result from incomplete fusion of the Müllerian ducts during embryological development. These anomalies may not be accurately diagnosed on routine ultrasonography, especially when the external uterine contour is not adequately visualized. Similarly, conditions like early endometriosis, pelvic adhesions, and tubal pathology may remain undetected due to their subtle presentation. In regions like India, genital tuberculosis remains an important yet often overlooked cause of infertility, further complicating diagnosis [5].

Diagnostic hysterolaparoscopy has emerged as the gold standard in infertility evaluation due to its ability to provide direct visualization of pelvic organs. Laparoscopy allows detailed assessment of uterine morphology, fallopian tubes, ovaries, and peritoneal surfaces, while hysteroscopy evaluates the uterine cavity. Additionally, chromopertubation performed during laparoscopy provides a definitive assessment of tubal patency. One of the major advantages of this approach is the ability to perform therapeutic interventions simultaneously, thereby improving treatment outcomes [6].

In cases of long-standing infertility, particularly when initial investigations are inconclusive or contradictory, early use of diagnostic laparoscopy can significantly alter clinical management. It not only helps in identifying missed diagnoses but also aids in appropriate counseling regarding prognosis and treatment options, including assisted reproductive techniques [7].

The present case highlights the limitations of conventional imaging and emphasizes the diagnostic value of laparoscopy in uncovering hidden etiologies such as uterine anomalies and tubercular pathology, thereby reinforcing its role in the comprehensive evaluation of infertility [8].

CASE PRESENTATION

A 30-year old woman presented with a history of primary infertility same duration and had no prior conception. Her menstrual cycles were regular, with no history suggestive of dysmenorrhea, abnormal uterine bleeding, or chronic pelvic pain. There was no significant past medical or surgical history.

Initial infertility evaluation was conducted. Hormonal profile, including Anti-Müllerian Hormone (AMH), was within normal limits (AMH: 3.2 ng/mL), indicating adequate ovarian reserve. Transvaginal ultrasonography revealed normal uterine size and morphology with no adnexal pathology. The husband's semen analysis was reported to be normal, thereby ruling out male factor infertility (**Figure 1**).

Hysterosalpingography (HSG) was performed as part of routine evaluation and revealed bilateral cornual block, suggesting tubal obstruction. In view of long-standing infertility and HSG findings, the patient was planned for diagnostic hysterolaparoscopy with chromopertubation, with a possibility of tubal recanalization if feasible.

During hysteroscopy, the procedure was technically challenging due to the presence of a pinpoint internal os, which prevented proper negotiation of the hysteroscope into the uterine cavity. As a result, adequate visualization of the uterine cavity could not be achieved (**Figure 2).**

Subsequently, laparoscopy was performed, which revealed a bicornuate uterus characterized by two distinct uterine horns, including a non-communicating rudimentary horn. This congenital anomaly had not been detected on prior ultrasonography or HSG. Chromopertubation findings correlated with tubal pathology (**Figure 3**).

Additionally, multiple small whitish nodules were observed over the liver surface and peritoneum, suggestive of miliary tuberculosis. These findings indicated the presence of abdominal (genital) tuberculosis as a coexisting factor contributing to infertility.

The laparoscopic findings significantly altered the diagnosis from a presumed isolated tubal block to a complex etiology involving congenital uterine anomaly and probable tubercular pathology. The patient was counseled regarding the findings, further evaluation, and management options, including anti-tubercular therapy and reproductive planning.

RESULTS

Hysteroscopic evaluation in this case was technically difficult and remained inconclusive due to the presence of a markedly narrow (pinpoint) internal os, which hindered proper and negotiation of the hysteroscope into the uterine cavity. Consequently, adequate visualization of the endometrial cavity could not be achieved, limiting the ability to assess intrauterine morphology and detect any subtle abnormalities through hysteroscopy. In contrast, laparoscopic examination provided comprehensive and clinically significant findings. It revealed a bicornuate uterus, characterized by two distinct and well-formed uterine horns. .

Additionally, a non-communicating rudimentary horn was identified, confirming the presence of a congenital Müllerian anomaly. Importantly, this structural abnormality had not been detected on prior imaging modalities, including transvaginal ultrasonography and hysterosalpingography, thereby underscoring the superior diagnostic accuracy of laparoscopy in identifying complex uterine anomalies. Chromopertubation performed during laparoscopy demonstrated findings consistent with bilateral cornual block, correlating with the earlier HSG results and confirming the presence of associated tubal pathology.

Furthermore, an incidental but clinically significant observation during laparoscopy was the presence of multiple small whitish nodules scattered over the surface of the liver and peritoneum. These findings were highly suggestive of miliary tuberculosis, indicating the likelihood of underlying abdominal (genital) tuberculosis. This added an important infectious etiology contributing to the patient's infertility, which had not been suspected based on prior non-invasive investigations. Thus, laparoscopic evaluation not only confirmed the presence of tubal obstruction but also revealed additional critical findings, including a congenital uterine anomaly and probable tubercular involvement.

Figure 1: HSG image depicting suspected bilateral cornual block in a patient with primary infertility

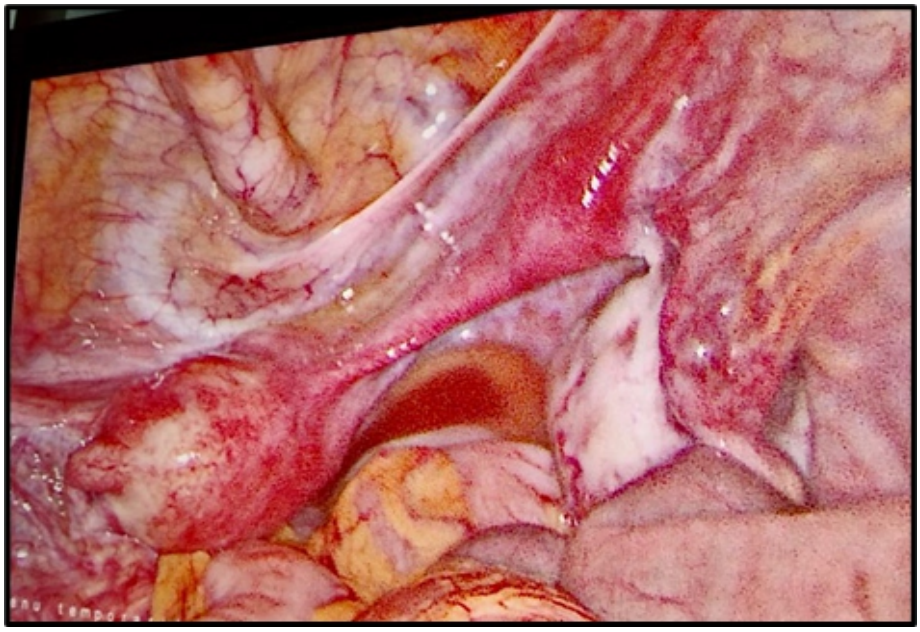

Figure 2: Laparoscopic image of bicornuate uterus with non-communicating rudimentary horn

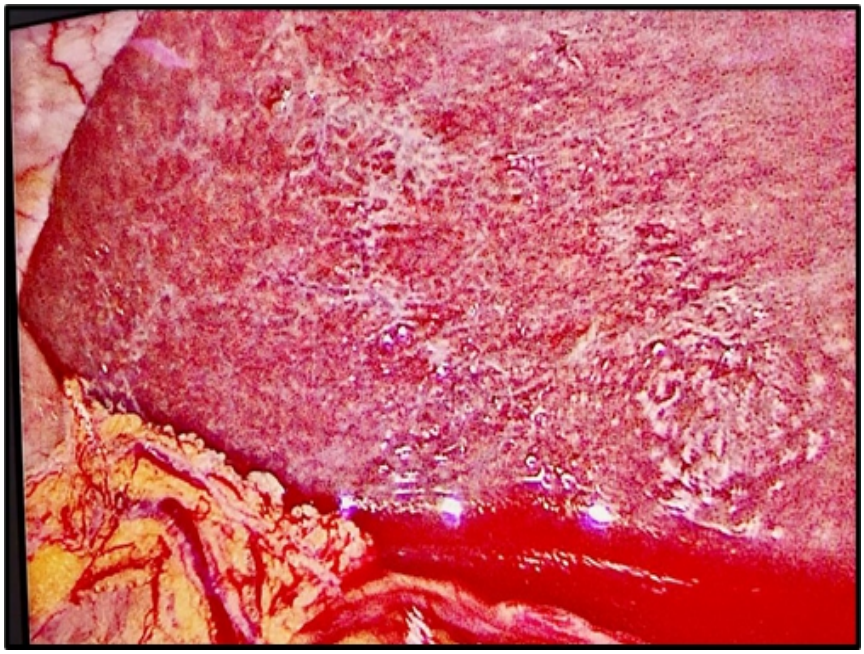

Figure 3: Laparoscopic view of miliary Tuberculosis in liver

These combined findings resulted in a substantial revision of the initial diagnosis from presumed isolated tubal factor infertility to a complex, multifactorial condition involving structural and infectious components. The comprehensive diagnostic information obtained through laparoscopy significantly influenced further management planning, including the need for confirmatory tests for tuberculosis, consideration of antitubercular therapy, and appropriate reproductive counseling tailored to the patient's condition.

DISCUSSION

This case highlighted the diagnostic limitations of conventional imaging modalities in the evaluation of female infertility and underscores the importance of diagnostic laparoscopy in identifying hidden pathologies. Despite normal ultrasonography and hormonal evaluation, the patient was initially diagnosed with bilateral cornual block based on HSG findings. However, HSG is known to have limitations, including false-positive results due to tubal spasm or technical factors [9].

Congenital uterine anomalies, such as bicornuate uterus, are often difficult to diagnose using routine imaging techniques. Ultrasonography may fail to differentiate between septate and bicornuate uterus due to inadequate assessment of the external uterine contour. In contrast, laparoscopy provides direct visualization, allowing accurate diagnosis. The presence of a non-communicating rudimentary horn further complicates the clinical scenario, as it may be associated with reproductive complications including infertility and adverse pregnancy outcomes [10].

Another significant finding in this case was the presence of abdominal tuberculosis. Genital tuberculosis remains an important cause of infertility in developing countries, particularly in India. It often presents with subtle or nonspecific findings and may be missed on routine investigations. Laparoscopy plays a crucial role in detecting characteristic features such as tubercles, adhesions, and caseous nodules, which may not be visible on imaging [11].

The coexistence of multiple factors congenital anomaly and tubercular pathology-illustrates the multifactorial nature of infertility. This emphasized the need for a comprehensive evaluation rather than reliance on a single diagnostic modality. Early use of diagnostic hysterolaparoscopy in cases of long-standing infertility can prevent misdiagnosis and unnecessary delays in treatment [12].

Furthermore, laparoscopy allows for simultaneous therapeutic interventions, such as adhesiolysis or tubal recanalization, thereby improving fertility outcomes. It also aids in guiding further management, including medical therapy for tuberculosis or assisted reproductive techniques when indicated [13].

This case reinforces that patients labeled with unexplained infertility should be carefully evaluated using advanced diagnostic techniques. Timely identification of underlying causes not only improves clinical outcomes but also provides better reproductive counselling [14].

CONCLUSION

Diagnostic laparoscopy remains an indispensable tool in the evaluation of female infertility, especially when routine investigations fail to provide definitive answers. This case demonstrates how significant pathologies such as bicornuate uterus and abdominal tuberculosis can be missed on imaging but identified through laparoscopy. Early utilization of this modality in long-standing infertility can lead to accurate diagnosis, appropriate management, and improved patient outcomes. A multidisciplinary and thorough diagnostic approach is essential to address the multifactorial causes of infertility and to optimize reproductive success.

LIMITATIONS & FUTURE PERSPECTIVES

The study's limitations include a single-centre setting, a relatively small sample size, and a short study duration, which may limit the broader applicability of the results. Future studies should incorporate multicentre designs with larger populations to enhance validity, assess long-term outcomes, and investigate advanced diagnostic and management approaches. Such efforts will improve overall patient care and help minimize complications.

CLINICAL SIGNIFICANCE

This case emphasized the critical role of diagnostic hysterolaparoscopy in the evaluation of infertility, particularly in patients with long-standing unexplained infertility or inconclusive imaging findings. It highlights that reliance solely on non-invasive modalities such as ultrasonography and HSG may lead to misdiagnosis or incomplete assessment. The identification of a bicornuate uterus and coexisting abdominal tuberculosis in this patient demonstrates the importance of direct visualization in detecting subtle and complex pathologies. Early and appropriate use of laparoscopy can significantly alter clinical management by providing accurate diagnosis and enabling targeted treatment. It also helps in avoiding unnecessary interventions based on misleading imaging findings. Furthe-rmore, in regions with high prevalence of tuberculosis, clinicians should maintain a high index of suspicion for genital tuberculosis as a cause of infertility. Overall, this case underlines the need for a comprehensive, stepwise, and individualized approach in infertility evaluation.

ABBREVIATIONS

HSG: Hysterosalpingography
USG: Ultrasonography
TVS: Transvaginal Sonography
DHTL: Diagnostic Hysterolaparoscopy

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AUTHOR CONTRIBUTIONS

All authors significantly contributed to the study conception and design, data acquisition, or data analysis and interpretation. They participated in drafting the manuscript or critically revising it for important intellectual content, consented to its submission to the current journal, provided final approval for the version to be published, and accepted responsibility for all aspects of the work. Additionally, all authors meet the authorship criteria outlined by the International Committee of Medical Journal Editors (ICMJE) guidelines.

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CONFLICT OF INTEREST

Authors declared that there is no conflict of interest.

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CONSENT FOR PUBLICATION

All necessary consent for publication was obtained by authors.

DATA AVAILABILITY

All data generated and analyzed are included within this research article. The datasets utilized and/or analyzed in this study can be obtained from the corresponding author upon a re-asonable request.

USE OF ARTIFICIAL INTELLIGENCE (AI) & LARGE LANGUAGE MODEL (LLM)

The authors confirm that no AI & LLM tools were used in thewriting or editing of the manuscript, and no images were altered or manipulated using AI & LLM.

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