

Original Article

Determining The Frequency of Tubal Blockage in Infertility Patients Undergoing X-Rays Hysterosalpingography

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ABSTRACT

Background: Infertility is a complex global health issue, affecting millions of couples and necessitating detailed diagnostic evaluations. Among the various diagnostic procedures, X-ray hysterosalpingography (HSG) is pivotal for assessing tubal patency and identifying underlying causes of infertility.

Objective: To determine the frequency of tubal blockages, particularly hydrosalpinx, in patients undergoing HSG at a tertiary care facility.

Methods: This retrospective study was conducted at Allama Iqbal Teaching Hospital DG Khan from July 2022 to February 2024. A total of 210 female patients with consecutive infertility were included, excluding those with prior tubal surgeries. Data were extracted from medical records, focusing on demographics, clinical history, and HSG results.

Results: The mean age of the participants was 32.35 ± 3.56 years, and the mean duration of infertility was 3.5 ± 2.1 years. Among the patients, 65% were nulliparous, and 35% were parous. Prior fertility treatments were reported in 75% of cases. Tubal blockage was identified in 45 patients (21.4%), with 25 (11.9%) exhibiting unilateral blockage and 20 (9.5%) bilateral blockage. Hydrosalpinx was the most common abnormality, occurring in 30 patients (66.7%).

Conclusion: Tubal blockage, particularly hydrosalpinx, is a significant contributor to infertility, found in 21.4% of the study population. These findings emphasize the need for thorough tubal evaluations in infertility assessments.

Keywords: Fertility, Hysterosalpingography, Infertility, Tubal Blockage, Tubal Patency, Hydrosalpinx, Retrospective Study.

INTRODUCTION

Infertility, a multifactorial condition that affects millions of couples globally, presents significant challenges to both patients and healthcare providers. Among the various diagnostic tools available, hysterosalpingography (HSG) is particularly notable for its efficacy in assessing tubal patency and uterine abnormalities (1). This radiologic procedure utilizes X-ray imaging to provide detailed visualizations of the uterine cavity and fallopian tubes, thereby offering essential insights into potential causes of infertility such as tubal blockage (2). Tubal blockage, characterized by the obstruction or impairment of the fallopian tubes, is a prevalent etiology of infertility in women. Such abnormalities can obstruct the transport of ova and sperm, impeding successful fertilization and implantation, which underscores the importance of precise identification and characterization of tubal pathology to guide management strategies and enhance fertility outcomes (3).

The prevalence of infertility ranges from 9 to 18% among reproductive-aged couples, with the condition being classified into primary infertility, where the couple has never conceived, and secondary infertility, which occurs after a prior pregnancy regardless of the outcome (4). The increasing rates of infertility are attributed to factors such as the rise in male infertility and delays in childbearing among women. Female infertility is often caused by occluded fallopian tubes, uterine abnormalities, or anovulation, with tubal

pathologies accounting for 35–40% of these cases (5). Tubal function may be compromised by infections, surgical damage, or peritubal adhesions, which can result from inflammation, infection, previous surgeries, endometriosis, or ectopic pregnancies (6).

The hysterosalpingogram stands out due to its high diagnostic accuracy; it exhibits a sensitivity of 94% and a specificity of 92% for detecting tubal blockage. It is also useful for diagnosing congenital uterine anomalies with a sensitivity of 78% and specificity of 90% (7). Beyond its diagnostic capabilities, HSG can also offer therapeutic benefits, such as tubal flushing or the treatment of proximal tubal obstruction (8). Notably, abnormalities detected via HSG, such as synechiae, polyps, leiomyomas, or endometrial hyperplasia, often require further evaluation or treatment through additional procedures like laparoscopy, hysteroscopy, or pelvic ultrasound (9).

The objective of this study is to determine the frequency of tubal blockage in infertility patients undergoing X-ray hysterosalpingography. This will not only augment our understanding of the prevalence and patterns of tubal pathologies among these patients but also refine diagnostic and therapeutic approaches for managing infertility related to tubal factors.

MATERIAL AND METHODS

This retrospective study was conducted at Allama Iqbal Teaching Hospital DG Khan over a period from July 2022 to February 2024. The investigation encompassed a cohort of 210 patients, specifically targeting those with consecutive infertility who had undergone X-ray hysterosalpingography (HSG). To maintain the integrity of the study, patients who had previously undergone tubal ligation or tubal surgery were excluded from the analysis to prevent confounding results related to past surgical interventions.

Medical records of the eligible participants were meticulously reviewed. The review process involved extracting crucial demographic and clinical data including age, parity, the duration of infertility, and details of previous fertility treatments. Furthermore, HSG reports were scrutinized to assess tubal patency as well as to identify any related abnormalities such as tubal occlusion, hydrosalpinx, or peritubal adhesions. Tubal patency was determined by observing the free flow of contrast material through the fallopian tubes, with no evidence of obstruction or delay. Conversely, tubal blockage was defined by the absence of contrast spillage into the peritoneal cavity or by the presence of focal or complete obstruction within the tubes. Detailed notes were made regarding the location, severity, and morphology of any tubal abnormalities identified, facilitating a comprehensive analysis of the findings.

For the statistical analysis, the data were processed using SPSS version 29 and GraphPad 2021. The choice of statistical tests was dictated by the nature of the data, employing either parametric or non-parametric methods as appropriate. A p-value of less than 0.05 was set as the threshold for statistical significance, ensuring rigor in the evaluation of the results and their implications for clinical practice.

RESULTS

Data were collected from 210 female patients. Mean age of the patients was 32.35±3.56 years and mean duration of infertility was 3.5±2.1 years. 65% of the patients suffering from nulliparous, 35% parous, 75% have already previous fertility treatment and 25% with no previous treatment.

Table 01: Demographic and clinical characteristics of patients

Characteristic	Number of Patients	Percentage (%)
Total patients	210	100
Mean age (years)	32.35±3.56	-
Mean duration of infertility (years)	3.5±2.1	-
Nulliparous	137	65
Parous	73	35
Previous fertility treatments	157	75
No previous fertility treatments	53	25

Out of 210 45 (21.4%) patients had tubal blockage and 25 (11.9%) with unilateral blockage. 20 (9.5%) patients with bilateral blockage and 165 (78.6%) had tubal patency. Hydrosalpinx were the most common tubal abnormality happened in 30 (66.7%) patients.

Table 02: Frequency of tubal blockage

Tubal Pathology	Number of Patients	Percentage (%) of Total Patients
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Total with tubal blockage	45	21.4
Unilateral blockage	25	11.9
Bilateral blockage	20	9.5
Tubal patency	165	78.6
Tubal Abnormality		
Hydrosalpinx	30	66.7
Tubal occlusion	10	22.2
Peritubal adhesions	5	11.1

Among patients under 30 years old, 16.0% exhibited tubal blockage, while this percentage increased to 22.2% for patients aged 30 to 35 years. Patients aged 36 to 40 years demonstrated a similar prevalence of tubal blockage at 20.0%. However, in patients over 40 years old, the prevalence notably increased to 50.0%, indicating a potential association between older age and higher likelihood of tubal pathology.

Table 03: Association between age and tubal blockage

Age Group (years)	Total Patients (n)	Patients with Tubal Blockage (n)	Percentage of Patients with Tubal Blockage (%)
< 30	50	8	16.0
30 - 35	90	20	22.2
36 - 40	60	12	20.0
> 40	10	5	50.0

Among patients with a duration of infertility less than 2 years, 12.5% exhibited tubal blockage, while this percentage increased to 18.8% for patients with a duration of 2 to 4 years. Patients with a duration of 5 to 7 years demonstrated a higher prevalence of tubal blockage at 33.3%, indicating a potential association between longer duration of infertility and increased likelihood of tubal pathology. Interestingly, among patients with a duration of infertility over 7 years, the prevalence of tubal blockage decreased to 16.7%.

Table 04: Association between duration of infertility and tubal blockage

Duration of Infertility (years)	Total Patients (n)	Patients with Tubal Blockage (n)	Percentage of Patients with Tubal Blockage (%)
< 2	40	5	12.5
2 - 4	80	15	18.8
5 - 7	60	20	33.3
> 7	30	5	16.7

DISCUSSION

Infertility poses a complex and multifaceted challenge affecting millions worldwide, necessitating advanced diagnostic evaluations to uncover underlying causes and direct suitable treatment strategies. In this retrospective observational study, we investigated the prevalence of tubal blockage among infertility patients undergoing X-ray hysterosalpingography (HSG), and explored potential associations with demographic and clinical variables (12). Our results indicated that tubal blockage was present in approximately 21.4% of the patients, with a significant number exhibiting bilateral pathology. This aligns with previous studies that have reported prevalence rates of tubal obstruction ranging from 10% to 25% among women undergoing tubal assessment (13).

The study highlighted hydrosalpinx as the predominant tubal abnormality, emphasizing the need for meticulous evaluation and management of tubal pathology in the context of infertility. Infertility impacts roughly one in seven couples, representing a significant proportion of the population and contributing substantially to global health burdens (14). The necessity for enhanced research and implementation of diagnostic and therapeutic strategies in developing countries is underscored by the higher incidence of infertility in these regions (15).

Despite advancements in medical imaging, hysterosalpingography remains a cornerstone diagnostic tool due to its accessibility, cost-effectiveness, minimal invasiveness, and ease of interpretation, maintaining its relevance in the diagnostic arsenal for over a century

(16). Tubal blockage, a leading cause of infertility, accounts for between 15% and 30% of cases, with primary infertility due to tubal blockage at 15% and secondary infertility at 40% (17). Common causes include sexually transmitted infections, previous pelvic surgeries, endometriosis, and occasionally Mullerian anomalies. The diagnostic regimen for tubal factor infertility includes HSG, which is an integral part of the gynecological evaluation (18), employing an oil-soluble contrast medium that allows visualization under X-ray.

When comparing HSG to laparoscopy, the gold standard for assessing tubal patency, HSG demonstrates a sensitivity of 65% and a specificity of 83% (19). However, it is crucial to consider tubal spasm as a potential false positive for tubal occlusion, particularly when the obstruction appears at the proximal or interstitial segment of the tube during HSG (20).

The strengths of our study include a robust sample size and the comprehensive analysis of HSG results correlated with clinical data, providing a detailed picture of tubal pathologies. However, the study is not without limitations. Its retrospective nature may introduce selection biases, and the exclusion of patients with previous tubal surgeries might limit the generalizability of the findings. Additionally, HSG's sensitivity relative to laparoscopy suggests potential underestimations of tubal patency.

In conclusion, our study reaffirms the role of hysterosalpingography as an essential diagnostic tool in infertility evaluations, confirming its effectiveness in detecting tubal blockages which are critical barriers to conception. The findings advocate for ongoing research into refining diagnostic accuracy and expanding access to infertility treatments, particularly in under-resourced settings.

CONCLUSION

The study concludes that tubal blockage, notably hydrosalpinx, plays a significant role in infertility, with 21.4% of the examined cohort presenting with this condition. Although no substantial correlations with demographic or clinical variables were detected, these results highlight the critical need for comprehensive assessment and management of tubal pathologies in patients undergoing X-ray hysterosalpingography. This underlines the necessity for healthcare providers to maintain a high degree of vigilance and accuracy in diagnosing and treating tubal factors, which are pivotal in influencing fertility outcomes and optimizing the treatment strategies for infertile couples. This awareness could lead to enhanced diagnostic protocols and more targeted therapeutic interventions in the field of reproductive medicine.

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