



## Comparison of Hysterosalpingography and Laparoscopy in Evaluation of Tubal Factor as a Cause of Female Infertility

Authors

Shivi Jain<sup>1</sup>, Shuchi Jain<sup>2\*</sup>, R.C. Shukla<sup>3</sup>, Madhu Jain<sup>4</sup>

<sup>1,3</sup>Department of Radiodiagnosis and Imaging & <sup>2,4</sup>Obstetrics and Gynaecology  
Institute of Medical Sciences, Banaras Hindu University, Varanasi-221005

\*Corresponding Author

Shuchi Jain

Assistant Professor, Department of Obstetrics and Gynaecology, Institute of Medical Sciences,  
Banaras Hindu University Varanasi-221005, India

### Abstract

**Introduction:** Tubal factor contributes to 60% of female infertility in Indian women (Chaudhari AD et al., 2017). Hysterosalpingography (HSG) and laparoscopy are commonly used for assessment of tubal patency. The objective of the study was to assess the diagnostic accuracy of HSG and compare it with laparoscopy, taking latter as the gold standard in evaluation of tubal patency.

**Material & Method:** 50 infertile patients (20-40 years), referred from department of Obstetrics & Gynaecology, IMS, BHU were subjected to HSG on day 6-9 of menstrual cycle and tubal findings were classified into patent and blocked tubes (unilateral and bilateral). All patients then underwent diagnostic laparoscopy with chromopertubation to assess tubal patency and look for any associated findings like adhesions, tuberculosis, endometriosis, etc.

**Result:** 34/50 patients had primary infertility (68%) and 16/50 had secondary form (32%). Laparoscopy showed patent tubes in 23 (46%), unilateral tubal block in 10 (20%) and bilateral tubal block in 17 (34%) compared to 20 (40%), 8 (16%) and 22 (44%), respectively on HSG. HSG showed sensitivity: 92.59% (95% CI: 75.71%-99.09%), specificity: 78.26% (95% CI 56.30%-92.54%), positive predictive value: 83.33% (95% CI: 69.57%-91.62%), negative predictive value: 90.00% (95% CI: 69.98%- 97.20%) and diagnostic accuracy: 86.00% (95% CI: 73.26%-94.18%). Additional laparoscopic findings were also detected in patients with tubal block (n=27); pelvic adhesions-13 (48.1%), endometriosis-6 (22.2%) & tuberculosis-8 (29.7%) and also in those with patent tubes (n=23); pelvic adhesions-1 (4.4%) & endometriosis-2 (8.7%).

**Conclusion:** HSG should be used as initial test for assessing tubal patency due to its high sensitivity. Laparoscopy being invasive, should be used either in those cases who have normal HSG but fail to conceive or in those who have blocked tubes, to not only confirm the HSG findings but also to diagnose etiological factors so that decision can be taken for tubal microsurgery/in-vitro fertilization.

**Keywords:** Tubal factor, Female infertility, HSG, Laparoscopy.

### Introduction

Tubal factor contributes to 60% of female infertility in Indian women.<sup>1</sup>

Hysterosalpingography (HSG) and laparoscopy are commonly used for assessment of tubal patency. Besides less invasive procedures such as

hysterosalpingography (HSG), laparoscopy also plays an important role in the evaluation of tubal and intrauterine abnormality particularly when the incidence of uterine abnormalities in infertile and recurrent pregnancy loss cases has been reported to be 15-27%.<sup>2,3</sup>

### Material & Methods

50 infertile patients (20-40 years), referred from department of Obstetrics & Gynaecology in a tertiary teaching hospital, were subjected to HSG on day 6-9 of menstrual cycle and tubal findings were classified into patent and blocked tubes (unilateral and bilateral). All patients then underwent diagnostic laparoscopy with chromopertubation to assess tubal patency and were looked for any associated findings like adhesions, tuberculosis, endometriosis, etc.

### Results

34/50 patients had primary infertility (68%) and 16/50 had secondary form (32%). Laparoscopy showed patent tubes in 23 (46%) and tubal block in 27 (54%) cases while on HSG, patent tubes were seen in 20 (40%) and tubal block in 30

(60%) cases. Laparoscopy was normal in 16.67% (5/30) patients with abnormal HSG (n=30) and abnormal in 10% (2/20) patients with normal HSG (n=20, Table 1). Thus, false positive rate was higher than false negative rate with HSG. Analyzing the 50 cases, unilateral tubal block was observed more on laparoscopy than HSG [10 (20%) vs. 8 (16%) respectively] while bilateral tubal block was noted less on laparoscopy than HSG [17 (34%) vs. 22 (44%) respectively, Table 2], indicating that the chances of false positive results were mainly with the bilateral tubal block on HSG. HSG showed sensitivity: 92.59% (95% CI: 75.71%-99.09%), specificity: 78.26% (95% CI 56.30%-92.54%), positive predictive value: 83.33% (95% CI: 69.57%-91.62%), negative predictive value: 90.00% (95% CI: 69.98%-97.20%) and diagnostic accuracy: 86.00% (95% CI: 73.26%-94.18%). Moreover, additional findings were also detected on laparoscopy in patients not only with tubal block (n=27) [pelvic adhesions-13 (48.1%), endometriosis-6 (22.2%) & tuberculosis-8 (29.7%)] but also in those with patent tubes (n=23) [pelvic adhesions-1 (4.4%) & endometriosis-2 (8.7%), Table 3].

**Table 1:** Tubal Findings on HSG & Laparoscopy

HSG	Laparoscopy Abnormal	Laparoscopy Normal	Total
Abnormal	25	05	30 (60%)
Normal	02	18	20 (40%)
Total	27 (54%)	23 (46%)	50

**Table 2:** Comparison of Tubal Findings of HSG & Laparoscopy

Laparoscopy	Normal	Unilateral Tubal Block	Bilateral Tubal Block	Total
<b>HSG</b>				
Normal	18	02	0	20 (40%)
Unilateral Tubal Block	0	07	01	08 (16%)
Bilateral Tubal Block	05	01	16	22 (44%)
Total	23 (46%)	10 (20%)	17 (34%)	50

**Table 3:** Associated Findings & Tubal Findings on Laparoscopy

Laparoscopic Findings	Blocked Tubes (n=27)	Patent Tubes (n=23)
Adhesions	13 (48.1%)	1 (4.4%)
Endometriosis	6 (22.2%)	2 (8.7%)
Tuberculosis	8 (29.7%)	0

### Discussion

The incidence of infertility has increased over last few years and may be due to pelvic inflammatory

diseases, late age of marriage among career oriented young generation and perhaps due to promiscuity leading to increased chance of

sexually transmitted diseases. Among various causes of female infertility noted worldwide, tubal factor has been reported to be responsible in 25-35% of the cases.<sup>4</sup> To assess the tubal damage, HSG has been used as the first line investigation for ages and besides the fallopian tubes, it also delineates the uterine abnormality.

Moreover, HSG is less invasive, simple, comparatively inexpensive and rapid to perform. On the negative side, the HSG has the possibility of allergic reactions to dye, pelvic infection, endometriosis, and rarely remote chance of tubal rupture (particularly in presence of hydrosalpinx) and exposure to ionizing radiation.

Laparoscopy that provides an opportunity to have functional and objective evaluation of tubal patency by dye insufflation is recommended by Royal College of Obstetricians and Gynecologists as the tubal patency investigation of choice for infertility.<sup>5</sup> Besides chromo pertubation, it also provides an opportunity to detect and treat peritubal and periovarian adhesions and fulgurate the endometrial deposits. Although, the chances of coming across significant pelvic pathology are not very common in presence of patent tubes, some adhesions and endometrial deposits may still be found as in 4.4 and 8.7% of our cases. Tsuji et al found pelvic abnormalities on laparoscopy in presence of normal HSG in about 80% of the patients with suspected unexplained infertility.<sup>6</sup>

The associated pathology is more likely to be seen with blocked tubes. We found adhesions in 48% of the patients with blocked tubes, endometriotic deposits in 22.2% and pelvic tuberculosis was diagnosed in 29.7% of the cases. It is imperative to treat all these associated conditions to have positive outcome. Laparoscopy thus provides an opportunity to change its role from diagnostic to therapeutic by allowing to perform adhesiolysis and coagulate endometriotic deposits. It also enables one to have tissue diagnosis of tuberculosis and endometriosis and direct the future course of treatment. Dense pelvic adhesions detected on laparoscopy may change the treatment plan and advocate Assisted Reproductive

Technique for treating infertility. Some authors reported change in the treatment plan in 14-25% of the infertile patients with normal HSG findings following laparoscopy.<sup>6,7</sup> On some occasions, hysterosalpingography may have false positive and false negative results as we found it to be in 16.67% and 10% of our patients respectively. This again highlights the importance of performing laparoscopy even in patients with negative HSG findings. Moreover, bilateral tubal block diagnosed on HSG in one of our patients turned out to be unilateral block.

HSG in our patients showed sensitivity of 92.59% (95% CI: 75.71%-99.09%), specificity of 78.26% (95% CI 56.30%-92.54%), positive predictive value of 83.33% (95% CI: 69.57%-91.62%), negative predictive value of 90.00% (95% CI: 69.98%- 97.20%) and diagnostic accuracy of 86.00%. Swart et al found 65% sensitivity and 83% specificity with HSG in in diagnosing tubal patency and peritubal adhesions.<sup>8</sup> Thus, diagnostic laparoscopy may be considered as a final step in determining the etiology of infertility as it also helps in deciding the optimal management.

### Conclusion

An accurate assessment of tubal disease cannot be made with HSG alone. However, HSG should be used as initial test for assessing tubal patency due to its high sensitivity, less invasive nature and relatively low cost. Laparoscopy being a surgical procedure is more invasive and should be used for definitive assessment, even in presence of normal HSG findings as it allows to have direct visualization of the pathology, provide a chance to treat the condition, and help in adopting an appropriate treatment plan.

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