

## Comparative Evaluation of Tubal Patency by sterosalphingography and Laparoscopicchromopertubation

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**Abstract:** Ninety women, who attended the infertility clinic, were evaluated. Hysterosalpingography and laparoscopy with chromopertubation was done in all these 90 patients for assessment of tubal patency. The study analysed the efficacy of HSG versus laparoscopy and compared the correlation between the two methods. The results of the study showed that in diagnosing a patent tube the correlation between HSG and laparoscopy is 75% for patent tubes and 73% for blocked tubes. The sensitivity of HSG in diagnosing tubal pathology was 81% while specificity is 71%. A high false positive rate of 29% in HSG was shown in this study.

**Keywords:** Chromopertubation, Diagnostic Laparoscopy, Hysterosalpingography, Infertility, Tubal patency

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### I. Introduction

Infertility affects approximately 10-15% of reproductive age couples. Being labelled infertile is devastating to a couple. For the vast majority of patients, infertility is a totally unexpected blow to their future. They become desperate for help to achieve their goal of pregnancy and a child. Many times the problem of infertility has been blamed as the main reason for marital breakdown. The approximate prevalence of female factor of infertility is 40-55% of which tubal factors constitute 36-44%. Evaluation of infertile patients has 4 important goals.

- To identify the cause of the infertility.
- To provide a basis for potentially successful treatment options
- To provide a realistic prognosis
- To offer emotional support

The purpose of this study is to critically evaluate the usefulness of the 2 important diagnostic modalities namely the HSG and laparoscopy in the diagnosis of infertility

### II. Aim

- To compare the relative efficacy of Hysterosalpingography and Laparoscopy with chromopertubation in the diagnosis of tubal factors in infertile women.
- To assess the reliability of individual techniques in such infertile Women.

### III. Materials and methods

Ninety women attending the Coimbatore Medical College Hospital's infertility clinic at Department of Obstetrics and Gynaecology between February 2015 and January 2016 who fit in the inclusion criteria were selected for the study. The patients were initially counselled along with their partner and a thorough history of both the partners was obtained followed by a general and pelvic examination of female partner.

Haemoglobin, urine analysis, Blood VDRL, Blood sugar were done. A Mantoux test was performed in female partner whenever necessary. Patients were carefully selected after excluding the contraindications for HSG and Laparoscopy.

#### 3.1 Inclusion Criteria

- a. Primary infertility
- b. Age between 20 and 40 yrs
- c. Duration of infertility at least 1 yr in younger age gp
- d. Not suffering from other Medical illness
- e. Normal seminal and other parameters in the partner

### **3.2 Exclusion Criteria**

- a. Age more than 40yrs and less than 20yrs
- b. Duration of infertility less than 1 year in < 30 yrs
- c. Secondary infertility
- d. Active Pelvic Inflammatory Disease
- e. Active cervical or vaginal infection
- f. Other medical and surgical disorders

After initial evaluation of the patient and her partner HSG was performed by using Leech Wilkinson cannula with contrast 420 as contrast medium between 9<sup>th</sup> and 11<sup>th</sup> day of the cycle. No severe complications were met with barring few cases of low abdominal pain in the study.

Laparoscopy was done with double port in the secretory phase of the menstrual cycle under General anaesthesia. A thorough inspection of the uterus, tubes, ovaries and cul-de-sac was done. Findings were noted Chromopertubation was done by injecting the methylene dye and the nature of the spill visualized. The site of block, hydrosalpinx, and other pathology were noted.

At the end of the procedure an endometrial biopsy was taken for dating and to rule out Tuberculosis. Patient was allowed oral feeds after 6 hours and was discharged after 24 hours.

## **IV. Results and Observations**

All our patients were categorized according to the age distribution which shows that nearly 83% of the patients were within 30yrs age group. The analysis of duration of infertility shows that 75.6 % of patients sought medical advice within 5yrs of Marriage. Patients with duration of infertility more than 5 years contributed to only 22.2%. Only 2.2% patient in our study group had a duration of infertility for more than 10yrs.

In all the 90 patients, an initial HSG was performed to evaluate the tubal patency and uterine factors. In our study 42 patients had patent tubes and 48 had blocked tubes, the associated uterine pathology found was synechiae in 8, Arcuate uterus in 2 and Bicornuate uterus in 1 and remaining 79 were normal.

In our series of 48 patients with blocked tubes in HSG, 13 patients had unilateral block and 35 patients had bilateral block, The site of tubal occlusion was most commonly found in midsegment of the tube in 24 cases, followed by Fimbrial block in 16 cases and proximal block in 8 cases

Diagnostic Laparoscopy with chromopertubation was performed in all 90 patients. The initial uterine and tubal findings during laparoscopy were Normal uterus in 82, Subserous Fibroid in 5, Arcuate uterus in 2 and Bicornuate uterus in 1. The Tubal finding were Normal tubes in 65, Peritubal adhesions in 22, Tubo ovarian mass in 2 and Hydrosalpinx in 1

On chromopertubation we found that 56 patients had patent tube, 34 patients had blocked tube, in which unilateral block was 12, bilateral block was 22, cornual block was 5, mid segment block was 20 and fimbrial block was 9.

The complete evaluation of tubal, peritoneal and uterine factors by laparoscopy focused upon the various factors responsible for infertility. Thus the tubal factors were suspected in 34 cases and uterine pathology contributed to 7 cases. The possible role of anovulation as confirmed by histopathological examination report in 26 cases. Endometriosis accounted for 6 cases where laparoscopy was instrumental.

## **V. Discussion**

All the patients selected for the study were distributed according to their age. In our study 86.7% of patients were within 30 year of age.

According to Leon Spheroff [1], the causes for female subfertility are tubal and pelvic factors (40%), ovarian factors (40%), unexplained (10%) and unusual (10%). The commonly used tests for the diagnosis of tubal patency are HSG and laparoscopic chromopertubation. HSG has the additional advantage of detecting anomalies of uterine cavity

In our study with HSG it was found that 48 patients had tubal pathology, 11 patients had uterine pathology. Of those 11 patients with uterine pathology, 6 patients with synechiae also had tubal pathology. The remaining 5 had only uterine pathology and tubes were patent in them. Our study showed a high negative predictive value Of 81%. Opshal et al., 1993 studied the predictive value of HSG in tubal and peritoneal factors in 756 patients. HSG results were as normal, abnormal (bilateral distal tubal obstruction) or suspicious (all others). HSG was confirmed surgically in 96.6% of normals, 63.1% of suspicious and 95.7% of abnormal. Associated moderate-severe pelvic disease was found in 16.2% of normal, 53.9 of suspicious and 81.7% of abnormal. Abnormal HSGs are highly predictive of severe pelvic disease and does not require laparoscopy. Patients with suspicious HSG frequently have normal tubes but poor predictive value for tubal or associated pelvic disease so requiring confirmatory laparoscopy. Eventhough, normal HSG have a high negative predictive value it warrants diagnostic laparoscopy if nonsurgical treatment is unsuccessful[2].

When comparing the tubal patency in hysterosalpingography and laparoscopic chromopertubaion, it can be seen that more than half of the tubes were found to be patent in laparoscopic chromopertubation (62.2%) where as it was only 47% on hysterosalpingography. Blocked tubes constituted 37.8% in laparoscopy and when compared to hysterosalpingography (53%) the numbers were less. The false positives were high in HSG

The site of tubal blockade is mainly the mid segment as revealed by both diagnostic methods. Laparoscopy could demonstrate only half of those Fimbrial blocks which were diagnosed by HSG. Shah et al (2005) studied the accuracy of HSG to establish tubal patency, site of occlusion in 50 patients. HSG demonstrated 70% specificity for accurately diagnosing proximal tubal occlusion [3]

While analysing tubal patency more number of blocks were seen in HSG when compared to laparoscopy, the reasons might be

- a. The fact that it was only a spasm that was mimicking a block in HSG.
- b. Release of peritubal adhesion during laparoscopy facilitates the free flow of dye through fimbria.
- c. A small fimbrial phimosi could easily be overcome by anaesthesia and forcible injection of dye.

Added advantage is that laparoscopy provides an overall picture of the pelvic structure, ovarian pathology along with tubal patency and architecture thus it helps in evaluating other causes of infertility. In our study we found 22 cases of peritubal adhesions, 10 cases of endometriosis, 5 cases of subserous Fibroid, 4 cases of tubo-ovarian mass, 2 cases of arcuate uterus, evidence suggestive of pelvic inflammatory disease was found in 2 cases and a case of bicornuate uterus. Laparoscopy was better than HSG in defining the tubal architecture even in those cases found to be having a patent tube in HSG. Donnez et al, 1982 (4) studied the incidence of pathological factors not revealed by HSG but disclosed by laparoscopy in 500 infertile women and demonstrated the agreement of tubal patency in 90% of cases. He also stated that HSG alone permits the diagnosis of peritubal adhesions in 68.8% of cases confirmed by laparoscopy[4]. Ngowa et al 2015 studied infertile patients and evaluated the causes of infertility by using both HSG and Laparoscopy. This study showed that HSG had 51% sensitivity and 90% specificity in diagnosing proximal tubal occlusions. However, the study recorded a low sensitivity (24.6%) and specificity (45.4%) of HSG in diagnosing pelvic adhesions. Hence, this study emphasised that laparoscopy should be performed in cases of abnormal HSG and even in cases of normal HSG in patients with unexplained infertility [5].

Hutchins 1977 et al assessed the tubal patency in HSG and diagnostic laparoscopy in 409 patients. Peritubal adhesion were detected by HSG in only 18 of the 54 cases where they were demonstrated by laparoscopy. Laparoscopy gave much useful information either at variance with or in addition to that yielded by HSG [6]

Lavy et al, 2004 assessed the diagnostic benefit of laparoscopy in infertile women with normal HSG in 86 patients. Laparoscopy may be omitted in women with normal HSG since it was not changed the original treatment indicated by HSG in 95% of patients. However laparoscopy should be recommended in cases with suspected bilateral occlusion on HSG since it altered the original treatment plan in 30% of patients from IVF to induction of ovulation with IUI [7].

The result of our study shows that HSG has a sensitivity of 80.9% in diagnosing tubal patency while the specificity is 70.8%. Otubu et al (1990) had shown an accuracy of 91% and false positive rate of 9% in their study comparing HSG and laparoscopy in evaluation of tubal pathology [8].

Our study showed the false positives rate (28.16) to be high in HSG Hence which requires an early laparoscopy to confirm the diagnosis and for follow up action.

In our study the sensitivity of tubal pathology in infertile women by HSG shows a sensitivity of 80.9% and a specificity of 70.8% when HSG finding of a patent tube is seen, one can wait for 3 to 6 months with additional advantage of hoping for increase in fertility but it is not so in cases of blocked tubes, a high false positive rate of 28.16% is seen which implies that whenever a tube is found to be blocked, a laparoscopic chromopertubation has to be done to diagnose or refute the pathology.

Therefore it has been demonstrated from the study that HSG and laparoscopy with chromopertubation should be considered complementary to each other. This has also been highlighted in the study performed by Foroozanfard et al [9]. HSG and Laparoscopy are not alternative but are complementary methods in the examination of blocked tubes. Each have the merits and demerits of their own. Although laparoscopy was better than HSG as a predictor of future fertility, it should not be considered as the perfect test in the diagnosis of tubal pathology. For clinical Practice, laparoscopy can be delayed after a normal HSG for at least 6 months since the probability that laparoscopy will show tubal occlusion after a normal HSG is very low.

Mohammadbeigi and Tanhaeivash 2012 noted that HSG was 92% sensitive and 70% specific and hence HSG should be performed initially and the use of laparoscopy should be limited to patients whom extratubal pathologies are suspected such as endometriosis and peritubal adhesions[10].

Sakar et al in 2008 studied 82 infertile women and observed pathological findings in 45.1% by HSG and 65.85% by laparoscopy. HSG was 63% sensitive and 89.3% specific and the accuracy ratio was 72% and hence the above mentioned two methods are not alternative but complementary [11].

**VI. Tables and Figures**

**Table 1.** Age distribution of infertility

YEARS	Number	Percentage
20 – 25yrs	53	58.9%
25-30yrs	25	27.8%
30 – 35yrs	11	12.2%
>35yrs	1	1.1%

**Table 2** Duration of infertility

Years	Total Numbers	Percentage
1 – 5yrs	68	75.6%
6 – 10	20	22.2%
>10	2	2.2%

**Table 3** Finding in tubal patency by HSG

Tubal patency	Number
Patent tubes	42
Blocked tubes	48

**Table 4** Pathological causes of infertility diagnosed by HSG

Pathology	Number
Tubal	48
Uterine	11
Both	6

**Table 5** Site of tubal block in HSG

Site of block	Number
Proximal tubal block	8
Block at mid segment	24
Fimbrial block	16

**Table 6** Causes of infertility by laparoscopy

Cause of infertility	Number
Tubal factors	34
Uterine factors	7
Ovarian factors	26
Endometriosis	61

**Table 7** Patency of tubes as diagnosed by laparoscopic chromopertubation

Laparoscopic chromopertubation	Number	Percentage
Patent	56	62.2%
Blocked	34	37.8%

**Table 8** Comparison of tubal patency by hysterosalpingography and laparoscopic chromopertubation

	Hysterosalpingography		Laparoscopic Chromopertubation	
	Number	Percentage	Number	Percentage
Patent tube	42	47%	56	62.2%
Blocked tube	48	53%	34	37.8%

**Table 9** Comparison between HSG and laparoscopic chromopertubation in the site of tubal blockade

	Proximal	Midsegment	Fimbrial end
HSG	8	24	16
Laparoscopy	5	20	9

**Table 10** correlation of HSG findings with laparoscopic chromopertubation

	HSG	Laparoscopic Chromopertubation	
		Confirmation	Disagreement
Patent tube	42	42	-

Blocked tube	48	34	14
Additional Pathology diagnosed during laparoscopy in those cases with patent tubes are			
Hydrosalpinx	- 1		
Tubo ovarian mass	- 2		
Peritubal adhesion	- 5		
Total	- 8		

**Table 11** Showing comparative analysis of tubal block between HSG and laparoscopy

HSG	Tubal block as diagnosed by laparoscopy	
	Tubal block	Normal tubes
Blocked Tubes	34	14
Patent Tubes	8	34

**Table 12** Results in our study

	Results	Estimate 95% CI
Sensitivity	81%	66-91%
Specificity	71%	56-83%
Positive predictive value	71%	56-83%
Negative predictive value	81%	66-91%
False positive	29%	17-44%
False negative	19%	9-34%
Correct classification	76%	65-84%
Kappa statistics	K-0.51	Moderate agreement

P-0.001

## VII. Conclusion

HSG being non invasive has a reasonably good sensitivity and specificity in diagnosing tubal pathology of infertile women. The high rate of false positive diagnosis of tubal pathology (29%) by HSG, a follow up laparoscopy is warranted. Therefore laparoscopy and HSG are complementary to one another in diagnosing tubal and peritoneal factors and any infertility work up gives a more definite diagnosis when HSG findings was supplemented with laparoscopy.

By Laparoscopy, the fertility can be better assessed than HSG and accepted as the reference standard for determination of the accuracy of other diagnostic tools for tubal pathology

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