



A Comparative Study of Hysterosalpingography and Diagnostic Laparoscopy in Evaluation of Tubal Pathology in Primary Infertility.

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Abstract

Background: Infertility is one of the most common conditions confronting Gynecologists and tubal factor is one of the most common causes of infertility. Hysterosalpingography and laparoscopy are used as methods for diagnosis of tubal patency in infertility.

Methods: 75 patients of infertility were evaluated. A prospective cross sectional study was performed. Diagnostic laparoscopy was considered as the reference standard in detecting tubal blockade and findings of hysterosalpingography were compared with laparoscopy.

Results: The sensitivity of HSG for detection of tubal block was 77.41% and specificity was 56.81% with positive predictive value 55.81% and negative predictive value 78.12% and with false positive rate = 44.1% and false negative rate = 21.8%. The positive predictive value of HSG for detecting tubal pathology was 55.81% among 75 patients. The diagnostic accuracy of HSG for tubal pathology revealed false negative rate of 21.8%. The most frequent pathologies encountered by laparoscopy were tubal pathology were found in 41.33% (31/75) of women.

Conclusion: HSG is the first step diagnostic test for assessment of fallopian tubes. Laparoscopy with

chromotubation is the gold standard for diagnosis of tubal block, and for identifying periadnexal adhesions and endometriosis and thus to guide appropriate therapy.

Keywords: Hysterosalpingography, Laparoscopy, Tubal Occlusion.

Introduction

Infertility is one of the most prevalent Health disorder in reproductive age group couples. It affects approximately 10-15% of couples. Infertility is defined as the Inability to Conceive after one year of regular unprotected sexual intercourse.^{1,2} The prevalence of pelvic inflammatory disease, genital tract tuberculosis and chronic infection is quite common in our country; hence, the incidence of tubal factor in infertile women is high. Tuboperitoneal factors are responsible for about 30-40% of female infertility.³

Tuboperitoneal pathology is responsible for infertility in 40-50% of cases. Uterine pathology accounts for 15-20% of cases, ovulatory dysfunction 30-40% & male factor 30-40%.^{4,5}

The magnitude of problem of infertility can be assessed from the fact that between 8-12% couples around the world are infertile⁶ but due to better diagnostic and therapeutic development in the past two decades, there has been a tremendous progress in the evaluation & management of infertility.

The most frequently used procedures to evaluate tubal patency currently are Hysterosalpingography (HSG) and Diagnostic Laparoscopy with Chromopertubation test. The major contribution in this field was made by introduction of carbon dioxide insufflations by Rubin (1920).

In Indian scenario where the burden of population over the health care system is too large, HSG comes up as an economical as well as non-invasive tool to screen up

the patients not only for infertility but also various pathologies involving tubes and uterus.⁷

The primary role of HSG is to evaluate the morphology and the patency of the fallopian tubes. The fallopian tubes should appear as thin, smooth lines that widen in the ampullary portion. Tubal abnormalities observed with HSG can be congenital, or due to spasm, occlusion or infection. Tubal occlusion manifests as an abrupt cutoff of contrast material with non-opacification of the distal fallopian tube, and can be unilateral or bilateral. Peritubal adhesions prevent contrast material from spilling into the abdominal cavity and distributing freely.^{8,9}

Disadvantages are that it is sometime painful, emits radiation during the procedure and presents both false positive and negative findings. Despite these drawbacks, it remains one of the first tests to be performed in infertile patients.¹⁰

But laparoscopy allows for the most comprehensive evaluation of tubal and peritubal factors, proper evaluation and management which can improve the fertility.¹¹

Direct visualisation of the pelvis has become increasingly important in evaluation of infertility. Although first described in 1902, Laparoscopy received renewed interest. Laparoscopy, however, is an operational and invasive procedure. It is considered as a gold standard. It gives good image of the pelvic anatomy and, also abdominal cavity. It may investigate tubal patency by chromopertubation without questionable result. It can diagnose other pelvic pathologies and in many cases it may be a therapeutic instrument. Main disadvantages are invasiveness of procedure, necessity of general anaesthesia and carries along the risk of surgical accidents.

In the present context, it is proposed to do a comparative study between the Hysterosalpingography and Diagnostic Laparoscopy with Chromopertubation in infertility work up with an open mind, keeping advantages and disadvantage of this procedure in view.

Sample Size

Sample size calculated as 95% confidence level assuming tubal pathology in 78.1% of women with primary infertility as per seed article (Nigma A, Saxena P, Mishra A. Comparison of hysterosalpingography and combined laparohysteroscopy for the evaluation of primary infertility. Kathmandu Univ Med J (KUMJ). 2015 Oct-Dec; 13(52) : 281-5). At the absolute allowable error of 10%, 65 cases of primary infertility required as sample size which has been enhanced and rounded of to 75 cases as final sample size of present study.

Methods

A total of 75 cases were subjected to the comparative study between Hysterosalpingography and Diagnostic Laparoscopy with Chromopertubation test. Hysterosalpingography was done in postmenstrual phase between 7th and 9th day of menstrual cycle. Diagnostic laparoscopy with chromopertubation was done premenstrually on 21st / 22nd day of cycle. Both procedures were done in all 75 patients in different settings.

Hysterosalpingography

The patients were explained and informed about procedure and written consent of them was obtained. On the night before the procedure laxative was given to patient. Prior to procedure antispasmodic injection intramuscularly was also given. The patient was placed in dorsal position with her knee flexed. After cleaning vulva and vagina with antiseptic solution a Sim's speculum was introduced into vagina, and cervix was

caught with Vulsellum and Leisch Wilkinson's cannula inserted into the cervix, speculum was removed and patient was carefully positioned underneath the X-ray device. The contrast materials was injected through the canula into uterine cavity that began to fill the uterine cavity, fallopian tubes and spills into the peritoneal cavity and two X-ray images were taken. If certain abnormality was encountered, the patient was asked to rest and wait upto 30 minutes so that a delayed image could be obtained.

Laparoscopy

The patients were explained and informed about procedure and written consent of them was obtained. On the night before the procedure laxative was given to patient. The patient was placed on an operating table (that flexes at the foot piece in a modified lithotomy position (45° instead of 90°). The abdomen and vagina were cleaned with antiseptic solution, and then the patient was draped. General anaesthesia was used. General anaesthesia generally was intravenous Pentothal, N₂O and muscle relaxant such as succinyl choline.

The cervix was caught and held with vulsellum forcep. The intrauterine cannula (Rubin's) was introduced and kept in place. Pneumoperitoneum was done by insufflating gas through the veress needle. The gas was allowed to flow at a rate of 1 litre/minute, at a pressure between 10 to 20 mmHg. The incision previously made for the insertion of veress needle was slightly enlarged so as to permit the insertion of trocar which was introduced while elevating the abdominal wall. The trocar was removed and the laparoscope introduced through the same incision. The interpretation of the pathology, anatomy and morphology were observed by laparoscopic examination. Chromopertubation test was done with injecting of 1% methylene blue through the

Rubin's Cannula to observe tubal patency by visualization of dye in pouch of Douglas.

All the cases gone through the Hysterosalpingography and Diagnostic Laparoscopy with Chromopertubation test. The results were compared keeping Diagnostic Laparoscopy as gold standard. The sensitivity and specificity of HSG were calculated.

Results

Total 75 infertile women were selected, with age group ranging from 25 years to 35 years. The duration of infertility more than one year.

Hysterosalpingography and Laparoscopy with chromopertubation were successfully done in all 75 women.

Table 1 : Comparison of Hysterosalpingography and Diagnostic Laparoscopy findings.

	Hystero-salpingography		Diagnostic Laparoscopy	
	No.	%	No.	%
B/L Tubal Patency	32	42.67	44	58.67
B/L Cornual Block	12	16.00	14	18.67
B/L Fimbrial Block	11	14.67	4	5.32
U/L Cornual Block	14	18.66	5	6.67
U/L Fimbrial Block	6	8.00	8	10.67
Total	75	100.00	75	100.00

$$\chi^2 = 9.864 \quad d.f. = 4 \quad p = 0.043$$

In HSG, 32 cases (42.67%) had bilateral tubal patent, in 12 cases (16.00%) bilateral cornual block was present, 14 cases (18.66%) had unilateral cornual block and in 6 cases (8.00%) there was unilateral fimbrial block.

In diagnostic laparoscopy with chromopertubation test, 44 cases (58.67%) showed bilateral tubal patent, in 14

cases (18.67%) there was bilateral cornual block, 4 cases (5.32%) had bilateral fimbrial blocks, in 5 cases (6.67%) unilateral cornual block was present and in 8 cases (10.67%) there was unilateral fimbrial block.

In HSG, 32 cases showed that both tubes were patent, 23 cases showed bilateral tubal blockage, 10 cases had left tube patent with right tubal blocked and 10 cases had right tube patent with left tubal blocked.

In diagnostic laparoscopy with chromopertubation test, 44 cases showed bilateral tube patency, 18 cases had bilateral tubal blockage, 13 cases show right tube was patent with left tubal block and there was no case with only left tubal patency.

Table 2: Comparative Findings of Hysterosalpingography and Diagnostic Laparoscopy

Diagnostic Laparoscopy (gold standard)	HSG		
	Blocked Tube	Patent Tube	Total
Blocked Tube	24 (TP)	7 (FN)	31
Patent Tube	19 (FP)	25 (TN)	44
Total	43	32	75

The above table describes the sensitivity of HSG for detection of tubal block to be 77.41% and specificity to be 56.81% with positive predictive value 55.81% and negative predictive value 78.12% and with false positive rate = 44.1% and false negative rate = 21.8%.

Table 3 : Associated Pelvic Pathological Finding in Hysterosalpingography and Diagnostic Laparoscopy.

Pelvic Pathology	Hystero-salpingography		Diagnostic Laparoscopy	
	No.	%	No.	%
Hydrosalpinx	2	66.67	8	19.06
Ovarian Cysts	0	0.00	4	9.52
Endometriosis	0	0.00	4	9.52
Peritubal Adhesion	0	0.00	11	26.19

Fibroid Uterus	0	0.00	11	26.19
Beaded Tubes	1	33.33	4	9.52
Total	3	100.00	42	100.00

$$\chi^2 = 6.429 \quad d.f. = 5 \quad p = 0.296 \quad NS$$

The above table shows associated pathological findings in hysterosalpingography and diagnostic laparoscopy. Hydrosalpinx was detected in only 2 cases by hysterosalpingograph, but it was detected in 8 cases in laparoscopy. Presence of ovarian cyst in 4 cases, endometriosis in 4 cases, peritubal adhesion in 11 cases and fibroid uterus in another 11 cases detected only by laparoscopy. Beaded tube appearance was seen in one case by hysterosalpingograph and in 4 cases by laparoscopy.

Complications were more in diagnostic laparoscopy as compared to HSG. During HSG, 4 patients complained of pain and vomiting while in laparoscopy, 3 cases complained of fever and only one had infected stitches whereas vomiting was reported in 6 cases.

Discussion

Present study was conducted on 75 infertile women in Zenana Hospital, Chandpole an affiliate Department of Obstetrics & Gynaecology, SMS Medical College, Jaipur during the period of May 2018 to June 2019.

Present study shows that mean age of infertile women is 28 ± 2.96 . In this study, maximum number of patients (68.00%) were from middle class. Present study shows that mean duration of infertility is 4 ± 1.98 years. In present study, no abnormality was detected on general physical, systemic and per abdominal examination. In present study, out of 75 cases, 67 cases (89.33%) had no abnormality on pervaginal & perspeculum examination. In 4 cases (5.33%) B/L fornix were tender and in 4 cases (5.33%) uterus was bulky.

In the study HSG revealed left tubal block in 6 patients but laparoscopic findings showed that both tube were patent. In HSG, 3 patients had right tubal block but in laparoscopy detected B/L tubal patency in these patients. This can be explained by tubocornual spasm and mucus plugs blocking the tubes in HSG which was relieved in diagnostic laparoscopy due to the effect of anaesthesia and it may also be due to a technical or any human error. Hence, there was a significant difference between hysterosalpingography and diagnostic laparoscopy for detection of tubal pathology ($p=0.043$). **Taori MC et al (1992)¹²** compared tubal patency by HSG and laparoscopic chromopertubation test. They found tubal patency (unilateral or bilateral) in 66% cases by HSG.

In present study, the sensitivity of HSG for detection of tubal block was found to be as high as 77.41%, specificity being 56.81%, PPV was found to be 55.81 whereas NPV was 78.12%. **Lall SS et al (2007)¹³** compared tubal patency by HSG and laparoscopic chromopertubation and found sensitivity of HSG was 94.6% and specificity was 84%.

In present study, pelvic pathology was detected in 42 cases out of the total 75 patients, of which 4 cases (9.52%) had endometriosis, 11 cases (26.19%) had peritubal adhesions, 11 cases (26.19%) had fibroid uterus, 4 cases (9.52%) had beaded tube appearance, 8 cases (19.06%) had hydrosalpinx and 4 cases (9.52%) had ovarian cyst.

Vaid K et al (2014)¹⁴ found in their study that out of 177 cases, pelvic endometriosis was prevalent in 3 (15.54%) cases, beaded tube was seen in 8 (4.14%) cases, hydrosalpinx demonstrated in 5 (2.59%) cases, ovarian cyst was found in 2 (1.03%) cases, pelvic adhesions were seen in 65 (33.67%) cases and fibroid uterus was found in 7 (3.62%) cases.

It is found that tubal pathology is significantly higher in our study. This may be due to higher incidence of tuberculosis in India. The present study also shows that HSG had fewer complications when compared to diagnostic laparoscopy.

The difference between HSG and laparoscopic findings was highly significant, indicating laparoscopy is more superior to the former method.

Conclusion

HSG is the first step diagnostic test for assessment of fallopian tubes. Laparoscopy with chromotubation is the gold standard for diagnosis of tubal block, and for identifying periadnexal adhesions and endometriosis and thus to guide appropriate therapy.

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