Original Research Article

HYSTEROSONOSALPINGOGRAPHY AS A PRIMARY SCREENING PROCEDURE FOR ASSESSMENT OF TUBAL FACTOR OF INFERTILITY

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Abstract: Objective: To compare the efficacy of HSSG with HSG and to see whether HSSG can be used as a primary screening procedure for assessment of tubal factor in infertile patients. **Methods:** A comparative study was conducted on 64 patients presenting with complaint of infertility in Department of Obstetrics & Gynaecology, Acharya Shri Chander College of Medical Sciences, Jammu from June 2011 to June 2012. HSSG findings were compared with HSG findings. The sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of HSSG were calculated. **Results:** In our study, 81.25% cases were in the age group between 20-30 years. Sixty-nine percent of cases had primary infertility and 28% had secondary infertility of 2-10 years. HSSG had a sensitivity of 33% and specificity of 100% for uterine malformations as compared to HSG. In detecting tubal pathology, HSSG was found to have an overall sensitivity of 90%, specificity of 84.2%, PPV 93%, NPV 80% and concordance of 89% as compared to HSG. Also HSSG agreed with HSG findings in 91% for tubal patency and in 84.2% for tubal occlusion whereas disagreement was found in 9% of cases for tubal patency and 15% of cases for tubal block. **Conclusion:** HSSG can be used as primary procedure in detecting tubal factors in infertile patients. It has high sensitivity and specificity in detecting tubal patency. Also it allows concomitant visualization of ovaries and myometrium.

Keywords: Infertility, Hysterosalpingography, Hysterosalpingography, Tubal factor.

Introduction

Infertility affects about 10-15% of couples of reproductive age groups[1]. Tubo-peritoneal factors are responsible for 30-40% of cases of infertility. The etiology of tubal damage can be intrinsic (ascending salpingitis, including salpingitis isthmica nodosa) or extrinsic (peritonitis, endometriosis and pelvic surgery). Evaluation of tubal patency represents a key step in the basic workup of infertile women.[2,3] HSG is the most common method used for evaluation of the fallopian tubes[4]. Hysterosalpingography (HSG) is often performed as first line approach to assess tubal patency and the presence of peritubal adhesions as it is inexpensive and less invasive[5]. But it involves radiation exposure risks and is not feasible in patients with idiosyncrasies to X-ray contrast agents.[6] Laparoscopy, although permits a direct visualization of the pelvic anatomy but

has drawbacks such as the need for anaesthesia and surgical intervention and shows only external surface of the uterus and the tubes. So in order to overcome the limitations of HSG and laparoscopic chromopertubation, Hysterosonosalpingography is used to assess the tubal patency. The objective of this study was to compare the efficacy of HSSG with HSG and to see whether HSSG can be used as a primary screening procedure for demonstation of tubal patency.

Materials and Methods

Study period: One Year from June 2011- June 2012

Study Population: Patients presenting to OPD department of Obstetrics and Gynaecology, Acharya Shri Chander College of Medical Sciences And Hospital, Jammu with complaint of infertility.

Study Design:

Comparative study between Hysterosalpingography and Hysterosonosalpingography.

Inclusion Criteria: Infertile women of 20-40 years

Exclusion Criteria: Acute Genital inflammation
Age <18 years
Patients with sensitivity to radio-opaque dye.

A detailed history and examination of the patients presenting with infertility were done. Patients were then subjected to HSSG using a solution of saline, ciprofloxacin and povidone iodine on day 8 and HSG using Urograffin was performed on day 10. For both the procedures consent was taken. Premedication with atropine 0.65mg and injection diclofenac was given to prevent tubal spasm and viscera-peritoneal shock. Patient was placed in lithotomy position and vagina was draped. For HSSG, an 8F foley's catheter was inserted into the uterus transcervically and balloon inflated with 2ml saine to stabilize it. Transvaginal probe was inserted into the vagina. Aboul 30-40 ml of saline with air was injected through the catheter intermittently. If the tubes were patent, the mixture of air bubbles and saline gushed past the ovary to give the "waterfall sign" sign.

In patients undergoing HSG, water soluble radio opaque dye was injected into the uterus with the help of Leech Wilkins cannula. Two X-ray films were taken one showing cervix and uterus and other showing tubes and presence of contrast in the peritoneal cavity signifying the patency of tubes.

Results

Out of sixty-four patients, 56% belonged to the age group of 26-30 years, 25% belonged to 21-25 years age group while 9.4% patients were below the age of 20 years and 9.4% were above the age of 31 years. (Table 1)

Table 1

Age	**Numbers**	**Percentage**
< 20	6	9.4
21-25	16	25
26-30	36	56
>30	6	9.4
Type of Infertility		
Primary	46	72
Secondary	18	28

Years of Infertility		
2-5 years	46	71.87
Primary	36	56.25
Secondary	10	15.62
6-10 years	16	25
Primary	8	12.5
Secondary	8	12.5
11-15 years	2	3.1
Primary	2	3.1
Secondary	0	0

Out of sixty-four cases, 72% (46) cases had primary infertility while the remaining 28% (18) had secondary infertility. 56% (36) of all the cases had a primary infertility of 2-5 years duration. Out of all the cases, 69% (44) had primary and 28% (18) had secondary infertility of less than 10 years duration.

Out of sixty-four cases in whome HSSG was performed, no disease could be detected in 37.5% (24). Fibroid uterus was detected in 3.1% (2) , hydrosalpinx in 6.2% (4), Ashermans in 3.1%(2), tubo-ovarian adhesions in 6.25%(4) and cystic ovaries in 12.5%(4) patients. Uterine malformation was observed in 3.1% (2). All the cases were then subjected to HSG. No disease was detected in 49% (30). Uterine malformations were detected in 9.4% (6) cases, Asherman in 3% (2), unilateral hydrosalpinx in 6.25%(4) and bilateral hydrosalpinx in 6.25%(4). (Table 2)

Table 2
DISEASES DIAGNOSED ON HSSG AND HSG

S.No	Findings	HSSG		HSG	
		Number	%	Number	%
1.	Normal Pelvic organs	24	37.5	30	49
2.	Uterine Malformations Unicornuate Bicornuate	2	3.1	6 4 2	9.4
3.	Fibroid uterus	2	3.1	0	0
4.	Hydrosalpinx Unilateral Bilateral	4 2 2	6.25 3.1 3.1	8 4 4	12.5 6.25 6.25
5.	Asherman's	2	3.1	2	3
6.	Tubo-ovarian Adhesions	4	6.25	-	-
7.	Cystic ovaries	8	12.5	-	-

Table 3
COMPARISON OF HSG & HSSG FOR UTERINE MALFORMATIONS

	HSG		Total
HSSG	2	0	2
	4	58	62
Total	6	58	64

True positive 2 True Negative 4
Sensitivity 33% Specificity 100%
Correlating the findings of HSSG and HSG, it was observed that out of 30 cases with normal HSG, 22 cases had no pathology on HSSG. Out of remaining eight cases, three showed polycystic ovaries and two showed fibroid uterus on HSSG. Out of 24 cases that showed some pathology on HSSG, only eight showed abnormality on HSG.

Some pathologies like cystic ovaries were detected only during the procedure of HSSG. However, Hydrosalpinx was observed in 12.55(8) cases by HSG but only in 6.25%(4) cases on HSSG. Also intramural fibroid was detected only on HSSG but not on HSG. On the other hand, unicornuate uterus (four Cases) detected on HSG could not be demonstrated on HSSG.(Table 2)

Tubal patency on HSSG showed bilateral block in ten (15.6%) while 53.12% (34) cases had both the tubes patent. In rest of the 20 cases, 10 had right tubal block and 10 had left tubal block. (Table 4)

Table 4
TUBAL PATENCY ON HSSG

	Number of cases	Percentage
Right Tube		
Patent	10	15.6%
Blocked	10	15.6%
Left Tube		
Patent	10	15.6%
Block	10	15.6%
Both Tubes		
Patent	34	53.12%
Block	10	15.6%

These cases were then evaluated by HSG. Bilateral tubal occlusion was diagnosed in 15.6% (10) cases whereas in 50% (32) cases both the tubes were found to be patent. Out of remaining 11 patients, 14 patients had unilateral right tubal block and four had unilateral left block and four patients had right unicornuate uterus (absent left tube).(Table 5).

TABLE 5
TUBAL PATENCY ON HSG

	Number of cases	Percentage
Right Tube		
Patent	8	12.5
Blocked	14	22.0
Left Tube		

Patent	14	14
Block	4	4
Both Tubes		
Patent	32	50
Block	10	15.6

Out of 40 cases in which right tubes (32 bilateral and 8 unilateral) were found patent on HSG, only 36 showed patency on HSSG, whereas out of 46 left tubes (32 bilateral and 14 unilateral) were found patent on HSG, 42 were found patent on HSSG. Out of 24 (10 bilateral and 14 unilateral) right tubes which were found blocked on HSG, only 20 showed block on HSSG. Out of 14(10 bilateral and 4 unilateral), left tubes which were found blocked on HSG, 12 showed block on HSSG. Out of 32 cases with bilateral tubal patency on HSG, 28 showed patency and out of 10 cases with bilateral block on HSG, only 6 showed bilateral block on HSSG.(Table 6)

Table 6
COMPARISON OF HSSG WITH HSG FOR TUBAL PATENCY

	HSG	HSSG	PERCENTAGE
Right Tube			
Patent	40	36	90
Blocked	24	20	83.33
Left Tube			
Patent	46	42	91.30
Block	14	12	85.71
Both Tubes			
Patent	32	28	87.5
Block	10	6	60

On the whole,a total of 86 (both left and right) tubes were seen to be patent by HSG, out of which HSSG showed patency in 78 tubes i.e. 19.6%. Out of a total of 38 tubes found to be blocked on HSG, 32 (84.5%) tubes showed no peritoneal spill on HSSG.

Table 7
COMPARISON OF HSSG WITH HSG

HSSG	Right tube	Left tube	Both Tubes	Overall
True Positive	36	42	28	78
True Negative	20	12	6	32
False Positive	4	2	4	6
False Negative	4	4	4	8

Table 8
SENSTIVITY AND SPECIFICITY

	Right Tube	Left Tube	Both Tubes	Overall
Sensitivity	90%	91.3%	87.5%	90%
Specificity	83.33%	85.7%	60%	84.2%

PPV	90%	95.5%	87.5%	93.0%
NPV	83.33%	75%	60%	80.0%
Concordance	87.5%	90%	81.0%	89.0%

Discussion

In our study, 81.25% cases were in the age group between 20-30 years. Sixty –nine percent of cases had primary infertility and 28% had secondary infertility of 2-10 years. Uterine malformation constituted 9.4% on HSG. These included two cases of bicornuate uterus and four cases of right unicornuate uterus. HSSG could demonstrate only the bicornuate uterus but not the unicornuate uterus. The absence of tube on one side of unicornuate uterus was interpreted as being blocked tube. In our study, HSSG had a sensitivity of 33% and specificity of 100% for uterine malformations as compared to HSG. In a study by Uchenna C. et al. HSG identified defects in 64 of abnormal cavities on hysteroscopy missing almost 42% with sensitivity of 58.2%. In addition, HSG described abnormalities in 29 of 39 normal cavities for a false positive rate of 74.4% and specificity of 25.6%. HSSG identified 63 of the 77 defects missing <20% with sensitivity of 81.8%. Of the 16 normal cavities on hysteroscopy, 1 was described as abnormal on HSSG with specificity of 93.8%. In study by Randolf et al. USG demonstated a sensitivity of 98% and specificity of 100% compared to HSG with sensitivity of 98% and specificity of 92% in demonstrating uterine abnormalities. The sensitivity, specificity, positive predictive value and negative predictive value of HYCOSY in the diagnosis of uterine pathology was 72.1%, 96.15%. 93.93% and 80.64% while that of HSG was 83.3%, 60.7%, 63.6% and 80.64% respectively[8].
Intramural fibroids were detected in the anterior wall of two patients on HSSG but were missed on HSG. Uterine syneche were detected with both Hsg and HSSG. Diagnostic accuracy of HSSG was 98% for submucosal fibroids, 96% ofr polyps, and 81% for synechiae.[9]

The great variation in the findings reported by various investigators may be due to the difference in the sample size and type studied and difference in the expertise of the observer to interpret the findings of HSSG.

Analyzing the results of tubal patency by the two methods in the present study, bilateral tubal occlusion was observed in 15.6% of cases by either method. However, HSG showed bilateral tubal patency in 50% cases whereas HSSG showed bilateral tubal patency in 53.12% cases.
Out of 10 cases in which both the tubes were blocked at HSG, only 6 cases showed occlusion on HSSG whereas remaining four cases were interpreted as having one of the tubes patent on HSSG. Another 32 cases in which HSG showed both the tubes patent HSSG could demonstrate bilateral patency in only 87.5%(28) whereas remaining four cases showed unilateral block on HSSG. Six cases of unilateral tubal block found on HSSG demonstrated bilateral tubal patency on HSG.

Based on present study, HSSG was found to have an overall sensitivity of 90%, specificity of 84.2%, PPV 93%, NPV 80% and concordance of 89% as compared to HSG in detecting tubal pathology. Also HSSG agreed with HSG findings in 91% for tubal patency and in 84.2% for tubal occlusion whereas disagreement was found in 9% of cases for tubal patency and 15% of cases for tubal block. Kore et al. demonstrated that when the results of HSSG were compared to laparoscopy,

97% correlation was noted whereas there was around 93% correlation between the results of HSSG and HSG.[10] A meta analysis conducted in 1995 evaluated 20 studies comparing HSG to laparoscopy with chromopertubation for diagnosing tubal pathologies. The study demonstrated that HSG had 65% sensitivity and 83% specificity for diagnosing tubal occlusion.[11] Dijkman et al compared contrast SIS with HSG in evaluating tubal pathology in 100 sub fertile women using laparoscopy as a reference test. And found that the likelihood ratio of diagnosing tubal occlusion were similar between HSG and SIS. HSG[12].
HSSG is an excellent screening method to detect tubal patency because of its high sensitivity and specificity, very close to Laparoscopic Chromopertubation[13].

Conclusion

HSG and HSSG are both outpatient procedures that do not require sedation or anaesthesia. HSSG has the advantage of not exposing a patient to ionizing radiation or iodine containing contrast as HSG does. HSSG can also be easily performed in the clinic while HSG requires a dedicated radiology facility. Additionally, HSSG allows concomitant visualization of the ovaries and myometrium. So it should be considered as first line screening method for tubal evaluation in infertile patients.

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