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Original Research Article

A Comparative Study between Sonosalphingography and Laparoscopic Chromopertubation for Tubal Evaluation

Yasmeen Usmani[1], Vishnu Datt Pandey[2,] Ekrumullah[3], Seema Rashid[4], Yogesh Yadav[5*]
[1]Department of Radiodiagnosis, S.V.B.P. Hospital, LLRM Medical College, Meerut, UP
[2]Department of Anatomy, LLRM Medical College, Meerut, Up.
[3]Department of Radiodiagnosis, J N Medical College, AMU, Aligarh, UP.
[4]Department of Obs. & Gynae. , J N Medical College, AMU, Aligarh, UP.
[5]Department of Anatomy, Dr. BSAMCH, Rohini, Delhi.

***Corresponding author**
Dr. Yogesh Yadav
Email: dryogeshyadav@gmail.com

Abstract: Infertility has not only been a source of personal misery, a cause of disgrace and divorce since ancients times but it continues to be a major medical and social problem even today. Tubal factor is constituted the largest single cause of infertility**.** Evaluation of tubal patency is important for comprehensive work up of infertile patients. To find out whether sonosalphingography, which is a less invasive method, can be used for assessment of tubal factor in cases of infertility initially instead of the invasive methods like hysterosalphingography and diagnostic laparoscopy with chromopertubation. A total of 40 patients infertility, attending our infertility clinic were studied and all underwent sonosalphingography and laparoscopic chromopertubation. Sonosalphingography was found to have a sensitivity of 86.6%, specificity of 80% positive predictive value of 92% and negative predictive value of 66% in the assessment of bilateral tubal patency. Sonosalphingography was found to have a Sensitivity of 80% Specificity of 94%, positive predictive value of 97% and negative predictive value of 66% in the assessment of bilateral tubal block. A Correlation was noted in the results of Sonosalphingography and Laparoscopy in 93 % cases.
Keywords: Infertility, salphingosonography, transvaginal sonography, laparoscopic chromopertubation

INTRODUCTION

The age old problem of infertility still continues to baffle gynecologists. Amongst all the causes of infertility, the tubal factor is the largest single cause of infertility accounting for 35.9%-40% of patients[1,2].

The incidence of tubal factor is rapidly increasing with increasing prevalence of salpingitis, sexually transmitted diseases etc. The assessment of tubal patency is commonest and most practical method of evaluating tubal function. Aim of the study was to evaluate accuracy and efficacy of sonosalphingography in assessment of tubal patency, particularly in comparison to established methods like laparoscopy and to determine its value as a basic non-invasive screening procedure in infertile women.

MATERIALS AND METHODS:

The study involved a series of 40 patients of infertility from gynecological outpatient department at Jawaharlal Nehru Medical College & Hospital, Aligarh. Tubal patency was evaluated by TVS in department of radio-diagnosis. In all these patients, detailed history with respect to nature and duration of infertility and history suggestive of etiological factors like PIH, TB, previous operations etc were taken. Menstrual history, past obstetric history in case of secondary infertility and significant personal and past history were recorded. History regarding male factors of infertility was also taken. The patients were subjected to a general, abdominal and bimanual pelvic examination to detect any obvious pathology. Routine investigations, husband's semen analysis and other relevant investigations were done in all these cases.

Sonosalphingography (SSG)

ln post-menstrual preovulatory phase (Day-8). These patients were subjected to sonosalpingography in Gynaecology OPD. Transvaginal sonography was done on USG Machine GE LOGIC 500 using 7.5 MHz Vaginal Transducer. Patients were administered 20mg

of HyosineN-butylbromide (Buscopan) intramuscularly, one hour before the commencement of procedure, in an attempt to eliminate tubal spasm in response to anxiety or discomfort during sonosalpingography, which otherwise might lead to an erroneous diagnosis of tubal obstruction. Diagnostic premenstrual D & C laparoscopy was done under general anesthesia in all these patients preferably in the same cycle. The data was analysed to study the accuracy of sonosalpingography in the evaluation of tubal patency as compared to the laparoscopy.

The 3 scanning maneuvers used were:-

1. Side to side movement within upper vagina for sagittal imaging.
2. Transverse orientation for imaging in semiaxial /axial planes.
3. Cervical imaging by gradual withdrawal of probe.

Images of the uterus with the Foley's catheter in situ were obtained in the sagittal and coronal planes. After scanning the uterus, left ovary and right ovary, we concentrate on an area between the left cornu of the uterus and the left ovary). About 30-40 cc of sterile saline with air with an ampoule of a suitable antibiotic and hydrocortisone was pushed through the Foley's catheter. The left tube if patent distended and the mixture of saline and air-bubbles gush past the ovary to give rise to what is known as "the Waterfall Sign", the sign of sonosalphingography. The procedure was repeated on the right side. The catheter was then deflated and pulled out. Patients with bilateral tubal block complained of a sharp acute lower abdominal pain the moment the mixture of air and saline was injected and the reflux was seen very clearly in the stem of Foley's catheter with slight withdrawal of the probe. The patients were allowed to rest for a short period of time and then sent home on a 5-day course of doxycycline and metronidazole.

Laparoscopy

Laparoscopic chromopertubation along with endometrial biopsy was done on day 21 or 22 of the cycle, preferably in the same cycle. During laparoscopy the whole of the pelvis was first inspected and then diluted methelene blue (0.1%) was injected and the passage of the dye through the fimbrial ends of the tubes was looked for.

OBSERVATION & RESULTS

We had studied 40 patients on whom sonosalphingography (SSG) and laparoscopy done.

The age range of patients was 20-40years with majority of being 26-30 years (47%). Thirty-four patients (85%) had primary infertility, while 6 (15%) had secondary infertility. Duration of Infertility in our study ranged from 01 -15 years with majority (70%) of patients having infertility of 01 to 05 years duration. Sonosalphingography revealed bilateral tubal patency in 28(70%) cases, bilateral block in 06 (15%) and right and left sided block in 4 (10%) and 2 (5%) cases respectively and laparoscopy revealed bilateral tubal patency in 30 (75%) cases, bilateral block in 05 (12.5%) and right and left sided block in 03 (7.5%) and 2 (5%) cases respectively. (Table – 1&2).

Sonosalphingography was found to have a sensitivity of 86.6%, specificity of 80% positive predictive value of 92% and negative predictive value of 66% in the assessment of bilateral tubal patency A Correlation was noted in the results of Sonosalphingography and Laparoscopy in 93 % cases. Sonosalphingography shows tubal blockage in 12 (30%) patients was found to be comparable. Sonosalphingography was found to have a Sensitivity of 80% Specificity of 86%, positive predictive value of 66% and negative predictive value of 92% in the assessment of tubal block. Sonosalphingography was found to have a Sensitivity of 80% Specificity of 94%, positive predictive value of 97% and negative predictive value of 66% in the assessment of bilateral tubal block. A single TVS scan with Sonosalpingography in the same sitting provides a lot of information about the underlying causes of female infertility besides assessing the tubal patency and the condition of the pelvic organs.(Table-3)

Table-1 Observations by Sonosalpingography and Laparoscopy

Findings	No Of Patients	
	Sonosalpingography	Laparoscopy
Bilateral Patency	28 (70%)	30 (75%)
Bilateral Block	06 (15%)	05 (12.5%)
Right Block	04 (10%)	03 (7.5%)
Left Block	02 (5%)	02 (5%)

Table-2: Comparison of Sonosalpingography and Laparoscopy

S.No	Criteria	True Positive	False Positive	False Negative	True Negative
1	Bilateral tubal patency	26 (65%)	2 (5%)	4 (10%)	8 (20%)
2	Bilateral tubal block	4(10%)	2 (5%)	1 (2.5%)	33 (82.5%)
3	Left tubal block	1(2.5%)	1 (2.5%)	1 (2.5%)	37 (92.5%)
4	Right tubal block	2 (5%)	2 (5%)	1 (2.5%)	35 (87.5%)

TRUE POSITIVE- finding present in both procedures
FALSE POSITIVE- finding present in SSG but absent in Laparoscopy
FALSE NEGATIVE- finding absent in SSG but present in Laparoscopy
TRUE NEGATIVE- finding absent in both procedures

Table-3:– Associated Findings On SSG and Laparoscopy

S.No	FINDINGS	Number of Patients (%)	
		SSG	Laparocsopy
1.	Hydrosalphinx	3 (7.5%)	5(12.5%)
2.	Tuboovarian masses	2 (5%)	4 (10%)
3.	Fibroid	8 (20%)	9 (22.5%)
4.	Ovarian cyst	6 (15%)	8 (20%)
5.	Congenital anomalies	2 (5%)	3 (7.5%)

Table- 4: Showing the Results of Studies of Different Workers

Parameters	Present Study (n=40)	Volpi *et al* [3](n=l54)	Inki *et al*[4] (n=32)	Phillipe Jeanty [5] (n=115)
Average Age (yr.)	29 yr	31.7 yr	31 yr	31.9 yr
Average duration of infertility	20 months	19 months		25.5 months
Procedure: Saline *I* Air injection	Saline mixed with Air	Air then Saline Solution	Air/ Saline Solution than saline	Saline Solution then air
Laparoscopy done	40 pts	29 pts	53 tubes	15 pts
Sensitivity	86.6	85	90.2	85.7
Specificity	80%	91.5%	83,3%	77.2%
PPV	92%	89.3%	94.9%	54.5%
NPV	66%	85%	71.4%	94.4%
Agreement	93%	90%	89%	79.4%
Disadvantages	Abdominal pain	Abdominal pain	Abdominal discomfort	Abdominal pain
	Vasovagal reaction			Vasovagal reaction
	No infection			No infection

DISCUSSION

Sonosalphingography is a relatively new technique in the evaluation of tubal patency in infertile women. The present study was carried out on infertile patients attending Gynecology OPD at Jawaharlal Nehru Medical College, A.M.U. Aligarh.Present study was comprised of 40 patients of which 34 (85%) had primary infertility and 06 (15%) had secondary infertility. The average age of patients studied by us was found to be 29 years which is comparable to the average age of 31.7 years 3l years and 31.9 years found by Volpi E. *et al*[3], Inki P. *et al*[4] and Philippe Jeanty *et al*[5] respectively as shown in Table 4.

Bilateral tubal patency was found in 28 (70%) patients on SSG and in 30 (74%) patients on Laparoscopy out of 40 patients examined by both methods. The results of our study showing a correlation or 93% between SSG and Laparoscopy are in agreement with those of Allahbadia [6], Inki *et al*[4] and Nabil *et al*[7] who reported 90%, l1% and 94% correlation respectively apparent disagreement between the results of our study and those of H. Spalding *et al*[8], Philippe Jeanty *et al*[5] and Exacoustos *et al*[9] who reported a correlation of 85%,79.4% and 86.6% respectively was probably due lo slight difference in techniques used by them .

This study undertaken for the assessment of bilateral tubal patency showed a sensitivity of 86.6% which was in agreement with those of Volpi *et al*[3] and Philippe Jeanty *et al*[5] who reported 85% and 85.7% sensitivity respectively. Specificity found in our study was 80% which was in agreement with those of lnki P.

et al[4] and Philippe Jeanty *et al*[5] who reported 83.3% and 77 .2% specificity respectively. Apparent disagreement between the results of our study and those of Volpi *et al*[3] and Oguntoyinbo *et al*[10] when reported 91.5% and 96.8% specificity respectively was probably due to slight difference in techniques used by them .The high sensitivity and specificity of the method in diagnosing tubal patency in the present study also support the role of sonosalphingography as a reliable screening test to assess tubal patency. Positive predictive value of 92% found in the present study is in agreement with the results of Volpi *et al*[3] and Inki P. *et al*[4] who reported 89.3% and 94.9% positive predictive value respectively apparent disagreement between the results of our study and those of Philippe Jeanty *et al*[5] and Oguntoyinbo AE *et al*[10] who reported 54.5% and 98.3% positive predictive value respectively. However negative predictive value of 66% found in our study was in agreement with results of lnki P. *et al*[4] who reported 71.4% negative predictive value. Apparent disagreement between the results of our study and those of Volpi *et al*[3] and Philippe Jeanty *et al*[5] who reported 85% and 94.4% negative predictive value respectively was probably due lo slight difference in techniques used by them. In 2 patients we got false positive results i.e. tubes found patent on SSG showed bilateral blockage on Laparoscopy, Both these patients had a huge hydrosalpinx. The hydrosalpinx itself could be the reason for the false positive results since turbulence of flow of saline through dilated tubes may simulate spillage on ultrasound screen. In 3 patients, false negative results were elicited i.e. blocked tubes shown on SSG were found patent on laparoscopy. This could be done to rubocurnual spasm during the injection of saline, endometrial bits blocking the tube, peritubal adhesion, inappropriate technique or human error. The insertion or catheter into uterine cavity was successful in all 40 cases and mild pelvic pain during the insertion of foley's catheter or injection of saline was experienced by approximately half of the patient and 4 patients reported moderate to severe abdominal pain requiring medication. Two patients experienced vasovagal collapse after and no infective complications occurred during one month of follow up. These observations of the present study are similar to those of Philippe Jeanty [5] and Inki P. *et al*[4] who reported abdominal pain, vasovagal reaction and absence of infection in their studies. Compared to other procedures SSG causes lesser degree of discomfort[5]. In the present study tubal blockage was found responsible for infertility in 12 (30%) patients by SSG .This was in agreement with the reports of WHO study [11], Sharma *et al*[2], M. Rahman & D.K. Sinha [12] who reported tubal factors responsible for infertility in 27% ,35.5%, 40% and 30 -40% cases respectively. This study undertaken for assessing bilateral tubal block showed sensitivity of 80% and specificity of 94%, positive predictive value of 97% and negative predictive value of 66% are in agreement with the results of Ornigbodun AO *et al*[13] who reported sensitivity of 90 to 100 % and a specificity of 95 % in detecting bilateral tubal occlusion. Non-visualization of both tubes is associated with much increased resistance to pushing the piston of the syringe. In our study left and right sided tubal block found 2(5%) and 4(10%) cases respectively are in agreement with the results of M. Rahman & D.K. Sinha [12]who reported left and right sided tubal block in 2 (5%) and 4 (10%) cases. TVS is a safe and repeatable procedure and does not need any special device. TVS permits easy evaluation of the pelvis, giving a complete picture of other diseases such as endometriosis cysts, polycystic ovarian disease or fibroids, which are impossible or difficult to diagnose by HSG. It is performed with isotonic saline injection without general anesthesia. It is easy to perform, safe, cost-effective, non-invasive and less time consuming. When aseptic conditions arc provided, there is no infective complications resulting from this technique. As stated by other researchers, HSG presents a number of potential problems in evaluating the upper genital tract. Iodinated contrast agents could produce an anaphylactic reaction in a sensitized patient. Moreover, this technique requires radiologic facilities and associated staff. Ayida and coworkers [14] have recently suggested that laparoscopy and chromotubation have no place as a primary test for tubal patency in a non complicated patient (i.e. a patient without a history of pelvic inflammatory disease, endometriosis or genital tract anomaly). TVS may also be used to assess tubal status alter microsurgery for anastomosis and is clearly indicated in patients with no history of reactions to iodinated contrast material.

Apart from this, sonosalpingography has the following advantages:

1. It is an office procedure, less time consuming and cost effective.
2. It is a non-invasive procedure.
3. No anaesthesia is required.
4. It helps in diagnosing both uterine anomalies and pelvic pathologies.
5. It can be used to detect tubal patency during post-operative hydrotubation following tubal rcconstructive operation.
6. No radiation hazards are involved.

However sonosalpingography can be criticised on the following grounds:

1. Site of tubal block cannot be determined.
2. lntratubal pathology cannot be visualised.
3. Peritubal adhesions and mobility of the tube cannot be properly assessed.
4. There are false positive results in cases of massive hydrosalpinx
5. Findings are subjective.

Laparoscopy has the advantage of direct visualization of tubes, detection of peritubal adhesions

and fimbrial pathology. But exact site of tubal block may not be diagnosed and there are anesthetic and operative hazards involved.

CONCLUSION

A single TVS scan with SSG in the same sitting provides a lot of information about the underlying causes of female infertility besides assessing the tubal patency and the condition of pelvic organs. SSG is such a simple, safe, noon-invasive and cost effective mode of investigation which can be used as a screening procedure for assessment of tubal patency in initial workup of infertile females. SSG is a first step procedure of the choice in assessment of tubal patency; if it does not demonstrate patency, the next step can be laparoscopic chromopertubation.

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