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A comparative study of the methods of tubal patency using Hysterosapingography, Sonosalpinography and Laproscopic Chromopertubation

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Abstract

Objectives: To find out the comparative evaluation of Sonosalpingography, Hysterosalpingography and Laparoscopy for determination of tubal factors in cases of primary and secondary infertility.

Method: A total of 71 patients 45 with primary infertility and 26 with secondary infertility attending our obstetrics and gynaecology department were studied from June 2015 to July 2016. All underwent Sonosalpingography, Hysterosalpingography and Laparoscopic chromopertubation. Chi square tests were used for statistical analysis to find out the sensitivity and specificity of the test.

Result: Sonosalpingography has 100% sensitivity and 80.5% specificity in comparision to laparoscopy chromopertubation whereas hysterosalpingography has sensitivity of 94.6% and specificity of 73.1%.

Conclusion: As Sonosalpingography has high sensitivity and specificity and is less invasive. It should be used initially to assess tubal patency in case of infertility. Laparoscopy is the best technique for diagnosing tubal and peritoneal disease as it allows direct visualization of all the pelvic organs.

Keywords: Tubal Patency, Hysterosapingography, Sonosalpinography, Laproscopic Chromopertubation

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Introduction

Infertility is defined as the ability to conceive after unprotected intercourse for a period of one year for couple in which the women is under 35 years or six months of trying for couples in which the women is over 35year of age. Primary infertility is a condition in which no previous pregnancies have occurred. Secondary infertility is a condition in which a prior pregnancy, although not necessary live birth has occurred. A roughly about 10% to 15% of reproductive age couples in United States are affected by infertility. There were an estimated 48.5 million infertile couples worldwide from year 1990 to year 2010.(1) There are only little changes noted in the overall prevalence of infertility in most of countries. The prevalence of female infertility has increased since 1990 but secondary infertility has decreased overall. Among the females, the causes of infertility both ovulatory dysfunction and tubal pathologist are responsible for approximately 40% cases each. The fallopian tubes play an important role in reproduction. After ovulation the fimbria pick up the oocyte from the peritoneal fluid, the epithelial cilia in the tube than transport the oocyte up to the ampulla. The capacited spermatozoa are transported from the cervix through the endometrial cavity into the ampulla of the fallopian tube, where ultimate fertilization occurs. Fallopian tube abnormalities or tubal damage obstruction may either result in infertility or abnormal implantation resulting in an ectopic pregnancy. Tubal obstruction can commonly result due to formation of scar tissue and adhesions due to infections(especially chlamydia and gonorrhea), endometriosis, pelvic tuberculosis and salpingitis isthmic nodosa or abdominal or gynaecological surgeries.

While a full testing of tubal functions in patients with infertility is not possible, testing of tubal patency is feasible. Hysterosalpingography (HSG) is able to accurately define the shape and size of the uterine cavity. It can help diagnose uterine developmental anomalies submucous myoma adenexal and endometrial polyps. A hysterosalpingography will demonstrate that tubes are open when the radio opque dye spills into the abdominal cavity. In comparison to hyterosalpingography, sonosalpingography (SSG) helps in eliminating the risks associated with the use of dye and radiation required for hysterosalpingography. The saline infusion sonography technique employs the use of sterile solution as a negative contrast in conjunction with traditional transvaginal sonography. Thus beside the imaging the uterine cavity, this technique also helps in evaluating the patency of fallopian tubes. Diagnostic laproscopy is another modality in which dye is pushed intracervically through cannula and flow is directly seen under vision through laproscopic peritoneally called as chromopertubation for patency.

Every method has its own merits and demerits. Laparoscopy is an invasive procedure and carries some amount of risks, whereas HSG fails to detect extratubal and peritoneal factors. Keeping in mind all the positives and negatives points related with each other procedure this study was planned to compare the efficacy of diagnostic procedures in infertility.

Material and Methods

The study was conducted in the Department of Obstetrics and Gynaecology in UPUMS, Saifai, Etawah in collaboration with Department of Radiodiagnosis between Feb 2015 and Jan 2016. All patients with primary infertility who fit in the inclusion criteria were selected in the study. The patients were initially counseled along with their partner and a through history of both the partners was obtained followed by a general and pelvic examination of female partner. A haemoglobin, urine analysis, blood VDRL and blood sugar tests were obtained. Patients were carefully selected after excluding the contraindication.

Inclusion criteria:

- All cases of infertility between 20-40years.
- All patients willing to participate in study.
- Not suffering from other Medical illness.
- Normal seminal and other parameters of the partner.

Exclusion criteria:

- Age less than 20years and above 40 year.
- Active PID.
- Patients with cervical pathology.
- Hypersensitivity to contrast.
- Patients unfit for anesthesia.
- Patients having history of tubal surgery.

To assess the tubal factors, a prior written informed consent was taken from all patients and were posted for specialized tests as hysterosalpingography, sonosalpingography and diagnostic laproscopy with chromopertubation and findings of all the procedure were recorded. Sonosalpingography procedure was done during the proliferation phase of menstrual cycle between 6^{th} to 10^{th} days. The procedure involves instillation of normal saline into the endometrial cavity during vaginal sonography and inspection of the tubes for spillage. The vulva and vagina was cleaned with antiseptic solution, a sterile speculum introduced into the vagina and ant. Lip of cervix was held with valsellum. A foley catheter of no 10 size introduced beyond the internal os and balloon distended with 3ml of normal saline to prevent retrograde leakage of saline into the vagina. The speculum was then removed and the transvaginal introducer inserted into the vagina. The catheter position in the endometrial cavity identified and repositioned if necessary. Sterile saline 20ml then injected slowly through the catheter under continuous sonography control. The uterus scanned systematically in sagittal and coronal planes to delineate the entire endometrial cavity and appropriate image recorded. Spillage on each side of tube assessed by turbulence noted and fluid accumality in the pouch of douglas.

HSG was performed prior to ovulation between menstrual cycle days 7 to 12 to avoid potential pregnancy. With patients in dorsal lithotomy position, a balloon catheter was inserted through the cervix and past the internal cervical os. Contrast dye (radio opaque material) was dissolved in 10-20cc of water and was injected into the uterine cavity by contrast material and second in spreading period of abdomen.

Laproscopy was done under general anesthesia at least three month after HSG. After preoperative evaluation and preparation of the patient, laproscopy was performed in the supine position under effect of general anasthesia, cleaning and sterilization of abdomen upto mid thigh and vagina was done. Sims speculum was introduced into the vagina. So that cervix could be visualized clearly. Meanwhile a small incision about 1cm was made above the umbilicus through which camera was passed into the abdominal cavity. Meanwhile catheter is passed through cervix through which methylene blue dye is forced into the uterine cavity to the fallopian tubes in order to see for patency of fallopian tube which is seen as spill of dye into the peritoneal cavity and visualized by camera.

Results

The present study was carried out in total 71 numbers of patients. The maximum numbers of patients were between 26-30 year (55.5%) of age group in primary infertility and 42.3% patients were in secondary infertility (Table 1). It is also clear that maximum percentage of infertility patients belong to lower socioeconomic status. Thirty five patients (77.7%) out of 45 of primary infertility belong to the lower socioeconomic status (Table 2).

Table 1: Demography profile of the patients. (n=71)

Age (yr)	Primary infertility n=45	Secondary infertility n=26
20-25 yr	7 (15.5%)	3 (11.5%)
26-30 yr	25 (55.5%)	8 (30.7%)
31-35 yr	10 (22.2%)	11 (42.3%)
>35 yr	3(6.6%)	4 (15.3%)

Table 2: Socioeconomic status of patients

	Primary infertility n=45	Secondary infertility n=26
Lower	35 (77.7%)	19 (73.0%)
Middle	5 (11.1%)	5 (19.2%)
High	5 (11.1%)	2 (7.6%)

The results of all three diagnostic procedures are shown in Table 3.

Table 3: Assessment and correlation of three test for tubal patency (n=71)

	Both tube patent	Both tube block	Rt. Tube block	Left tube block
SSG	18	35	12	6
HSG	13	31	18	9
Laparoscopic chrompertubation	26	30	11	4

The statistics have been calculated taking n=142 (i.e. 71 cases each with two fallopian tubes).

For evaluating the tubal patency, the comparison of the sonosalpingography with diagnostic laproscopy, the sensitivity of transvaginal sonosalpingography has been calculated to be 100%, the specificity was 80.59%, the positive predictive value was 85.22%, and the negative predictive value was being 100%. The percentage of false negative were 0% and the percentage of false positive was 19.4% total accuracy was calculated to be 90.84% (Table 4).

Table 4: Tubal patency comparison of sonosalpingography with diagnostic laproscopy. (n=142)

	Block (n=75)	Open (n=67)
Block(n=88)	75	13
Open (n=59)	0	54

On comparison the data of hysterosalpingography with the diagnostic laproscopy for evaluating tubal patency, the sensitivity of Hysterosalpingography for detecting tubal patency was 94.6%, the specificity was 73.13%, the positive predictive value was 79.7%, and the negative predictive value was 92.48%. The percentage of false negative were 5.3% and the percentage of false positive was 26.86%.The total accuracy was calculated to be 84.5% (Table 5).

Table 5: Comparison of Hysterosalpingography with Diagnostic Laproscopy. (n=142)

	Block (n=75)	Open (n=67)
Block (n=89)	71	18
Open (n=53)	4	49

Hysterosalpingography was found to be inferior in sensitivity, specificity, negative predictive value and positive predictive value from sonosalpingography in this study when compared with diagnostic laproscopy.

Pelvic Pathologies were better detected by Laproscopy than by Sonosalpingography and Hysterosalpingography and Sonosalpingography detected more pelvic pathology than Hysterosalpingography (Table 6).

Table 6: Associated Pelvic Pathology in the Study. Total patients n=71

	Sonosalpingography	HSG	Diagnotic Laproscopy
Endometriosis	2	-	1
Fibroid	3	-	5
Hydrosalpinx	8	7	8
PCOD	3	-	6
Peritubal adhesion	-	-	7
Tubo ovarian mass	3	-	2
Septate uterus	-	1	1
None	52	63	41

Discussion

Seventy one women presenting with infertility, attending outpatient department of Obstetrics and Gynaecology, after the initial work up of infertility tubal factors were studied by sonosalpingography and diagnostic laproscopy performed during the same cycle and the comparative evaluation was performed. Out of 71 patient, 45cases (63.4%) head primary infertility in contrast to 26 cases (36.6%) with secondary infertility.

A study done by Seal Subrata Lall[(2)] et al in the year 2004 they found that majority of women with primary infertility. Maximum percentage of the patient was between 25-30 years (64.8%) of age group followed by age group below 25 years (18.3%). A study done by Seal Subrata Lall[(2)] et al in the year2004 they found that majority of the women of primary infertility belong to the age group of 20-30years. In our study bilateral tube patency was documented in 18 patients (25.4%) by sonsalpingography, in 13 patients (18.3%) by hysterosalpingography and in 26 patients (36.6%) on diagnostic laproscopy. Allahabadia[(3)] G. N found 82% (41 out of 50 cases)tubes bilaterally patent by sonosalpingography 74% (37 cases) by hysterosalpingography and 82% (41 cases) by laproscopy. Our findings confirms to those of F.F. Mitri[(4)] et al (1994) who found bilateral patency by sonosalpingography in 31.25% (5 cases out of 16 total cases) and by hysterosalpingography in 18.75% (3 cases).

In the present study bilateral tubal blockage was demonstrated in 35 patient (49.3%) by sonosalpingography, in 31 patient (43.7%) by hysterosalpingography and in 30 patients 42.3% by diagnostic laproscopy. Bilateral tubal blockage was reported by Allahabadia[(2)] G.N in 12%. 20% and 12% cases by sonosalpingography, hysterosalpingography and diagnostic laparoscopy respectively. A study was

done by Beenamol[5] et al (2013) demonstrated by bilateral tubal blockage in 16%, 20.8%and 16% cases (n-24) in sonosalpingography, hysterosalpingography and diagnostic laparoscopy respectively.

The sensitivity of transvaginal sonosalpingography for detecting tubal blockage has been calculated to be 100%. The specificity true negatives was 80.59%. The positive predictive value was 85.22% negative predictive value being 100%. The percentage of false positive out numbered. The percentage of false negative, the probable cause could be the spasm of the utero-tubal junction caused by apprehensive, anxiety and pain that lead to false interpretation of patient taken as blocked tube. The overall agreement of sonosalpingography. Finding with that of laproscopy for patent and blocked tube was 90.84%. The sensitivity of hysterosalpingigraphy for detecting tubal blockage was calculated to 94.6%. The specificity was 73.13%. The positive and negative predictive value of hysterosalpingography was79.7% and 92.45% respectively. The percentage of false negative was 53% and that of false positive was 26.86%. The total accuracy was calculated to be 84.50%.

Allahabadi[6] G. N et al (1992) found considerable discrepancy between finding at hysterosalpingography and laparoscopy in the presence of peri tubal adhesion or endometriosis. The concordance rate was 73% between the two procedure. In the series of Heli Heikkine[7] et al (1995), the correlation between hysterosalpingography chromopertubation was reported to be approximately 75%. Subrat et al 2004 found that the sensitivity of hysterosalpingography is slightly less i.e., 94.6% and specificity is 84%.

Hysterosalpingography has certain disadvantage. It detect only the endotubal pathology some time it cause allergic manifestation and reaction to the drugs used known hydrosalpinx, acute PID or cervicitis and adenaxal mass palpable on bimanual examination all constitute contraindication to hystero salpingography. It also exposes women to radiation. However hysterosalpingography has the advantage of detecting the site of blockage, istuima nodosa benign polyps and tubal endrometriosis. Laproscopy is the best technique for diagnosis of tubal and peritubal disease. It allows visualization of all the pelvic organ and permits detection of uterine fibroid, peritubal and periovarian adhesion and pelvic endrometriosis. Laparoscopy also allows careful assessment of the external architecture of the tubes and in particular the visualization of the fimbria. But it has the disadvantage of being and invasive procedure associated with morbidity and mortality.

The sonosalpingography has also certain other advantage it is outpatient procedure, less time consuming and cost effective, it is a non-invasive procedure, no anesthesia is required. It helps in the diagnosis of both uterine anomalies and pelvic pathologies. It causes no radiation hazards, it avoid allergic reaction. Its disadvantage are tubal spasm may lead to the diagnosis of the tubal occlusion. In hydrosalpinx tubal flow may give a false impression of tubal patency, intra tubal pathology cannot be detected site of blockage, cannot be detected precisely peritubal adhesion and motility of the tubes cannot amerced properly.

Sono salpingography picked up the fibroid in three patient (4.2%) while diagnostic laparoscopy picked up the fibroid in five patient. Hysterosalpingography picked up the septate uterus in a 1 case which could not be visualized on diagnostic laparoscopy and diagnosed the septate uterus as Arcuate uterus. The sensitivity of transvaginal sonography for detecting tubal blockage was100% and the specificity was 80.59%.

Conclusion

Hysterosalpingography can be done as an outdoor procedure and is the most frequently used diagnostic tool for evaluation of the endometrial cavity. It also helps to diagnose the uterine anomalies, but might not prove to be useful for diagnosis of peritubal adhesions or endometriosis.

The sonosalpingography, offers a much less invasive and costeffective method for evaluation of uterine cavity and for assessing tubal patency, while maintaining a high sensitivity and specificity similar to that of laproscopic chromopertubation. The sonosalpingography can be perform in patients who have bronchial asthmas or cardiac problem. Sonosalpingography is highly sensitivity and specific and is less invasive. The sonosalpingography should be used initially to assess tubal patency in case of infertility, if any abnormality is detected on sonosalpingography, a hysterosalpingography or laproscopy can be done for the confirmation.

Reference

1. Richard O B, Daniel J S, Mylene W M Y. Infertility. In: Berek J S. Berek and Novak's gynecology. 14th ed. New Delhi: Lippincott Williams and Wilkins; 2007. 1185-1276.
2. Subrata Lall et al. Comparative evaluation of sonosalpingography hysterosalpingography, and laparoscopy for determination of tubal patency, J Obstet Gynecol India 2007;57:158-61.
3. Allahbadia G N, Nalawade Y V, Palkar V D. Sonosalpingography. Bombay Hospital journal 1991;33:12-16.
4. Mitri F F, Andronixau A Det al. A clinical comparision of sonographic hydrotubation and hysterosalpingography. British J of Obst & Gynae 1991;98:1031-36.
5. Beenamol et al. A comparative study between sonohysterosalpingography and hysterosalpingography in the evaluation of infertility. Journal of Evolution of Medical and Dental Sciences 2013;7:702.
6. Allahabadia G N. Fallopian tubes and ultrasound: The Sion experience. Fertile Steril 1992;58:901-2.
7. Heli Heikkien et al. Transvaginal salpingography for the assessment of tubal patency in infertile women: Methodological and clinical experiences. Fertile Steril 1995;64:293-98.