

Role of 3 Dimensional Sonohysterography in Infertility Workup

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Abstract

Introduction : Infertility is defined by WHO(1975) as “ inability to conceive after 12 months or more of regular unprotected intercourse by a couple in reproductive age group”. It is classified as primary and secondary infertility with tubal and peritoneal pathology comprising 30-40%. Here, the aim of our study was to evaluate the diagnostic role of 3 dimensional sonohysterography for detection of intrauterine, extrauterine lesions and tubal pathology and to compare it to diagnostic hysterolaparoscopy.

Materials And Methods: Hospital based prospective, descriptive study conducted on 50 patients of infertility with normal pelvic manual examination and normal transvaginal sonography done between march 2012 to august 2013 in the Department of Obstetrics and Gynaecology, SMS Medical College, Jaipur, Rajasthan .

Results: Majority of cases i.e.31(62%) were of primary infertility and 19 (38%) were of secondary infertility with mean age of cases 26.58±4.19 years and mean duration of infertility was 4.33±3.66 years. Out of 31 cases of primary infertility,3-dimensional sonosalpingography

revealed bilateral tubal patency in 28(90.32%) cases and blockage either unilateral or bilateral in 3(9.68%) cases. Out of 19 cases of secondary infertility, bilateral patency seen in 14 (73.70%) cases and block in 5 (26.32%) cases while laparoscopy showed patency in 41cases and blockage in 7 cases.

Conclusion: 3-Dimensional sonohysterography can replace hysterolaparoscopy as a preliminary diagnostic tool in infertility workup, being cost effective and noninvasive.

Keywords: 3 diensional sonohysterography, diagnostic hysterolaparoscopy, extrauterine lesions, infertility, intrauterine lesions, tubal pathology.

Introduction

Infertility is defined by WHO as “inability to conceive after 12 months or more of regular unprotected sexual intercourse.”[1] It is classified as 1.) Primary :- no previous pregnancy has occurred (approx 40%). 2.) Secondary :- at least one pregnancy has taken place irrespective of outcome (approx 60%). Among causes of infertility, tubal and peritoneal pathology and ovulatory

dysfunction constitute 30-40% and 20-40% respectively.[2] The basic methods for evaluation of uterine cavity and tubal patency are :-HSG, TVS, Saline sonosalpingography, Hysteroscopy, Laparoscopy and 3D ultrasound with saline salpingography.

- **TVS:** It has advantage of being more sensitive for detection of submucous myomas and endometrial polyp.
- **Hysteroscopy:** It is a gold standard for both diagnosis and treatment of intrauterine pathologies.
- **Laparoscopy:** It permits definite diagnosis of pelvic adhesions and test for tubal patency by direct visualisation.
- **3D Sonography:** New imaging technique which enables visualisation of uterus and endometrial cavity from any chosen angle.
- **Saline Sonography:** It is a technique of introduction of sterile saline into uterus for revealing uterine shape, cavity and contour.

When we combined 3D-USG with saline salpingography, it provides detailed information regarding internal as well as external contour of uterus and obviates the need for other modalities like hysteroscopy, laparoscopy which are invasive and has anaesthetic risks. Hence, the current study was done to evaluate the diagnostic role of 3 dimensional sonohysterography for detection of intrauterine lesions, extrauterine lesions and tubal pathology.

Material & method

- This was a prospective, descriptive study carried out in the department of obstetrics and gynaecology, SMS Medical College, Jaipur over a period of one year. Ethical clearance was taken from Institutional Ethical Committee.

- Fifty women with complaint of infertility with normal pelvic bimanual examination and normal TVS were taken after informed and written consent.
- We used 3-D USG with sonohysteroscopy, diagnostic hysteroscopy and diagnostic laparoscopy for evaluation of infertility in our study.
- All the procedures were performed in postmenstrual phase of menstrual cycle.
- Sonosalpingography was performed by a single operator using 3 dimensional ultrasound system with 5MHz transvaginal transducer between days 5 and 10 of menstrual cycle.
- The women was placed in lithotomy position and a foleys catheter size no. 8 was placed just above the internal os under all aseptic precautions and the balloon was inflated with 1 to 2 ml of sterile saline solution.
- Then a 20ml plastic syringe containing solution of ciprofloxacin and hyaluronidase with dexamethasone to foleys catheter was attached and we introduce transducer in posterior vaginal fornix. The solution was slowly introduced into uterus.
- Around 5-15ml fluid was required for distension of uterine cavity. At this stage architecture of the uterine cavity was observed using 3D SHG.
- Test results were considered normal if endometrial outline was not distorted and no intrauterine lesion was observed.
- While fluid was being pushed into the uterine cavity bilateral ovaries were focused to look for fountain effect on colour doppler. Red colour denotes high velocity while blue colour denotes low velocity.
- The patients were then subjected to diagnostic hysterolaparoscopy, following day by the same operator to avoid interobserver variations.

If you are using Word, use either the Microsoft Equation Editor or the Math Type add-on (<http://www.mathtype.com>) for equations in your paper (Insert | Object | Create New | Microsoft Equation or Math Type Equation). "Float over text" should not be selected.

Results

The mean age of cases of infertility in our study population was 26.58 ± 4.19 yrs with maximum number of cases i.e. around 50% were between the age group of 21-25 yrs. Majority of the cases i.e. 31 (62%) were of primary infertility and 19 (38%) were of secondary infertility. The mean duration of infertility in our study population was 4.33 ± 3.06 yrs.

Table no. 1 comparison of tubal finding between 3D SSG and laparoscopy. 3D SSG showed tubal patency (either unilateral or bilateral) in 47 women and bilateral tubal occlusion in 3 women. These were confirmed by laparoscopy in 46 and 4 women as tubal patency and occlusion respectively.

Table no 2 shows the efficacy of 3 D SSG in diagnosis of tubal patency compared to that of laparoscopy (gold standard). 3D SSG showed tubal patency in 42 women and block in 8. These were confirmed by laparoscopy in 41 and 7 women as tubal patency and tubal occlusion respectively. The findings of both methods were agreed in 48 out of 50 women (concordance 96%). Agreement for the two methods was compared by kappa index value which was 0.73, showed good agreement between two methods.

Table no 3 shows that in majority of the cases i.e. 92% no additional findings were picked up by laparoscopy in comparison to 3 D SSG. The pick up rate of cystic ovary/ovarian pathology was 12%. Adhesions and tubal kinking (peritubal and periovarian) were an important finding picked up by laparoscopy in 8% of cases. Inability

to diagnose peritubal adhesion is an important shortcoming of 3D SSG.

Table no. 4 shows the accuracy of 3D SSG in diagnosing ovarian pathology. Normal ovaries were seen in 37 out of 50 cases. These were confirmed by laparoscopy in 36 cases. Of the 13 cases of ovarian pathologies 3 were normal looking on laparoscopy. This was because of the presence of multiple small follicles seen in ultrasound, but the size of ovary was normal. Hence laparoscopic view was assumed to be normal.

Table no.5 shows the accuracy of 3D SSG in the assessment of abnormalities of uterine cavity. Positive findings in form of anatomical abnormalities like fibroid, endometrial polyp and mullerian anomalies (arcuate and septate uterus) were seen in 5 cases. These findings were confirmed on hysteroscopy. In 45 patients, no abnormalities were found in 3D SSG. These were confirmed in only 43 cases with hysteroscopy. In two cases the findings were missed on 3D SSG. There were 2 cases of filmy intrauterine adhesions present in the fundal region near the ostia.

Table no.6 shows the sensitivity, specificity, PPV, NPV and diagnostic accuracy of 3D SSG. It was comparable to the gold standard diagnostic hysterolaparoscopy.

Discussion

The mean age of cases of infertility in our study population was 26.58 ± 4.19 yrs. Majority of cases were of primary infertility 31 (62%) and remaining 19 (38%) were of secondary infertility. This was similar to study done by Kiyokawa K. et al (2000) [3] which showed that, out of 25 patients, 16 (64%) had primary infertility and 9 (36%) had secondary infertility. Majority of women approached for infertility work up within 1-5 years of married life with mean duration of infertility 4.33 ± 3.06 years. Similar results were observed by Kiyokawa K et al (2000)[3] with mean period of infertility as 3.5 years and

by Wahid El Sherbeny et al (2010)[4] with mean period of infertility 3.4 ± 1.6 years in their study. The diagnostic accuracy of 3 D SSG in diagnosis of tubal patency in our study was sensitivity 97.60%, specificity 87.50%, PPV 97.60% and NPV 87.50%. Kiyokawa K et al (2000)[3] studied 25 infertile patients to assess tubal patency and uterine cavity using 3 D hysterosalpingo-contrast sonography. In 50 fallopian tubes assessed, patency was seen by both methods in 38 cases. In 12 tubes in which occlusion was found, it was confirmed by X-ray hysterosalpingography in only 4 and discordance was seen in 8 cases between the two methods. Our results were similar to study conducted by Jinjura suttipichate et al (2002)[5] where 42 women were recruited in study procedure to evaluate test characteristics of transvaginal SSG for assessment of tubal patency in comparison to laparoscopy. The findings of both methods agreed in 40 out of 42 women i.e. concordance 95.24%. The sensitivity of saline SSG in diagnosing tubal patency was 96.97%. The most imp additional finding picked up by laparoscopy was adhesions (peritubal and periovarian), which was seen in 3 (6%) cases. Others were cystic ovaries and fibroid as seen in 6 (12%) and 1 (2%) cases. Agarwal S and Chandravati et al (1985)[6] conducted a study on 510 women of infertility to enumerate the incidence and nature of various pelvic factors involved in clinically normal patients of infertility. They concluded that 111 women had no pelvic pathology but commonly encountered were endometriosis, pelvic inflammatory adhesions, ovulatory dysfunction and obstructive lesions of fallopian tubes on laparoscopy as seen in our study. For evaluation of ovarian pathology the sensitivity and specificity of 3D SSG was 90.91% and 92.30% respectively. PPV was 79.90% and NPV was 97.30% with accuracy 93.00%. The agreement for DL and SSG was compared as kappa index value which was 0.78, showing

good agreement between the two. Additionally 3D ultrasound had role in assessment of ovaries and was helpful for measuring and evaluating follicles, which an added advantage over laparoscopy. 3D SSG had a sensitivity of 71.43% to detect intrauterine pathology. The test had a specificity and PPV of 100% and NPV of 95.58% with accuracy 96%. Wahid El et al (2010)[4] studied 180 infertile women with a normal uterine cavity at transvaginal ultrasound, who then underwent infertility workup with 3D SSG and office hysteroscopy. With hysteroscopy as the gold standard for diagnosing intrauterine lesions, the sensitivity, specificity, PPV, NPV of 3D SSG was 92%, 100%, 100% and 98% respectively which was in close agreement with our study.

A. Tables

Table No. 1 : Tubal Finding On 3-Dimensional Sonosalpingography and Laparoscopy

Tubal passage	3 - D SSG	Laparoscopy
Unilateral or Bilateral Patency	47	46
Bilateral occlusion	3	4
Total patients	50	50

Table No. 2: Accuracy of 3-Dimensional Sonosalpingography in Diagnosis of Tubal Patency

3D SSG	Laparoscopy with chromopertubation		Total
	B/L patent	U/L or B/L blocked	
B/L patent	41	1	42
U/L or B/L blocked	1	7	8
Total	42	8	50

Table No. 3 : Additional Findings Picked up by Laparoscopy

Findings	No. of cases	Percentage
Normal Looking Uterus	45	92.00
Cystic Ovary	6	12.00
Adhesions(Peritubal/Periovarian)	3	6.00
Tubal Kinking	1	2.00
Fibroid	1	2.00

Table No. 4 : Accuracy of 3-Dimensional Sonosalpingography in Diagnosing of Ovarian Pathology

3D SSG	Diagnostic Laparoscopy		Total
	Normal	Abnormal	
Normal	36	1	37
Abnormal	3	10	13

Table No. 5 : Accuracy of 3-Dimensional Sonosalpingography in Assessment of Uterine Cavity Abnormalities

3D SSG	Diagnostic Hysteroscopy		Total
	Normal	Abnormal	
Normal	43	2	45
Abnormal	0	5	5

Table No.6 : Comparison of Diagnostic Values of 3-Dimensional Sonosalpingography as Against Diagnostic Hysterolaparoscopy

Diagnostic Values	Tubal Patency	Ovarian Pathology	Uterine cavity	Gold Standard - DHL
Sensitivity	97.60	90.91	71.43	100.00
Specificity	87.50	92.31	100.00	100.00
PPV	97.60	79.92	100.00	100.00
NPV	87.50	97.30	95.56	100.00
Accuracy	96.00	92.00	96.00	100.00

Conclusion

3 dimensional sonohysterography is a practical, easily accessible, acceptable, non invasive, cost effective and efficient tool to assess women with infertility. It's sensitivity, specificity and diagnostic accuracy is comparable to hysterolaparoscopy, which is the gold standard for evaluation of fertile women. But , the later is invasive, requires operative skill and has an inherent risk of surgery and anaesthesia. Thus, in the hands of skilled practitioner, with a good technological basis , 3 Dimensional sonohysterography can replace the invasive methods, as a preliminary diagnostic tool, in infertility workup and endoscopies reserved for women with abnormal findings in 3D HSG, requiring therapeutic intervention.

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