

Original Research Article

Evaluation of efficacy of sonosalpingogram for assessing tubal patency in infertile patients with hysterosalpingogram


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Abstract

Introduction: Infertility is a leading psychosocial problem in couples. Diagnostic evaluation of uterine tube is important in the management of infertility. Causes or factors of female infertility can basically be classified regarding whether they are acquired or genetic, age, smoking, sexually transmitted infections (STIs), adhesions in the peritoneal cavity, previous abdomen surgeries, diabetes mellitus, smoking, alcohol, celiac disease, liver and kidney disease and being overweight or underweight can all affect fertility. Proper evaluation of the infertility is needed for better management of the cases of infertility.

Aim of the study: To assess the efficacy of Sonosalpingography (SSG) and Hysterosalpingography (HSG) in the diagnosis and management of infertility.

Materials and methods: A total 75 cases attending the department with complaint of infertility. Cases between ages 21 years and 44 years were recruited for this study. Duration of this study was two years, from June 2016 to May 2018. All the cases were undergone with baseline transabdominal sonogram, real time transvaginal sonography and saline infusion sonography to examine pelvic region of the cases. All the participants had to undergo SSG on 8th day and HSG on 10th day of the menstrual

cycle. Data was collected and sensitivity and specificity of SSG over HSG was assessed. Statistical analysis was done by using SPSS software version 14.0.

Results: Diagnosis by SSG showed bilateral tubal patency in 83.93% cases and by HSG showed bilateral tubal patency in 75% cases. SSG and HSG both correlated well (95.3%) and both procedures had similar diagnostic accuracy. In this study, positive predictive value was 95.2% and negative predictive value was 94.6%. Sensitivity was 98.3%, specificity 85.6% and accuracy rate of this study was 95.8%. The outcome of this study indicates that there is no statistically significant difference ($p=0.338$) between the values of SSG and HSG.

Conclusion: SSG is cost effective and radiation free procedure. The outcome of SSG is almost similar to the values of HSG.

Key words

Tubal patency, Primary infertility, Secondary infertility, Sensitivity, Specificity, Sonosalpingography, Hysterosalpingography.

Introduction

Infertility is becoming an alarming health hazard among Indian couples. It is an issue of both sexes (40-50% by female partner and 30-40% by male partner). In India, almost 27.5 million couples suffer from infertility. The management methods of infertility have remarkable impact on the lifestyle, personal and social life of couples. Fallopian tube blockage is the leading factor and accounts for one third of infertility cases [1]. In United States, almost 10% of women belonged to reproductive age group were suffering from infertility [2]. Diagnostic evaluation of uterine tube is important in the management of infertility. Various methods are available such as HSG, SSG and laparoscopy [3]. HSG is the gold standard technique since decades in the diagnosis of infertility which is a contrast enhanced fluoroscopic method which helps to examine the uterine tubes and cavity. Laparoscopy depicts the endometrium which is not possible with HSG. SSG is an economic and outpatient procedure without exposure to radiation [4]. It is effective in identification of intrauterine abnormalities, tubal patency, fluid accumulation in pouch of Douglas and assessing endometrial thickness with the principle of distending the uterine cavity with isotonic saline [5, 6, 7].

Aim of this study

This study was designed to assess the efficacy of SSG and HSG in the diagnosis and management of infertility.

Materials and methods

The present comparative study was conducted in Department of Obstetrics and Gynecology and Radiology, Prathima Institute of Medical Sciences, Karimnagar, Telangana State, India. Duration of this study was two years, from June 2016 to May 2018. A total 75 cases attending outpatient wing of Department of OBG with chief complaints of infertility were recruited for this study. Among total cases; 56 cases were of primary infertility and 19 cases were of secondary infertility.

Cases between ages 21 years and 44 years were included in this study, willing to go under semen analysis, regular menstrual cycles were included; cases with azoospermia, hormonal imbalance, unprotected sexual intercourse for less than one year and active Pelvic Inflammatory Disease (PID) were excluded from the study.

Informed consent was obtained from all the cases and study protocol was approved by institutional ethics committee. All cases were subjected to detailed clinical examination and history was collected. All the cases had undergone with baseline transabdominal sonogram, real time transvaginal sonography and saline infusion

sonography to examine pelvic region of the cases.

The patient was laid in lithotomy position, a speculum was introduced into the vagina and antiseptic solution was used to clean uterine cervix. SSG was performed on 8th day during mid-follicular phase. Sterile saline (5-20 mL) was infused through the catheter under the vision of ultrasound. Properties of endometrium and myometrium were studied by administering Inj. Buscopan 1 mL, intramuscularly. Presence of periovarian fluid was noted and images were taken. HSG was performed on 10th day of menstrual cycle. LEECH-WILKINSON cannula was inserted after pushing air out with contrast. With fluoroscopic control, 10 mL of contrast was pushed. Contour of uterine cavity and spill from

either end of tubes was noted. Spot films were taken. The outcome data was collected on Microsoft excel sheet. Data was analyzed by SPSS 16.0 statistical software. Sensitivity and specificity for SSG and HSG was calculated as a gold standard and positive predictive value was measured.

Results

A total of 75 cases were included in this study, 56 were of primary infertility and 19 were of secondary infertility. The age groups included were 21 years to 44 years. Age distribution and number of cases are tabulated in **Table - 1**. Maximum number of cases of primary infertility was in the age group of 21 to 30 years and secondary infertility was in the age group of 31 to 39 years.

Table - 1: Age distribution according.

Age (In Years)	Primary infertility		Secondary infertility	
	Number of cases	Percentage	Number of cases	Percentage
21 to 30 years	28	50.0	02	10.52
31 to 39 years	19	33.9	13	68.43
40 to 44 years	09	16.1	04	21.05
Total	56	100	19	100

Table - 2: Duration of symptoms in primary and secondary infertility.

Duration in years	Primary infertility		Secondary in fertility	
	Number of cases	Percentage	Number of cases	Percentage
6 months to 1 year	01	1.78	NIL	NIL
1 to 2 years	14	25.00	02	10.52
2 to 3 years	07	12.50	04	21.05
3 to 4 years	03	05.36	03	15.79
4 to 5 years	04	07.14	03	15.79
5 to 6 years	07	12.50	05	26.31
6 to 7 years	06	10.72	02	10.52
7 to 8years	05	08.93	NIL	NIL
8 to 9 years	04	07.14	NIL	NIL
9 to 10 years	02	03.57	NIL	NIL
10 to 11 years	02	03.57	NIL	NIL
11 to 12 years	01	01.76	NIL	NIL

In primary and secondary infertility, average duration of the symptoms was 1 to 2 years before reporting to the hospital (**Table - 2**).

When the comparison of the Sonosalpingography (SSG) and Hysterosalpingography (HSG) was made and the diagnosis results by SSG showed bilateral tubal patency in 83.93% cases and by

HSG showed bilateral tubal patency in 75% cases (**Table - 3**).

In this study, positive predictive value was 95.2% and negative predictive value was 94.6%. Sensitivity was 98.3%, specificity 85.6% and accuracy rate of this study was 95.8%.

Table - 3: Assessment of tubal patency by SSG and HSG.

Tube patency	SSG			HSG		
	Unilateral		Bilateral	Unilateral		Bilateral
	Right	Left		Right	Left	
Patent	49	45	47 (83.93%)	51	49	42 (75%)
Closed	07	11		05	07	

Discussion

Sonosalpingography (SSG) also popularly known as Sion test, is a diagnostic procedure primarily used for evaluating patency of fallopian tubes [8, 9]. It was introduced as a screening procedure from infertility investigations and is becoming popular among obstetrician gynecologists' due to absence of side effects. Under the ultrasound scanning guidance, a slow and deliberate injection of 20 ml physiological saline is introduced into the uterine cavity via Foley's catheter. An inflated bulb of the catheter prevents leakage of fluid outside uterine cavity. By visualizing the flow of the saline along the tube and observing it as a shower at fimbrial end, tubal patency can be tested. Presence of free fluid in pouch of Douglas (POD) also confirms tubal patency. Other uses of SSG are detection of sub-mucous fibroid or polyp, intrauterine lesions, part of infertility investigations and investigation of Amenorrhea and Asherman's syndrome.

Hysterosalpingography (HSG), also known as uterosalpingography is a radiological procedure to investigate the shape of the uterine cavity and the shape and patency of the fallopian tubes. A radio-opaque dye is injected into the cervical canal. A normal test result shows the filling of the uterine cavity and the bilateral filling of the fallopian tubes with the injected dye. Peritoneal cavity needs to be observed for spillage which indicates tubal patency. Series of X-rays are taken for analysis of the female genital tract. It should be done in the follicular phase of the

cycle [10]. It is done only in non-pregnant women and not in or during pregnancy. Mainly HSG is useful to diagnose uterine malformations, Asherman's syndrome, tubal patency or occlusion and pelvic inflammatory diseases (PID) and extensively used as a work-up investigation in infertility [11]. The HSG can be painful, so analgesics are administered before and or after the procedure to reduce the pain. A dose of antibiotics is given before the procedure to reduce the risk of infection. HSG is considered as a diagnostic procedure but may also have therapeutic benefits for infertility treatment, it was reported by many authors that after the procedure the chances of pregnancy increases by 10 percent. A meta-analysis study revealed 3.6 times greater chances of pregnancy [12] and this is due to tubal flushing with the oil-based contrast (dye). HSG is contra-indicated in pregnant women, infections, allergic reactions and coagulopathies.

Primary infertility is termed as couples not able to conceive a pregnancy even after one year of regular unprotected sexual intercourse. Secondary, infertility means unable to conceive a pregnancy after previous pregnancy [1]. Fallopian tube blockage is a leading cause of infertility in majority cases [13-16]. Diagnosis of tubal patency and its evaluation is necessary in the management of a disease. This study was designed to evaluate efficacy of SSG and HSG in the diagnosis of tubal patency in cases with infertility.

Among the total cases, 56 (74.66 %) cases had primary infertility and 19 (25.34%) cases had secondary infertility. Foroozanfard F, et al., in their study on 60 cases, 69.3% cases had primary infertility and 30.7% cases had secondary infertility [17]. In a study by Lakshmi CS, et al., 72.6% cases had primary infertility and 27.4% cases had secondary infertility [18]. In this study, majority cases were in between 21-29 years. Mean age of cases in primary infertility was 22.25±2.85 years and in secondary infertility was 27.43±3.87 years [17]. Lakshmi CS, et al., in their study considered cases between ages 20-40 years with mean age 26.9±4.9 years [18]. In 51.78% cases with primary infertility, duration of symptoms was 1-5 years and in secondary infertility-63.12% cases showed symptomatic duration up to 5 years. In few cases duration of symptoms was prolonged up to 7 years (8.93%), 8 years (7.14%), 9 years (3.57%) and 10 years (3.57%). While in secondary infertility duration of symptoms was extended up to 10 years in few cases. Study by Foroozanfard F, et al., noted mean duration of symptoms in primary infertility was 5.79±3.19 and in secondary infertility 5.97±3.36 years respectively [13]. Study by Kasivisalakshi KP, et al., observed mean duration of symptoms was 4.4 years in primary infertility and 3.6 years in secondary infertility [19]. Study by Foroozanfard F, et al., found no patency in 30.6% cases and bilateral tubal patency in 69.4% cases [17]. Whereas, in present study, diagnosis by SSG showed bilateral tubal patency in 84% cases and by HSG showed bilateral tubal patency in 70% cases.

In this study, positive predictive value was 95.2% and negative predictive value was 94.6%. Sensitivity was 98.3%, specificity 85.6% and accuracy rate of this study was 95.8% which is in close relation with the study conducted by Greeta Mathews, et al., where the positive predictive value was 95.6% and negative predictive value was 94.9%. Sensitivity was 98.5%, specificity 85.1% and accuracy rate of this study is 95.3%. Lakshmi CS, et al., in their comparative study between SSG and HSG, found sensitivity 97%, specificity 94%, positive predictive value 98.3%

and negative predictive value 75% for SSG [18]. Study by Foroozanfard F, et al., sensitivity 92.1%, specificity found 85.7%, positive predictive value is 97.2% and negative predictive value is 66.7% and accuracy rate is 91.1% [17]. Study by Kasivisalakshi KP, et al., found sensitivity is 98.1%, specificity is 83.3%, positive predictive value is 94.2%, negative predictive value is 93.7% and accuracy rate is 94.1% [19].

In the present study, HSG and SSG were correlated 95.8% and both procedures had similar diagnostic accuracy. Study by Kasivisalakshi KP, et al., found 93% of correlation between SSG and HSG [19]. Study by Johnson N et al., found 93% correlation between SSG and HSG and concluded that transvaginal SSG is a non-invasive procedure to assess the tubal patency [20].

Conclusion

Fallopian tube blockade is one of the most common causes of infertility. Proper evaluation with the best diagnostic tool gives better results in the patients of infertility. SSG is cost effective and radiation free procedure. HSG is a gold standard technique in the evaluation of tubal patency and uterine status. The outcome of SSG is almost similar to the values of HSG. In this study, positive predictive value was 95.2% and negative predictive value was 94.6%. Sensitivity was 98.3%, specificity 85.6% and accuracy rate.

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