Efficacy of Sonosalpingography and Hysterosalpingography in the Diagnosis of Infertility- A Comparative Evaluation

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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.

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

Materials and Methods: A total 50 cases attending the department with complaint of infertility between age group 2nd to 4th decades were recruited for this study. 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 16.0.

Results: Diagnosis by SSG showed bilateral tubal patency in 84% cases and by HSG showed bilateral tubal patency in 70% cases. SSG and HSG both correlated well (95.3%) and both procedures had similar diagnostic accuracy. SSG has 95.6% Positive Predictive Value (PPV), 94.9% Negative Predictive Value (NPV), 98.5% Sensitivity and 85.1% specificity in comparison to HSG. 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.

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. Study conducted in Bangalore stated that 10-15% of Indian couples are suffering from infertility. In United States, almost 10% of women belonged to reproductive age group were suffering from infertility [1].

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 [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 [5-7].

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 Radiology, Dr. BR Ambedkar Medical College, Bangalore, Karnataka, India, during April 2017 to June 2018. A total 50 cases attending outpatient wing of Department of OBG with chief complaints of infertility were recruited for this study. Among total cases; 35 cases were of primary infertility and 15 cases were of secondary infertility.

Cases between age group 2nd to 4th decades, 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.

STATISTICAL ANALYSIS

The outcome data was collected on Microsoft excel sheet. Data was analysed 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

Among the total cases 35 cases were of primary infertility and 15 cases were of secondary infertility. Majority cases were in between 21-30 years [Table/Fig-1].

Age (in years)	1^0 infertility (n=35)		2^0 infertility (n=15)	
	Number	Percentage	Number	Percentage
18-20	03	8.5%	-	-
21-25	16	45.7%	03	20%
26-30	13	37.1%	09	60%
31-35	03	8.5%	02	13.3%
35-40	00	-	01	6.6%

[Table/Fig-1]: Age wise distribution of total participants (n=50).

In 57.1% cases of primary infertility, duration of symptoms was of 2-3 years. In secondary infertility, duration of symptoms existed for 2-3 years in 26.6% cases and 3-4 years in 53.3% cases [Table/Fig-2].

Duration (in years)	1^0 infertility (n=35)		2^0 infertility (n=15)	
	Number	Percentage	Number	Percentage
0-1	-	-	-	-
1-2	01	2.8%	02	13.3%
2-3	20	57.1%	04	26.6%
3-4	04	11.4%	08	53.3%
4-5	03	8.5%	01	6.6%
5-6	02	5.7%	-	-
6-7	01	2.8%	-	-
7-8	01	2.8%	-	-
8-9	02	5.7%	-	-
9-10	01	2.8%	-	-
10-11	-	-	-	-

[Table/Fig-2]: Mean duration of infertility in primary and secondary infertility cases.

Diagnosis by SSG showed bilateral tubal patency in 84% cases and by HSG showed bilateral tubal patency in 70% cases [Table/Fig-3].

	SSG			HSG		
	Unilateral		Bilateral	Unilateral		Bilateral
	Right	Left		Right	Left	
Patent	44	41	42	46	45	35
Closed	06	09	-	04	05	-

[Table/Fig-3]: Assessment of tubal patency by SSG and HSG.

In this study 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 was 95.3% [Table/Fig-4].

HSG/SSG	Patent	Closed
Patent	45 (TP)	04 (FP)
Closed	02 (FN)	18 (TN)
Outcome	**Value**	
Positive predictive value (PPV)	95.6%	
Negative predictive value (PPV)	94.9%	
Sensitivity	98.5%	
Specificity	85.1%	
Accuracy	95.3%	

[Table/Fig-4]: Evaluation of outcome of the present study.
*TP: True positive; FP: False positive; FN: False negative; TN: True negative

DISCUSSION

The prevalence of infertility is 8-12% globally with regional variation [8]. Infertility is of two types i.e., primary and secondary. 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 [2]. Fallopian tube blockage is a leading cause of infertility in majority cases [9-12]. 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, 35 (70%) cases had primary infertility and 15 (30%) 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 [13]. In a study by Lakshmi CS et al., 72.6% cases had primary infertility and 27.4% cases had secondary infertility [14]. In this study, majority cases were in between 21-30 years. Mean age of cases in primary infertility was 26.25±3.85 years and in secondary infertility was 29.73±4.87 years [13]. Lakshmi CS et al., in their study considered cases between ages 20-40 years with mean age 26.9±4.9 years [14].

In 57.1% cases with primary infertility, duration of symptoms was 2-3 years, in 11.4% cases duration was extended up to 3-4 years. In few cases duration of symptoms was prolonged up to 7 years (2.8%), 8 years (2.8%), 9 years (5.7%) and 10 years (2.8%). While in secondary infertility duration of symptoms was extended up to 2 years in 13.3%, 3 years in 26.6% and 4 years in 53.3% [Table/Fig-2]. 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 [15].

Study by Foroozanfard F et al., found no patency in 30.6% cases and bilateral tubal patency in 69.4% cases [13]. Whereas, in present study, diagnosis by SSG showed bilateral tubal patency in 84% cases and by HSG showed bilateral tubal patency in 70% cases [Table/Fig-3].

In this study 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 [14]. 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% [13]. 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% [15].

In the present study, HSG and SSG were correlated 95.3% and both procedures had similar diagnostic accuracy. Study by Kasivisalakshi KP et al., found 93% of correlation between SSG and HSG [15]. 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 [16].

LIMITATION

This study limited to minimal sample size and focused HSG and SSG. Further studies are required to assess the efficacy of HSG, USG and laparoscopy with more number of samples in the diagnosis of uterine tube status in infertility cases.

CONCLUSION

Fallopian tube evaluation is important in infertility cases. HSG is a gold standard technique in the evaluation of tubal patency and uterine status. The results of this study concluded that SSG showed bilateral tubal patency in 84% cases and unilateral patency in 16% cases. Positive predictive value is 95.6% and negative predictive value is 94.9%. Sensitivity is 98.5%, specificity 85.1% and diagnostic accuracy is 95.3%. SSG is cost effective and radiation free procedure. The outcome of SSG is almost similar to the values of HSG.

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