ORIGINAL RESEARCH

Evaluation of Pattern of Hysterosalpingography in Infertility Patients

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Abstract

Aim: Infertility is a major burden for couples in developing nations, accounting for majority of gynecological outpatient consultation. The fallopian tubes are delicate structures, vulnerable to infections and their sequelae. The tubal factors are one of the leading causes of infertility. Fallopian tube patency and morphology of the uterus and cervix are best assessed by hysterosalpingogram (HSG). With this background, we aim to study different patterns of HSG in infertility.

Materials and methods: The present study was an observational study conducted over a period of one and a half years. A sample size of 172 patients seeking treatment for infertility and who fulfilled the inclusion criteria were recruited in the study. A routine hysterosalphingography was done to look for patency of the fallopian tubes and to identify uterine and intraluminal tubal abnormalities.

Results: The prevalence of infertility reported in the current study was 5.1%. In the present study, abnormal HSG findings were found in 37.2% ($n = 64$) of subjects. Majority of the patients had unilateral tubal blockade (24.4%) followed by peritubal adhesions (19.7%).

Conclusion: This study showed that HSG is an important and cost-effective tool in diagnosing genital tract abnormalities and tubal patency in infertility patients.

Keywords: Hysterosalpingogram, Infertility, Tubal blockade, Tubal factors, Tubal patency.

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Introduction

Infertility is an important reproductive health problem that causes emotional, psychological, and social disorders.[1] Although infertility is a global issue, the magnitude of infertility is reported worldwide differently. The infertility rate ranges from 5 to 30% as reported for different countries.[1] Infertility is a major burden for couples in developing nations, accounting for majority of gynecological outpatient consultation.[2]

There are many etiological factors of infertility but the provision of diagnostic modalities is limited in developing countries. Since infertility causes an economic drain, there is a need for investigation which is cost-effective and with high specificity and sensitivity. Patent fallopian tubes are important for normal fertility. They are particularly susceptible to infections and surgical damage, which may hamper their role of embryo pickup and fertilization. The high rate of sexually transmitted diseases, complications of unsafe abortion, and puerperal pelvic infection have led to an increase in the incidence of tubal damage.

Fallopian tube patency and morphology of the uterus and cervix are best assessed by HSG. There are many other modalities like hysteroscopy and laparoscopy for testing tubal patency but they are expensive and invasive procedures. Hence we conducted the study to find and analyze various HSG patterns in infertility and to compare them between primary and secondary infertility.

Materials and Methods

The present study was an observational study conducted over a period of one and a half years. A sample size of 172 patients seeking treatment for infertility and who fulfilled the inclusion criteria were recruited in the study. A written informed consent was obtained from all the couples after explaining the purpose of the study and assuring them of confidentiality before recruitment in the study. Approval from the Ethical Committee of the University was taken.

All patients reporting to the outpatient department who were desirous of childbearing cohabitating for at least 1 year and not using any contraceptive measure for a period of at least 1 year were recruited in the study. Subjects with a diagnosed cause of infertility, who have undergone any prior treatment for infertility, or who did not give consent for the study were excluded from the study.

A detailed history regarding demographic characteristics, marital life of the couple, menstrual history, any symptoms related to endocrine disorders, infections, tuberculosis, and any history of instrumentation was collected and documented. They were then subjected to a complete examination of genital organs. Based on the *gravida* status of the patient, the couples were grouped into primary infertility and secondary infertility. Primary infertility was defined as the inability to achieve pregnancy ever after at least 1 year of unprotected intercourse. Secondary infertility referred to cases who have experienced at least one pregnancy, irrespective of

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outcome and then after a year of regular sexual life without using any contraceptive measure were unable to bear children.

A routine hysterosalphingography was done to establish patency of the fallopian tubes and to identify uterine and intraluminal tubal abnormalities. A water-soluble iodinated dye 76% urografin was used. A fluoroscopic examination was conducted and images demonstrating contour of the uterine cavity and fallopian tubes and bilateral intraperitoneal spill of contrast were studied. The conditions which were looked for with HSG include:

Uterine

- Uterine congenital anomalies
- Submucosal uterine fibroids/endometrial polyps
- Intrauterine adhesions

Tubal

- Obliteration of fallopian tube
- Hydrosalpinx
- Salpingitis isthmica nodosa
- Tubal spasm
- Peritubal adhesions

The data were tabulated and percentages (frequencies) of various parameters were calculated and subjected to statistical test using Chi-square test and *t*-test wherever applicable. Statistical significance was taken as *p*-value ≤0.05.

Results

The prevalence of primary infertility and secondary infertility was 62.21% (*n* = 107) and 37.79% (*n* = 65), respectively. Of the total studied cases of infertility, female factors accounted for 37.21%. Among the various factors of female infertility, tubal factors were the leading cause accounting for 54.54% of cases including various pathologies like pelvic inflammatory disease (PID) and genital tuberculosis.

Table 1 depicts the correlation of various factors in primary and secondary infertility. PID was found to be more prevalent in primary infertility. This could be the reason for significantly higher cases of tubal disease in primary infertility.

Hysterosalpingogram findings were found to be abnormal in 37.7% (*n* = 64). The patterns which were observed on HSG are shown in Figure 1. Figures 2 and 3 show HSG films B/L hydrosalpinx proximal block of fallopian tubes. Both the tubal blockade (*n* = 34) and loculated contrast spill (*n* = 23) suggestive of peritubal adhesions were seen more on the right side. Table 2 highlights the different patterns observed in primary and secondary infertility and their statistical correlation.

Discussion

Hysterosalpingogram is a valuable nonoperative imaging modality in detection of patency of fallopian tubes seen as opacification with free intraperitoneal spillage of dye and uterine cavity abnormalities. HSG was performed routinely in all infertile women to evaluate tubal patency.

The incidence of abnormal HSG findings in the present study was 37.2% accounting for more than one-third of infertile

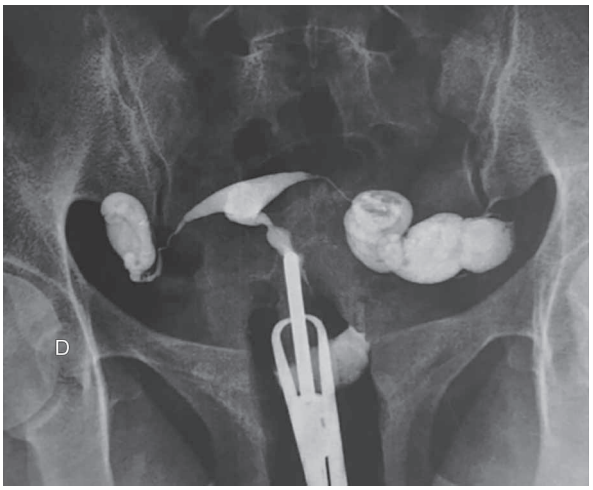

Fig. 1: HSG showing B/L hydrosalpinx

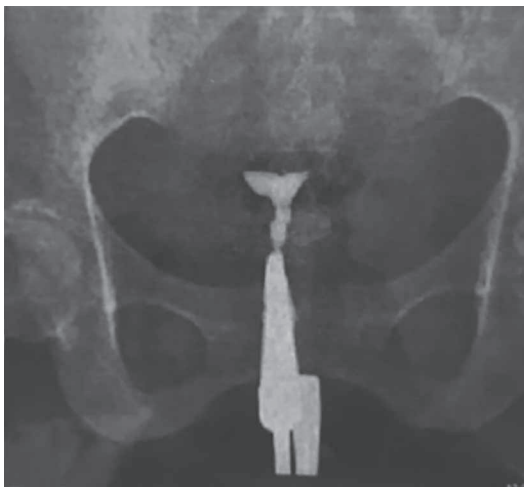

Fig. 2: HSG showing B/L cornual block and space-occupying lesions in uterus

Table 1: Comparison of sociodemographic and risk factors in primary (*n* = 107) and secondary infertility (*n* = 65)

Parameter	*Primary infertility (n = 107)*	*Secondary infertility (n = 65)*	*p-value*
Age (years) (mean ± SD)	26.2 ± 3.76	30 ± 6.48	<0.0001
Duration of infertility (years) (mean ± SD)	4 ± 2.12	6.4 ± 3.64	<0.0001
Clinical features of PID	29.23%	7.47%	0.0001
H/O instrumentation	2.80%	52.30%	<0.0001
H/O tuberculosis	25.3%	15.3%	0.12
Tubercular endometrium	1.86%	1.54%	0.87
Abnormalities on HSG	25.5	11.6	0.0009

women which is nearly comparable to previous recent studies by Deshpande and Gupta[3] and Waheed et al.[4] as shown in Table 3.

A much higher incidence of abnormal HSG findings has been reported by other studies by Onwuchekwa and Vaduneme,[5] Bukar et al.,[6] Itanyi and Oluseyi,[7] and Toufig et al.[8] The increased prevalence of subclinical pelvic infections following unsafe delivery and abortion practices and lack of local and menstrual hygiene leading to tubal damage supports the higher rates of abnormal HSG findings quoted by these studies.

Tubal pathology was the most common abnormality on HSG in the present study in agreement with various other studies by Singh et al.,[9] Al-Jaroudi et al.,[10] Toufig et al.,[8] Omidiji et al.,[11] Singh et al.,[9] Itanyi and Oluseyi,[7] etc. Unilateral tubal occlusion was seen in 25.5% and bilateral tubal occlusion in 3.49% of all abnormal cases, similar findings were seen in previous study by Menuba et al.[12] Similar rates of unilateral blockage were observed in other studies by Omidiji et al.[11] and Singh et al.[9] Contrary to our study, higher rates of bilateral tubal occlusion was observed in studies by Deshpande and Gupta,[3] Al-Jaroudi et al.,[10] and Toufig et al.[8]

Hydrosalpinx is a sequela of distal tubal occlusion with resultant dilatation of the proximal segment of fallopian tubes. Unilateral hydrosalpinx was seen in 6.4% of all infertile women, with similar rates evidenced by Omidiji et al.[11] and Bukar et al.[6] Bilateral hydrosalpinx was commoner than unilateral hydrosalpinx in a study

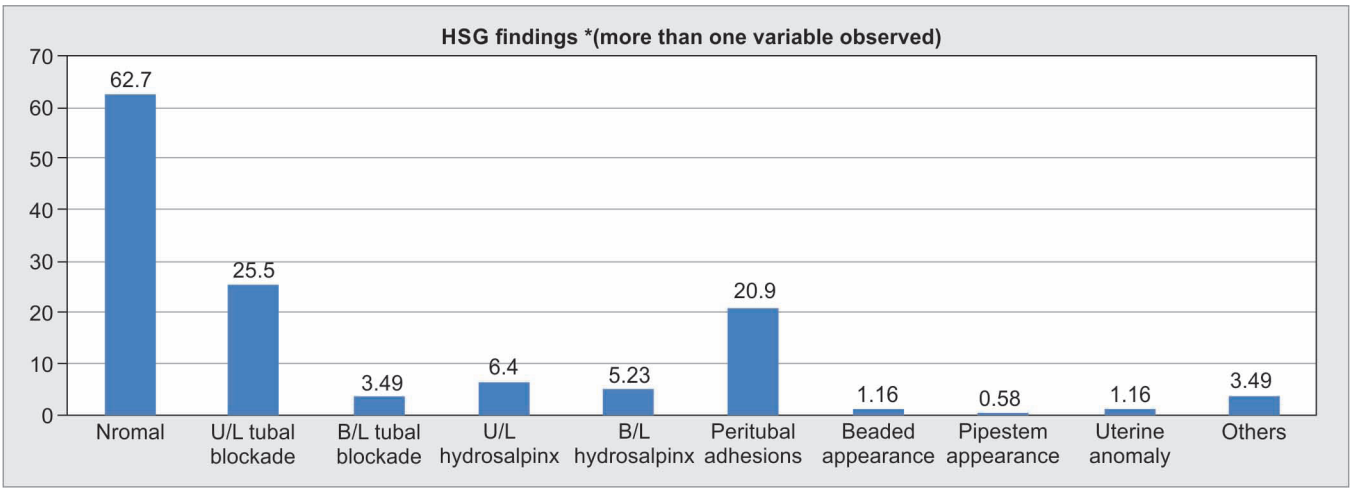

Fig. 3: HSG patterns ($n = 172$)

Table 2: Comparison of abnormal HSG findings in primary ($n = 44$) vs secondary infertility ($n = 20$)

HSG findings	*Primary infertility*		*Secondary infertility*		
**(more than one variable observed)*	*n = 44*	*%*	*n = 20*	*%*	*p-value*
U/L blockade	34	78	10	50	0.02
B/L blockade	4	9.7	2	10	0.97
U/L hydrosalphinx	5	12.1	6	30	0.09
B/L hydrosalphinx	4	9.7	5	25	0.11
Peritubal adhesions	30	68	6	30	0.005
Beaded appearance	1	2.4	1	5	0.59
Pipestem appearance	1	2.4	0	0	0.48
Uterine anomaly	2	4.8	0	0	0.32
Others (SOL or filling defect)	1	2.4	5	25	0.006

Table 3: Incidence of abnormal HSG findings

Author	*Year*	*n*	*Incidence of abnormal HSG findings (%)*
Present study	2020	172	37.2
Toufig et al.[8]	2020	75	52.7
Al-Jaroudi et al.[10]	2020	26	46.2
Deshpande and Gupta[3]	2019	120	42.43
Waheed et al.[4]	2019	303	30.3
Singh et al.[9]	2017	454	24.05
Itanyi and Oluseyi[7]	2017	219	68.04
Onwuchekwa and Vaduneme[5]	2017	299	72
Bukar et al.[6]	2011	272	70.6

Table 4: Pattern of tubal findings in other studies

Author	*Year*	*n*	*U/L tubal block (%)*	*B/L tubal block (%)*	*U/L hydrosalpinx (%)*	*B/L hydrosalpinx (%)*	*Peritubal adhesion (%)*	*Others (fibroid/ synechiae) (%)*
Present study	2020	172	16.28	3.49	6.4	5.23	6.4	3.49
Al-Jaroudi et al.[10]	2020	26	30.8	15.4	–	–	–	–
Toufig et al.[8]	2020	75	23	14.9	8		6.8	20
Omidiji et al.[11]	2019	974	15.3	10.6	5.7	3.7	–	–
Deshpande and Gupta[3]	2019	66	7.57	13.63	–	–	15.15	–
Singh et al.[9]	2017	454	15.81	8.25	–	–	–	–
Itanyi and Oluseyi[7]	2017	219					–	
Menuba et al.[12]	2014	211	15.6	2.8	1.8	3.8	–	7.8
Bukar et al.[6]	2011	272	8.5	6.3	7.5	1.5	25.8	18.8

by Menuba et al.[12] These findings again support our theory that untreated pelvic infections are the most common culprit.

Perifimbrial adhesions are fibrous tissue that forms secondary to healed pelvic infection or any trauma seen as loculated spillage of dye. The rate of perifimbrial adhesions in this study is 20.9% in agreement with the study by Toufig et al.[8] In studies by Deshpande and Gupta[3] and Bukar et al.,[6] peritubal adhesions were the leading tubal abnormality on HSG. As laparoscopy is superior to HSG in evaluating such adhesions had this been a part of our study the rate of perifimbrial adhesions in our study would have been much higher.

Features suggestive of tubercular salpingitis (beaded appearance, pipestem appearance) was seen in 4.8% of all abnormal cases. No case of salpingitis isthmic nodosa was observed in our study whereas 2.7% of patients with abnormal HSG findings had salpingitis isthmic nodosa in a study by Itanyi and Oluseyi.[7]

Uterine cavitary abnormalities include pathologies like uterine fibroid, endometrial polyp, intrauterine adhesions, adenomyosis, and congenital abnormalities. The position and size of fibroid are important as they can cause tubal blockage. Intrauterine fibroid was the most common uterine abnormality observed in our study. A case each of bicornuate uterus and septate uterus was seen in patients with primary infertility.

The current study shows a higher prevalence of tubal abnormalities in infertile women with primary infertility which is explainable by increased prevalence of subclinical pelvic infections which often goes unrecognized resulting in tubal pathologies and pelvic adhesions. Uterine abnormalities were common in patients with primary infertility in a study by Itanyi and Oluseyi,[7] which is contrary to the present study (Table 4).

Limitation of the study was a small sample size and it is recommended that a study with a larger sample size be conducted. Also to evaluate the peritoneal factors diagnostic laparoscopy is the gold standard which was not studied in the present study.

Conclusion

The present study estimated that primary infertility was more prevalent and tubal pathologies contributed the most to infertility. Causes identified like pelvic infections were mostly preventable. The sequelae can be reduced by educating adolescents about menstrual hygiene and taking medical advice before the disease flares up. This study showed that HSG is an important and cost-effective tool in diagnosing genital tract abnormalities.

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