

Role of Radiographic Hysterosalpingography in Infertility in Eastern Nepal

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Abstract

Background: Hysterosalpingography (HSG) is the radiographic technique for evaluation of uterine cavity and fallopian tubes. It still remains the best imaging procedure for fallopian tubes despite the advent of newer modalities and is used primarily for the evaluation of female infertility.^{1,2} The purpose of the study was to assess the uterine and tubal abnormalities detected on radiographic HSG as causative factors of infertility and to describe their imaging features. **Methods:** This prospective cross sectional study was conducted at the Department of Radiodiagnosis and Imaging, BPKIHS, Dharan. Forty-four patients with infertility (both primary and secondary) referred for HSG were included. HSG was performed using non-ionic contrast medium under image intensifier fluoroscopic control during the follicular phase of menstrual cycle. Radiographic films were obtained and analyzed. **Results:** Out of the total 44 patient, 26 (59.0%) had primary infertility while 18 (41.0%) had secondary infertility. Tubal abnormalities were seen in 28 (63.6%) and uterine abnormalities in 2 (4.6%) patients. The most common tubal abnormality detected on HSG was tubal block (50.0%). Unilateral and bilateral tubal blocks were equally distributed (50.0% each). Proximal tubal block was observed in 8 (36.4%) and distal in 13 (59.1%) patients. Fifteen (34.1%) patients had hydrosalpinx. **Conclusion:** HSG is easy, safe, and cost-effective and plays vital role in the evaluation of female with infertility. The most common structural cause of female infertility found as per this study was tubal block.

Keywords: Female infertility, Hydrosalpinx, HSG, Tubal block

Introduction

Infertility is termed primary if pregnancy has never occurred and secondary if a prior

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pregnancy has occurred or been documented previously, although not necessarily a live birth.³ Tubal and peritoneal factors account for almost 30-40% of cases of female infertility and hence evaluation of tubal patency represents a key step and a basic investigation in the assessment of infertile couple.⁴

HSG is the radiographic technique for evaluation of uterine cavity and fallopian

tubes. It still remains the best procedure to image fallopian tubes despite the advent of newer imaging modalities and is used primarily for the evaluation of female infertility.^{1,2} HSG has a sensitivity of 85-100% in identifying tubal occlusion.³ The specificity of HSG in identifying PID-related tubal occlusion approaches 90%.³



Fig 1: HSG showing uterine didelphys with left sided distal tubal block and terminal hydrosalpinx

HSG is usually performed between cycle days 6 and 11.³ The procedure should be avoided before day 6 of cycle due to increased incidence of vascular intravasation of the contrast agent caused by dilatation of peri-uterine veins at that time.³ Introduction of newer contrast agents such as non-ionic or water soluble contrast media are found to be associated with significantly less pain than the aqueous media used previously because of being less osmolar.⁵

HSG is used not only in the routine evaluation of most infertile couples but also for more specific indications such as evaluation of women with history of recurrent abortions, post-surgical (post-tubal reversal) evaluation and as a pre-operative control prior to uterine or tubal surgery.⁶ Improvements in technique have resulted

from advances in radiologic equipment, particularly image intensifier.

Considering the escalating incidence of infertility both globally as well as in Nepal, the present study is an attempt to evaluate the anatomical abnormalities of the female genital tract responsible for infertility in this part of the world. Therefore the objectives of the study are to assess uterine and tubal abnormalities as the causative factors of infertility in patients attending BPKIHS and to describe the imaging features of tubal and uterine abnormalities on radiographic HSG.

Methods

This prospective cross sectional study was carried out in the Department of Radiodiagnosis and Imaging, BPKIHS, Dharan, a tertiary care hospital and referral centre in Eastern Nepal, Total of 44 patients with infertility (both primary and secondary) attending the out patient department of Obstetrics and Gynecology referred for HSG examination were included. The patients with vaginal discharge, active or recently treated PID (within the past 3 months), suspected pregnancy, recent intrauterine instrumentation or tubal surgery (salpingectomy), active uterine or vaginal bleeding, palpable adnexal mass or tenderness on bimanual examination were excluded.

HSG was performed using water-soluble non-ionic contrast medium under fluoroscopic guidance (Siemens) during the follicular phase of menstrual cycle, when menstrual bleeding had stopped, between cycle days 6 and 11, under all aseptic precautions.



Fig 2: HSG showing bicornuate uterus with bilateral intra-peritoneal spillage.

Before injecting contrast, a supine control radiograph was obtained. The contrast medium was injected until the uterine cavity was distended, tubes filled and the contrast seen to spill freely from the distal ends of the fallopian tubes. Radiographic films were obtained to show uterine and tubal anatomy and peritoneal spillage. First film was taken on visualization of the uterine cavity, the second during early tubal filling and the third after peritoneal spillage. These films were reviewed and the findings analyzed.

Results

The mean age of patients was 27.2 (\pm 4.2) years with 45.4% of them belonging to the age group of 20-25 years. Age of the patients ranged from 22 to 38 years. Out of the total 44 patients, 26 (59.0%) had primary infertility while 18 (41.0%) were cases of secondary infertility. Almost 82% of patients had infertility of 1 to 5 year duration. The duration of infertility ranged widely from 1 to 12 years with a mean duration of 3.9 (\pm 2.7) years.

Table I: Radiographic abnormalities on HSG

HSG findings	Number of patients (n = 44)	%
Normal HSG (Normal tubes and uterus)	15	34.1
Tubal abnormality only	27	61.3
Uterine abnormality only	1	2.3
Both tubal and uterine abnormality	1	2.3

Out of the total 44 patients, 15 (34.1%) had bilateral normal tubes and normal uterus. Tubal abnormalities were seen in total 28 (63.6%) patients and uterine abnormalities in total 2 (4.6%) patients. One (2.3%) patient had both tubal and uterine abnormality (Table I).

Table II: Various tubal abnormalities on HSG

Type of tubal abnormality	Number of patients (n = 28)	%
Tubal block only	13	46.4
Hydrosalpinx only	5	17.8
Tubal block with hydrosalpinx	9	32.2
Peritubal adhesions with hydrosalpinx	1	3.6

Among the 28 patients detected to have some form of tubal abnormality on HSG, tubal block alone was detected in 13 (46.4%) patients whereas tubal block associated with hydrosalpinx was found in 9 (32.2%). However, among these 9 patients having tubal block with hydrosalpinx, one had

associated uterine abnormality. One (3.6%) patient had peritubal adhesions with hydrosalpinx (**Table II**). Hence, the most common tubal abnormality detected on HSG was tubal block, found in 22 (50.0%) patients, out of which 14 (63.6%) had primary infertility and 8 (36.4%) had secondary infertility.

Out of the 28 patients who had tubal abnormalities, unilateral abnormality was noted in 15 (53.6%) patients whereas bilateral abnormality was noted in 13 (46.4%) patients.



Fig 3: HSG showing non-opacification of both tubes with no evidence of intra-peritoneal spillage suggestive of bilateral proximal tubal block

In the present study of 44 patients, 16 had no tubal abnormality (32 normal fallopian tubes) whereas 28 patients had some form of tubal abnormality. Hence, 56 fallopian tubes evaluated in these 28 patients showed 15 normal tubes and 41 abnormal tubes. Out of these 41 abnormal tubes, 20 tubes (35.7%) had blockage (occlusion), 13 (23.2%) had blockage together with hydrosalpinx, 7 (12.5%) had hydrosalpinx only and 1 (1.8%) tube had hydrosalpinx associated with peritubal adhesions (**Table III**).

Table III: Various types of tubal abnormalities on HSG

Tubal findings on HSG	Number of fallopian tubes (n = 56)	%
Normal tube	15	26.8
Blockage (occlusion)	20	35.7
Blockage (occlusion) with hydrosalpinx	13	23.2
Hydrosalpinx only	7	12.5
Hydrosalpinx with peritubal adhesions	1	1.8

Proximal tubal block was observed in 8 (36.4%) and distal in 13 (59.1%) patients. One (4.5%) patient had proximal on one side and distal on another side.

Out of the two cases of uterine abnormalities detected on HSG, uterine didelphys was found in one patient and bicornuate uterus in another.

Fifteen (34.1%) patients had hydrosalpinx, out of which 5 (33.3%) had hydrosalpinx only, 9 (60.0%) had coexisting tubal block and 1 (6.7%) had associated peritubal adhesions.

Discussion

Infertility is considered a stigma and a major public health problem in many countries.⁷ In spite of the increased infertility services rendered these days, its prevalence still remains around 10-15%.⁸

An infertility workup is considered incomplete without an initial HSG

procedure. It is a safe, inexpensive and simple test which can reveal the shape of the uterine and tubal lumen. It is important to perform the procedure properly taking necessary precautions using careful techniques and intelligent analysis of findings.⁹ HSG is a fast technique and fluoroscopic time can be as little as 2 minutes with most tubal abnormalities detected.¹⁰

HSG remains the main examination for assessing the fallopian tubes in developing countries like ours, with tubal disease constituting a major contributory factor of female infertility. Abnormalities of the uterus are relatively uncommon cause of infertility but should always be considered. They can adversely affect the outcome of pregnancies achieved by successful treatment of other more common factors leading to infertility.¹¹

In the present study maximum number of infertile patients (45.4%) belonged to the age group of 20 to 25 years, that is, in the peak of the fertile period of life. However in the studies by Malwadde EK et al¹² and Dutta et al¹³, the most common age group in infertility was 26 to 30 years, which lies just beyond the maximum fertile stage.

Majority (about 82%) of the patients in our study had 1-5 years duration of infertility. This shorter duration of infertility at presentation could be due to the non-hesitancy of infertile couples in seeking early advice. Awareness of the importance of early treatment could be another factor contributing to the short duration of infertility at presentation.

In the present study, normal HSG findings were seen in 34.1% patients indicating that the cause of infertility in these subjects was not structural. The percentage of cases with tubal abnormalities was 63.6. This is comparable with the findings (61.8%) of Akinola et al.¹¹ However Sinawat et al¹⁴ reported tubal abnormalities in only one-fourth of all cases. Malwadde EK et al¹² reported abnormal findings at HSG in 83.4% of patients, tubal block in 38.9% and hydrosalpinx in 12.8%. The authors therefore concluded that the most common pathology on HSG in women presenting with infertility was tubal block possibly secondary to chronic pelvic inflammation and was found more commonly in patients with primary infertility. In the present study as well, among the various tubal abnormalities detected on HSG, tubal block ranked supreme (22 patients), accounting for 50% of the total. Hence, tubal block was the most common structural cause of infertility and was found more commonly in patients with primary (63.6%) than secondary (36.4%) infertility.

Akinola et al¹¹ reported tubal block as the most common abnormal HSG finding, with bilateral tubal block noted in 22 (10.0%) patients, unilateral tubal block in 38 (17.3%) patients (right tube) and 32 (14.5%) patients (left tube). In the present study, unilateral and bilateral tubal blocks were equally distributed (50% each). No significant difference was found between the right or left side.

In the study conducted by Poonam⁸, preponderance of proximal (88.8% of total tubal blocks) over distal tubal block was found. However, in the present study distal tubal block (59.1%) was observed more

commonly than the proximal tubal block (36.4%).

Tubal pathology with tubal block due to pelvic inflammatory disease (PID) is found to be one of the most frequent causes of female infertility. Proximal, distal and peritubal damage can be caused by a number of pathological processes such as inflammation, endometriosis and surgical trauma.

Hydrosalpinx is defined as a sausage-shaped dilatation of the proximal ampullary segment of the fallopian tube associated with thinning of adherent fimbriae and destruction of the mucosa.⁷ Hydrosalpinx, not detected by pelvic examination can be diagnosed by HSG.⁸ Hydrosalpinx, appear as a dilated, convoluted tubular structure on HSG² and contrast media does not spill out of the tube. It can be diagnosed on early films but it is best seen on the film taken 30 minutes after the completion of the procedure, as the delay allows for more accumulation of the contrast media within the blocked tube.⁷

In the present study, 34.1% of patients had hydrosalpinx, unilateral or bilateral, which is lower than that observed (44.5%) in a similar study by Adetiloye et al.¹⁵ A lower percentage of hydrosalpinx cases in our study could be due to the improvement in the health care delivery system over the years. However, hydrosalpinx represented the most common tubal pathology on HSG in most other studies^{7,16,17} and could be a reflection of the high prevalence of PID in the environment.⁷

Malik E et al¹⁸ observed uterine abnormality in 31.4% patients whereas in the study conducted by Poonam⁸, uterine anomalies

accounted for 20% of the cases. In the present study however, only 2 (4.6%) patients had congenital uterine anomalies and none had acquired abnormalities such as uterine filling defect, uterine synechiae or T-shaped uterus. The reason for less number of cases with uterine abnormalities in the present study could be the small sample size of the study population. Among the congenital uterine malformations, there was 1 patient with bicornuate uterus and 1 with uterine didelphys. The patient with didelphic uterus had tubal abnormality also, that is, distal tubal block with hydrosalpinx. On HSG the didelphic uterus appears as two completely separate cervical canals opening into fusiform endometrial cavities, each ending with a solitary fallopian tube. The complete bicornuate uterus has two separate horns of the uterine cavity which is separated by wide angle. Each of the horns has a rather fusiform appearance with a tapered superolateral apex ending in a single fallopian tube.⁶ similar appearance on HSG of didelphic uterus and bicornuate uterus was seen in the present study.

Usually quoted complications of HSG⁷, which have been reported, include infection, urticaria and syncope. Only mild procedural pain and discomfort was complained by few patients in our study and analgesics were administered.

Conclusion

HSG is an easy, relatively safe and cost-effective procedure demonstrating a wide variety of uterine and tubal abnormalities. The most common structural cause of infertility in this part of the world as per our study is tubal blockage. In a setting like ours in this developing part of the world, the radiographic HSG remains a frontline

imaging modality in the assessment of tubal and uterine factors of infertility. The radiographic description of the structural abnormalities seen on HSG ascertains the causative factors of infertility well, thus enabling the clinicians to manage this escalating problem of infertility better. Therefore it can be concluded that the radiographic HSG plays a vital role in the evaluation of female with infertility.

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