

Imaging in Infertile Female Patients Who Underwent Hysterosalpingography Investigation at Dhulikhel Hospital

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ABSTRACT

Background

Fallopian tube and uterine abnormalities are the most common cause of female infertility, accounting for 30% of cases. Hysterosalpingography is the safe, minimal invasive radiographic technique for evaluation of uterine cavity and fallopian tubes defects. The purpose of the study was to assess the various uterine and tubal abnormalities leading to infertility

Objective

To assess the abnormalities in uterus and fallopian tubes detected on Hysterosalpingography (as causative factors of infertility in a tertiary care centre for proper decision making in treatment.

Method

This is the prospective cross sectional study done in department of radiology Dhulikhel hospital, Kathmandu University Hospital between January 2015 to January 2016 with complain of infertility. Hysterosalpingography was performed using ionic contrast medium (10-20 ml of 76% urograffin) under digital fluoroscopy. Radiographic films were obtained and analyzed. Demographic data and radiological findings were reviewed and the obtained data analyzed with SPSS version 16.

Result

Out of the total 100 patient, 75 had primary infertility while 25 had secondary infertility. The age ranged from 19 to 43 years with mean age of 27.75 years. Normal Hysterosalpingography findings were seen in 37% cases. Tubal abnormalities were seen in 34%, uterine abnormalities in 23% and both tubal and uterine abnormalities in 6% patients. The most common tubal abnormality detected on Hysterosalpingography was tubal block 75%. Out of the 30 patients who had tubal block, unilateral block was noted in 76.7% patients whereas bilateral block was noted in 23.3%. Hydrosalpinx was seen in 25% cases with tubal abnormality. Among the 29 cases with various uterine abnormalities, bicornuate uterus 9% was the most common abnormality

Conclusion

Hysterosalpingography is an easily available radiographic procedure that can demonstrate a wide variety of uterine and tubal abnormalities for the initial assessment of infertility which can avoid unnecessary and sometimes more aggressive procedures.

KEY WORDS

Hysterosalpingography, hydrosalpinx, infertility, tubal block

INTRODUCTION

Infertility is the inability to conceive after a year of unprotected coitus. In primary infertility, couples are never pregnant while in secondary infertility describes they are pregnant at least once. Approximately 8 to 15% women experience infertility at one point in time in their reproductive life. But secondary is more common than primary¹⁻³; more likely to have tubo-uterine abnormalities.^{4,5}

Hysterosalpingography (HSG) is commonly available and the best first line imaging modality for the basic evaluation of infertility; and is still considered the primary choice of imaging procedure for fallopian tubes despite the advent of newer modalities.^{6,7} HSG evaluates and demonstrates morphology and patency of cervical canal, uterus, fallopian tubes and the pelvic cavity.^{5,8-10} In addition to the diagnostic value, HSG may also be used for therapeutic purposes to unblock the blocked fallopian tubes.^{11,12} The size of the uterine cavity varies with parity. The endocervical canal is of cylindrical shape with length of 3 to 4 cm and width of 1 to 3 cm.¹³

HSG has some disadvantages like contrast allergy, pelvic infection, bleeding, endometriosis and high radiation dose (1.2-3 mSv). HSG is not reliable for evaluation of extrinsic tubal pathology compared to other techniques.¹³⁻¹⁵ However, it gives a clear tubal resolution and definition compared to other techniques by.^{9,16}

Laparoscopy examination provides accurate information about extrinsic tubal pathology such as endometriosis and peritubular adhesion but is poor in diagnosing intrinsic tubal pathology which is more invasive with surgical complications and expensive.^{17,18} However, an Indian study revealed HSG and Laparoscopy to be complimentary.¹⁷

Ultrasound is used in assessing pelvic, uterine and ovarian morphology and pathology; but is poor in confirming tubal patency.^{19,20} Several studies showed sonohysterography superior to HSG in assessing intrauterine structures,^{21,22} similar in evaluating endometrial cavity and inferior for tubal evaluation.²³⁻²⁷

MRI is the study of choice in detailed elaboration of uterovaginal anatomy, but poor to diagnose intrauterine and peritubal adhesion.²⁸

Thus HSG still remains investigation of choice for the diagnosis of intrinsic tubal and uterine pathology.

METHODS

This is the prospective cross sectional study done in Department of Radiology Dhulikhel Hospital, Kathmandu University Hospital between January 2015 to January 2016. A total of 100 patients with infertility referred from Department of Obstetrics and Gynecology were included. Only the cases were sent for the procedure after ruling out other possible causes of infertility.

The study did not involve women patients with acute infection of the vagina or cervix and also women with active vaginal bleeding. Other groups of patients that were also excluded from the study were those with sub fertility complaints lasting less than a year.

Initially the patient was evaluated with detailed clinical history, a complete general, physical, systemic and local pelvic examination. Five minutes prior to the procedure inj. buscopan was given intramuscular. The patient was asked to empty the urinary bladder just prior to the procedure. The procedure was performed between 7th to 11th menstrual days on Hitachi digital fluoroscopy system. Patient was positioned on lithotomy position. Sterile Sim's speculum was applied in the vagina and the upper lip of cervix was caught with a tenaculum. 8F Foleys catheter was inserted through the OS into the endometrial canal. The speculum and tenaculum forceps were then pulled out. Then approx 10-20 ml of ionic contrast medium(76% urograffin) was slowly injected under the guidance of fluoroscopy.

A control radiograph was taken on supine position before contrast injection. 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. Serial radiographs were taken to show uterine and tubal anatomy and peritoneal spillage for analysis. The images were evaluated together by the radiologist and gynecologist and diagnosis was made in consensus. The cases with doubtful imaging findings were further evaluated with transvaginal ultrasound (TVUS). Further invasive procedures like hysteroscopy and laparoscopy were performed in the required cases and confirmed the radiological diagnosis of HSG.

Tubal pathologies are classified into fallopian tube occlusion and hydrosalpinx (one or two sided) on the basis of degree and distribution of contrast within the tube and spillage in the peritoneal cavity. Uterine cavity abnormalities are described as Unicornuate, Bicornuate, Arcuate, Irregular cavity and Fibroid on the basis of assessment of size, position and contour of the cavity. Demographic data and radiological findings were reviewed and the obtained data analyzed with SPSS version 16.

RESULTS

One hundred patients with infertility were interviewed and investigated. The age ranged from 19 to 43 years showing normal distribution with mean age of 27.75. Out of the total 100 patients, 75% had primary infertility while 25% were cases of secondary infertility. Table 1 showed more patients 68% aged between 21-30 years. The age group between 21-30 years had a high proportion of primary infertile participants 84% while more secondary infertile patients, 80% were above 31 yrs which was statistically significant ($p=0.002$).

Table 1. Age wise distribution of patients with infertility.

Age group	Type of infertility					
	primary	%	secondary	%	total	%
<20	4	5.3	0	0	4	4
21-30	63	84	5	20	68	68
>31	8	10.7	20	80	28	28
total	75	75	25	25	100	100

p-value=0.002

In the present study of 100 patients, 37 cases had normal HSG findings whereas 63 cases had abnormal findings. This could be the reason of hospital being a tertiary centre equipped with digital fluoroscopy machine. Twenty three cases had uterine abnormalities, 34 had tubal abnormalities and six of them had both tubal and uterine abnormalities.

Among the patients, 71 had normal uterine findings, whereas 29 of them had various uterine abnormalities, shown in table 2. Bicornuate uterus was the most common abnormal uterine abnormality, followed by arcuate uterus, submucosal fibroid, irregular uterine cavity and unicornuate uterus.

Table 2. Uterine abnormalities shown in HSG.

		UTERINE FINDING						Total
		A	B	F	I	N	U	
Infertility Primary	Fre	6	6	5	4	53	1	75
	%	8	8	6.7	5.3	70.7	1.3	100
Secondary	Fre	1	3	1	2	18	0	25
	%	4	12	4	8	72	0	100
Total	Fre	7	9	6	6	71	1	100
	%	7	9	6	6	71	1	100

Uterine findings N=Normal, U=Unicornuate B=Bicornuate A=Arcuate I=Irregular cavity F=Fibroid

Among the 40 patients detected to have some form of tubal abnormality on HSG, tubal block alone was detected in 75% patients whereas hydrosalpinx was found in 25% with significant p value of 0.01. Hence, the most common tubal abnormality detected on HSG was tubal block, found in 75.0% patients, out of which 63.6% had primary infertility and 36.4% had secondary infertility. Out of the 30 patients who had tubal block, unilateral block was noted in 76.7% patients whereas bilateral block was noted in 23.3% patients. Among the 10 cases with hydrosalpinx, two had bilateral and eight had unilateral hydrosalpinx. (Table 3 and 4)

DISCUSSION

Infertility in women is the main indication to undergo hysterosalpingography examination. About 40-45% of infertility is attributed by female factor including cervical factors, endometrial-uterine factors, ovarian factors and

Table 3. Tubal abnormalities shown in HSG.

		TUBAL FINDINGS					
		BB	BH	N	UB	UH	Total
Infertility Primary	Fre	6	1	49	16	3	75
	%	8	1.3	65.3	21.3	4	100
Secondary	Fre	1	1	11	7	5	25
	%	4	4	44	28	20	100
Total	Fre	7	2	60	23	8	100
	%	7	2	60	23	8	100

Tubal findings N=Normal BB=B/L Block UB=Unilateral block UH= Unilateral hydrosalpinx BH= B/L Hydrosalpinx

Table 4. Tubal abnormalities shown in HSG.

		TUBAL FINDINGS			
		Block	Hydrosalpinx	Normal	Total
Infertility Primary	Fre	22	4	49	75
	%	29.3	5.3	65.3	100
Secondary	Fre	8	6	11	25
	%	32	24	44	100
Total	Fre	30	10	60	100
	%	30	10	60	100

P value 0.01

peritoneal factors. Male factors attribute for about 25-40% while both male and female factors account for 10% and the remaining 10% is due to unexplained factors. Therefore infertility workup is incomplete without an initial hysterosalpingography examination that will depict abnormality in uterus and fallopian tubes.¹¹

In this study more patients had primary infertility than those with second infertility unlike other previous studies,^{5,8,19,29,30} However similar to other studies where it was found that primary infertility is commoner.^{31,32} The participants included in this study were of mean age of 27.75 years which was similar to the mean age of infertile women in Uganda and Nigeria,^{19,29} lower than those in Turkey and higher than those in Iran.^{31,32}

In the present study of 100 patients, 37 cases (37%) had normal HSG findings which is slightly lower as compared to previous similar study conducted at eastern part of Nepal.¹¹ Sixty three patients had abnormal findings accounted for about 63% of total cases. The reason behind this could be due to the fact that Dhulikhel hospital being the tertiary level hospital receiving referrals after initially being treated for other causes of infertility from peripheral health centers to rule out any structural abnormalities.

Hysteroscopy is the best technique for the diagnosis of uterine endometrial pathology because small submucosal myoma and polyps can be missed by hysterosalpingography. However no case of abnormal HSG findings will have normal finding in hysteroscopy, meaning false positive rate



Figure 1. HSG image showing normal endometrial canal with bilateral peritoneal spillage.



Figure 2. HSG image showing right sided hydrosalpinx with tubal occlusion.



Figure 3. HSG image showing normal endometrial canal and left sided peritoneal spillage with right sided tubal block.



Figure 4. HSG image showing bicornuate uterus.

of HSG is close to zero. In comparison to hysteroscopy the accuracy rate of HSG in diagnosing endometrial pathology ranges from 75% to 90%.^{33,34} Therefore in this study there is possibility that few patients who had normal finding could have small submucosal myoma and polyps which were not picked up by HSG. Congenital abnormalities of the uterine shape are the result of abnormal fusion of Mullerian ducts during the early weeks of gestation. The most common anomaly is the bicornuate uterus followed by arcuate uterus which has less impact on fertility. One of the common uterine pathology in this study was the presence of fibroids (6%). Fibroids which project in the uterine cavity such as those of submucosa will cause the actual filling defects which can be detected by the HSG. Uterine cavity may be distorted in its shape when the uterus has a large myoma. So HSG is of great value in evaluation of uterine cavity and fallopian tubes patency when planning for the myomectomy. Irregular uterine cavity which is a sign of infection was also present in 6%. This may be due to endometritis or synechiae following pelvic inflammatory disease (PID), post abortal or post partum infections.^{29,35} This distortion of uterine cavity due to both congenital and acquired causes result in infertility due to failure of embryo implantation or spontaneous abortion. Preterm labour, malposition of the fetus and obstructed labour may be another sequel of the uterine cavity distortion. Previous studies that compared HSG and laparoscopy showed that,

HSG has a high specificity of 80% and low sensitivity of 65% for detecting tubal patency.^{12,30,31,36} Another study showed that HSG is as accurate as laparoscopy in the diagnosis of tubal patency or blockage.¹⁸

When patency is demonstrated in HSG, there is little chance that the tube to be actually occluded. Most patients in this study (30%) were found to have tubal blockage which is similar to those study in Uganda, Nigeria and Pakistan,^{8,19,37} and lower to what was reported in South Africa accounting for 67.2%.^{5,30} The main reason for this high proportion of patients with tubal blockage is more likely due to high prevalence of pelvic inflammatory diseases among women in our environment.^{19,30}

Majority of patients with secondary infertility showed higher proportion of tubal blockage which is similar with some previous studies.^{8,18} However in HSG a common pitfall is non opacification of fallopian tube due to spasm. Though antispasmodic was used routinely in this study, its use would not have reduced the number of patients with tubal blockage significantly as very few patients show tubal spasm.

Another false negative result occurs when there is inadequate wedging of cervical cannula allowing leakage of contrast material into the vagina, thus interfering with generation of sufficient intracavitary pressure and leading to misdiagnosis of tubal blockage.

Hydrosalpinx which is not detected by pelvic examination can be diagnosed by HSG. Hydrosalpinx is seen as a dilated convoluted tubular structure on HSG which gradually increase in size due to distal tubal occlusion. It is a result of fallopian tubes inflammation following infections like gonococcal, chlamydial or tuberculosis of the genital tract. The fimbrial ends are eventually occluded due to adhesions leading to collection of the secretions in the lumen with gradual distension of the fallopian tube.

In this study 10% patients had hydrosalpinx either unilateral or bilateral which was similar with that reported in previous study done in Uganda,¹⁹ and higher than those reported in Iran and eastern Nepal.^{11,32} This high incidence of tubal related pathology may be due to the following reasons. The first is PID which is reported to be the most common gynecological disease affecting many women.^{19,30,38}

The second reason is that, in this group may be non compliance to PID treatment that may lead to sub acute or chronic PID with deleterious effects on the fallopian tubes. This indicates that PID is still common in our set up and makes it a common cause of infertility.

In this study it was observed that there is higher incidence of utero-fallopian tubes pathology in secondary infertility as compared to primary infertility which is similar to previous other studies.^{8,21}

One of the major limitations of our study was not been able

to record the detail follow up and outcome of the most of the patients due to limited time period of study. Similarly over diagnosis of tubal block could have been also made in cases of intraprocedure tubal spasm. A systematic multimodality imaging approach should be advocated in which initial hysterosalpingography is followed by hystero-graphic US, pelvic US, pelvic MR imaging, or a combination there of, with the selection of modalities depending on the findings at hysterosalpingography.

CONCLUSION

HSG is an easy, safe and cost-effective procedure which can demonstrate a wide variety of uterine and tubal abnormalities for the assessment of infertility in female. High proportion of patients in this study showed presence of uterine and fallopian tube pathology. Fallopian tubal blockage was the highest observed tubal structural abnormality while bicornuate uterus was the highest uterine pathology. HSG is still the most common and preferred imaging modality in our part in the management of infertility. Proper interpretation of the hysterosalpingogram is necessary for the initial workup in infertility and can avoid unnecessary and sometimes more aggressive procedures.

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