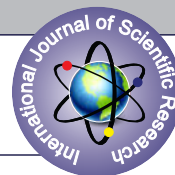


ROLE OF CONVENTIONAL HYSTEROSALPINGOGRAPHY IN THE WORK UP OF FEMALE INFERTILITY IN RURAL TERTIARY CARE HOSPITAL, INDIA



Radiodiagnosis

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ABSTRACT

Background: Infertility is a major problem throughout the world. In a country like India, it is associated with a social stigma. The cause can be multifactorial and many couples are seeking medical help for infertility nowadays. As part of the female infertility workup, hysterosalpingography plays an important role.

Methods And Material: A retrospective study was done in the department of Radiodiagnosis of a rural tertiary care hospital, India. All patients who were referred for hysterosalpingography study as part of infertility workup between January 2018 and December 2020 to the department of Radiodiagnosis were included in the study.

Results: A total of 173 patients are included in the study. Out of these 173 patients, 3 women had repeat Hysterosalpingography studies. 43.2% of these studies are abnormal. 56.8% cases showed normal findings.

Tubal abnormalities were the most common accounting for 34.6% of the total studies. Uterine abnormalities were seen in 6.8% of the total studies. Both fallopian tube and uterine abnormalities were seen in 1.7%. Post-operative follow-up imaging was available for 3 patients. All three patients had a bilateral tubal block in the first study and showed tubal patency in post recanalization HSG study.

Conclusion: Hysterosalpingography is a lesser invasive procedure, cost-effective, and does not require anesthesia compared to laparoscopy. This is a huge advantage, especially in a rural setup. It can be considered as a screening investigation along with an ultrasound examination. Tubal blockage is the most common abnormality accounting for nearly one-third of the causes of infertility in our study. Tuberculosis should always be ruled out as a cause of tubal blockage in India where it is more prevalent.

KEYWORDS

Infertility, rural health care, hysterosalpingography, tubal blockage, uterine anomalies, hydrosalpinx

INTRODUCTION

According to the WHO-ICMART glossary, Infertility is "a disease of the reproductive system defined by the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse." [1]

Infertility affects roughly 10% of the world's population.

According to a survey from the District Level Household and Facility Survey carried out in India during 2007–2008, 8% of married women reported infertility. [2]

Infertility can be multifactorial which can be due to male, female, or combined factors.

In response to the social stigma attached to being infertile and not being a mother, the number of couples seeking medical help has steadily increased over the past few years. [3]

Among the causes of female infertility, PCOS and tubal pathology are the most common causes. [4]

Patent fallopian tubes and normal morphology of the uterus are needed for normal human fertility.

Various radiological investigations are done in the workup of female infertility like conventional hysterosalpingography, ultrasonography (transabdominal and transvaginal), Magnetic resonance imaging of pelvis, etc. Hysterosalpingography, as the name itself suggests is a radiological examination of the uterus (hystero) and fallopian tubes (salpingo). Contrast dye is instilled into the uterine cavity through a cannula and fluoroscopy of the uterus, fallopian tubes, and peritoneal spillage of the dye is assessed.

Fallopian tube patency, the morphology of the uterus, and cervix are best assessed by hysterosalpingogram, which is simple, safe, and inexpensive. [5]

Despite newer innovations and recent advances in imaging modalities, hysterosalpingography remains an important baseline investigation for visualizing the fallopian tubes. [6]

The number of HSG examinations has increased dramatically over the past few years likely due to advances in reproductive medicine, resulting in more successful in vitro fertilization procedures and the trend toward women delaying pregnancy until later in life. [7]

It has also been suggested that hysterosalpingography has a therapeutic role in enhancing subfertility. [8]

In this study, the various findings on hysterosalpingography of women presenting with infertility (primary and secondary) and their incidence are discussed.

MATERIALS AND METHODS

A retrospective study of all the women who presented with infertility as the primary complaint and are referred for hysterosalpingography examination between January 2018 to December 2020 are included.

Study Design : Retrospective study.

Study Location: The study was done in the department of radiodiagnosis, PES Institute of Medical sciences and research, Kuppam.

Study Duration: January 2018 to December 2020.

Sample Size : 173 patients.

Inclusion Criteria:

Patients presenting with infertility as the main complaint.

Exclusion Criteria:

Patients with complaints other than infertility

Statistical Analysis:

The data will be entered into MS excel 2007 version and further analyzed using SPSS version 21. The categorical data will be analyzed using percentages.

RESULTS

A total of 176 studies are included in the study.

173 women who underwent Hysterosalpingography are included in

this study.

3 women had repeat Hysterosalpingography studies.

The age range of the patient is between 18-40 years, with mean age of 26.02 yrs.

The minimum age was 18 years and maximum 40 years.

Normal Hysterosalpingography appearance i.e normal filling of uterus, fallopian tubes and peritoneal spillage of contrast was seen in 56.8%.

Fallopian tube abnormalities are seen in 36.0%.

(Hydrosalpinx – 14, Tubal block – 50, Adhesions - 3)

Uterine abnormalities(anomalies and synechiae) are seen in 8.5% of total studies.

(Arcuate – 6, Bicornuate – 2, Septate / bicornuate– 2, Septate – 1, Unicornuate – 3, Synechiae – 1)

Both uterine and fallopian tube abnormalities were noted in 1.7%(3 cases)

Post operative follow up imaging were available for 3 patients. All three patients had bilateral tubal block in first study and showed tubal patency in post recanalization HSG study.

Two cases of arcuate uterus showed tubal blockage.

Table 1 Showing Year Wise HSG Findings :

Years	No of cases done	Normal	Abnormal
2018	65	34	31
2019	75	43	32
2020	36	23	13
Total	176	100	76
Percentage		56.8%	43.2%

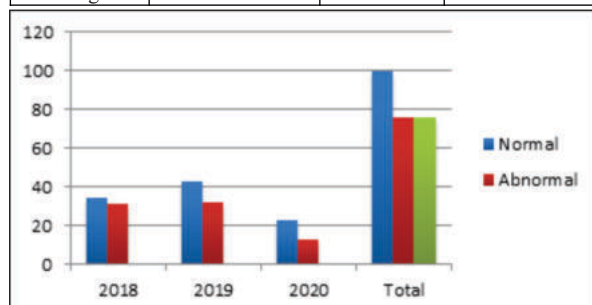


Chart 1 Showing Year Wise HSG Findings :

Table 2 Showing Number Of Uterine And Tubal Abnormalities:

Abnormal findings	Number of cases	Percentage(out of total HSG studies)
Tubal abnormalities	61	34.6%
Uterine abnormalities	12	6.8%
Both uterine and tubal abnormalities	3	1.7%

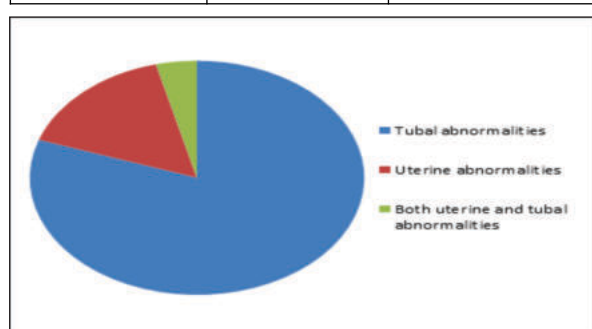


Chart 2 Showing Number Of Uterine And Tubal Abnormalities:

Table 3 Showing Number Of Each Uterine Abnormalities:

Type	Number of cases
Arcuate	6
Unicornuate	3
Bicornuate	2
Septate / bicornuate	2
Septate	1
Synechiae	1

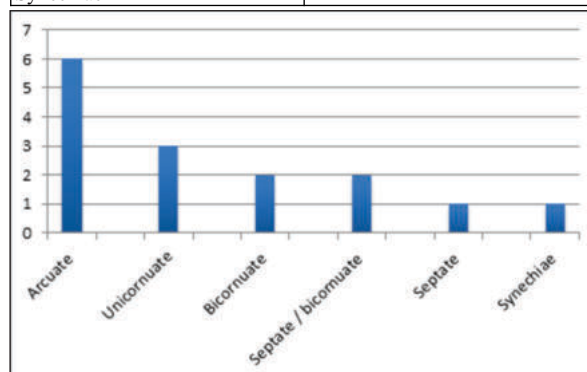


Chart 3 Showing Number Of Each Uterine Abnormalities:

Table 4 Showing The Number Of Each Tubal Abnormalities:

Fallopian tube block	47
Hydrosalpinx with contrast spillage	6
Hydrosalpinx with fallopian tube block	7
Beaded appearance	4

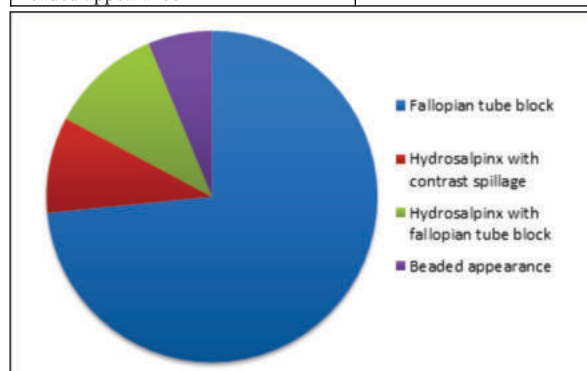


Chart 4 Showing The Number Of Each Tubal Abnormalities:

Table 5 Showing Number Of Unilateral/ Bilateral Fallopian Tube Block:

	Unilateral	Bilateral
Type	29	18

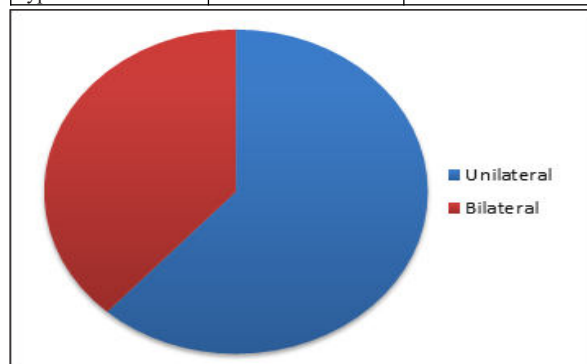


Chart no 5 Showing Number Of Unilateral / Bilateral Fallopian Tube Block:

Table 6 Showing Number Of Cases Of Right And Left Unilateral Block:

Right	18
Left	11

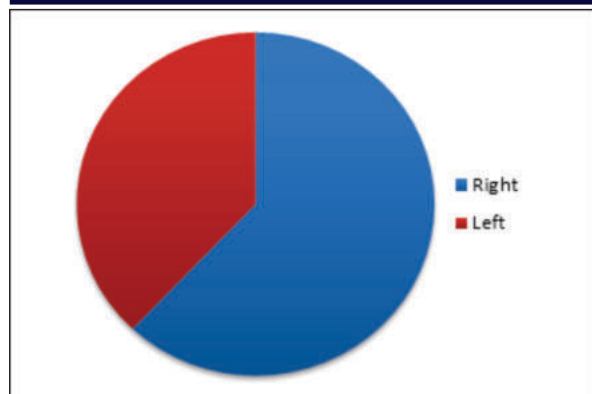


Chart 6 Showing Number Of Cases Of Right And Left Unilateral Block

Types Of Block:

In this study, the fallopian tube is divided into three regions; proximal(cornual), mid(isthmus/ ampullary) and distal portions(infundibular/ fimbrial).

Table 7 Showing Number Of Cases Of Tubal Blockage Classified According To The Portion Involved:

Portion involved	Number of cases
Proximal(cornual)	12
Mid(isthmus/ampulla)	7
Distal(infundibular/fimbrial)	35

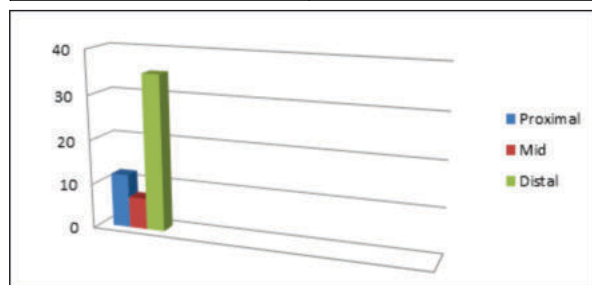


Chart 7 Showing Number Of Cases Of Tubal Blockage Classified According To The Portion Involved

Pre and post operative follow up imaging is available for 3 patients who underwent tubal recanalisation:

Table 8 Showing Pre And Post Operative Findings In 3 Patients:

	Pre operative	Post operative
Patient 1	Bilateral distal tubal block	Right distal tubal block
Patient 2	Bilateral mid tubal block	Right distal tubal block
Patient 3	Bilateral mid tubal block (secondary to tubectomy fallopian tubal rings)	Right distal tubal block

DISCUSSION

Hysterosalpingography, though thought to be an outdated procedure remains as a baseline investigation for infertility in developing countries like India mainly because of its non-invasiveness, cost-effectiveness as compared to laparoscopy. Laparoscopy is considered the gold standard procedure for evaluation of tubal pathologies but requires hospital admission, general anesthesia, is expensive, and is associated with postoperative complications. So, many women and clinicians prefer hysterosalpingography as it can be done as an outpatient procedure.

Hysterosalpingography is not only diagnostic but also has therapeutic effects in few cases.

A study by Mallarini G et al. in two groups where two consecutive hysterosalpingograms were done in one group and HSG and tube recanalization in the second group. It revealed that the therapeutic

efficacy of two consecutive HSG followed each other after four weeks compared with the fallopian tube recanalization are similar when the second HSG shows the presence of Fallopian tube patency.[9]

Studies by Foroozanfard F *et al.* have concluded that HSG is considered to have a high sensitivity and specificity. HSG and laparoscopy are not alternatives but are complementary methods in the examination of no tubal patency. The sensitivity and specificity of HSG on bilateral tubal patency or no bilateral tubal patency were 92.1% and 85.7% respectively. The positive and negative predictive values were 97.2% and 66.7%, and the accuracy was 91.1%.[10] A meta-analysis by Luttjeboer F *et al.* showed that after HSG, pregnancy and live birth rates increased compared to controls[11]

In this study, the mean age of patients presenting with infertility is 26.02 yrs. This is much lesser compared to a study by Onwuchekwa CR et al. where the mean age was 32.4 years[5] and another study by Schankath AC et al showed a mean age of 32.4 years. [12]

A study by Omidiji OA also showed a higher mean age of 33.9 years.[13]

This earlier age of presentation could be due to awareness of medical help in infertility at the rural level.

56.8% of the studies were normal on HSG in this study which is similar to 55% in a study by Schankath AC et al. This is greater than 29.2% in a study done by Onwuchekwa CR et al and 37.9% by Bacevac J et al.[14] A study by Omidiji OA showed an incidence of 47%.

Among the abnormal findings, Tubal abnormalities are the most common accounting for 34.6% of total studies(both normal and abnormal) and 80% of abnormal studies.

This closely correlates with a study done by Omidiji OA et al. where tubal abnormalities constituted 35.1% of the cases, comprising tubal blockage and hydrosalpinges.[13]

In a study by Deshpande PS et al. among the causes of female infertility found tubal pathology contributed to 33.8% of all cases attributed to female infertility.[4]

In our study unilateral tubal blockage is more common than bilateral blockage.

Right tubal block is more common than left side. This finding is similar to the study done by Onwuchekwa CR et al. where fallopian tube occlusion, loculated contrast material spillage and hydrosalpinx were more common on the right, and bilateral tubal occlusion was less common.

Uterine abnormalities constituted 6.8% of all the women presenting with infertility. According to a study by Chan YY et al, The prevalence of uterine anomalies was 8.0% in infertile women. In our study arcuate uterus is the most common anomaly which is similar to Chan YY study where arcuate uterus is most common in the unselected population[15]

CONCLUSION

Hysterosalpingography continues to be a valuable tool in the workup of female infertility. Because of the lesser complications compared to laparoscopy, HSG is preferred by the patient as well as the clinician and is done as an outpatient procedure in the radiology department.

In our study, a tubal blockage is the most common finding in which unilateral blockage was more common. In a country like India, infections especially due to Tuberculosis should be always kept in mind if a tubal blockage is seen. Adequate treatment can be given depending on the patient's complaints and hysterosalpingography findings. Laparoscopy, salpingectomy, or salpingostomy can be suggested if medical treatment does not improve fertility. A significant number of uterine anomalies were also found in our study. Identification of these uterine anomalies becomes important while considering procedures like IVF. These anomalies can be repaired surgically by metroplasty. Additional MRI imaging can be done to substantiate the findings on hysterosalpingography.

Post-operative follow-up hysterosalpingograms were available for 3 patients.

All three of them showed improvement in the fallopian tube status i.e spillage of contrast in post-operative images as compared to pre operative images where a spill is not seen.

So, hysterosalpingography can also be used as a follow-up imaging technique to know the success of the procedures like tubal recanalization, salpingectomy, or salpingostomy. Another advantage of increased fertility post HSG examination has also been established by many studies.

Taking into account all these advantages, the clinicians should consider it as a baseline investigation in female infertility if tubal and uterine factors are to be ruled out and radiologists should have a basic idea about how the procedure is done and interpretation of the images.

Images :

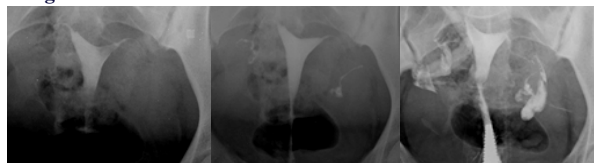


Figure 1: Normal hysterosalpingography showing (a)early filling stage (b) fully opacified uterus showing both fallopian tubes opacification. (c) free intraperitoneal spillage of contrast material.



Figure 2(a): Unicornuate Uterus On HSG.

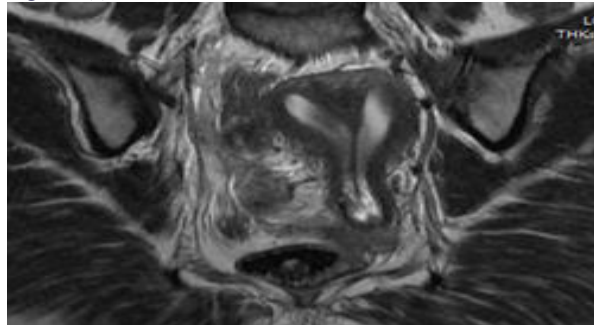


Figure 2(b): Coronal T2WI Of Same Patient Shows Septate Uterus.

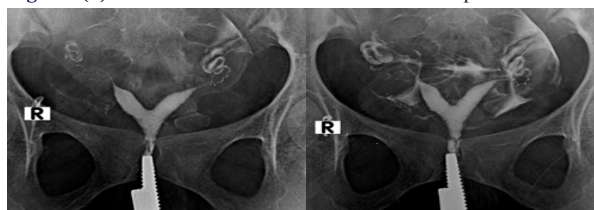


Figure 3(a): Septate/Bicornuate uterus with normal spillage of contrast on both sides(angle around 85-90 degrees)

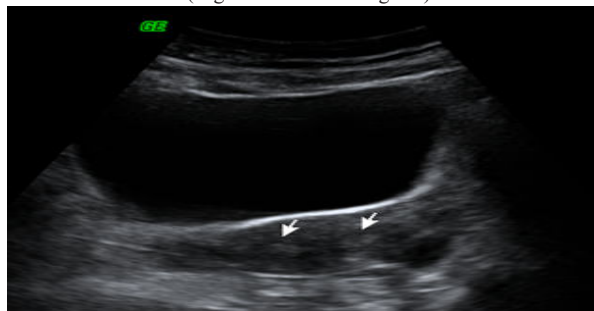


Figure 3(b):ultrasound Examination Of The Same Patient Shows Two Separate Endometrial Cavities(arrows)



Figure 4: Bicornuate Uterus With Normal Spillage Of Contrast On Both Sides(angle Between Two Horns Is More Than 100 Degrees).



Figure 4: Patient Showing Septate Configuration Of Uterus (Angle Between Two Horns Is < 75 Degrees)



Figure 5: Septate/ Bicornuate Uterus(angle 85 degrees) With Normal Contrast Spillage On Both Sides. USG examination showed two separate horns.



Figure 6: Bicornuate / septate uterus (angle 105 degrees) with normal spillage of contrast on both sides.



Figure 7: Arcuate Uterus With Normal Spillage Of Contrast On Both Sides.



Figure 8: Right Proximal Block.

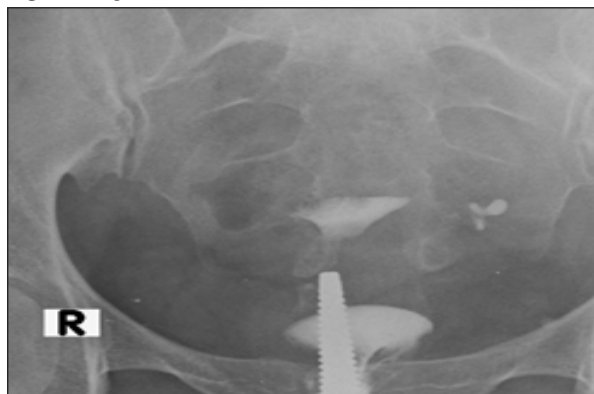


Figure 9: Right Proximal(cornual) Block And Left Mid Portion Block.



Figure 10: Left Fallopian Tube Block At Distal Portion.

Filling defect in the lower uterine segment – Could be due to synechiae



Figure 11: Bilateral Distal Tubal Block With Narrowing Of Both Tubes.

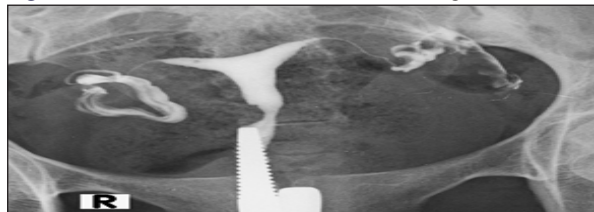


Figure 12: Right Distal(fimbrial) Block With Hydrosalpinx. Left Tube Shows Normal Spillage Of Contrast.



Figure13: Right tubal block in the ampullary region with hydrosalpinx. Left tube shows normal spillage of contrast.

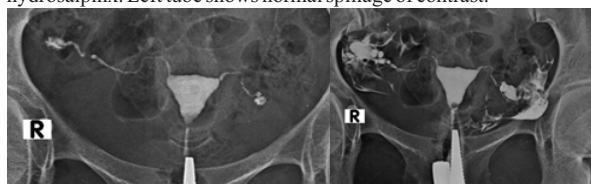


Figure 14: Beaded Appearance Noted In The Distal Portion Of Right Fallopian Tube – Strictures.

Air bubble noted incidentally in the lower uterine segment.



Figure 15: Beaded appearance of distal left fallopian tube with spillage of contrast on both sides – Strictures.

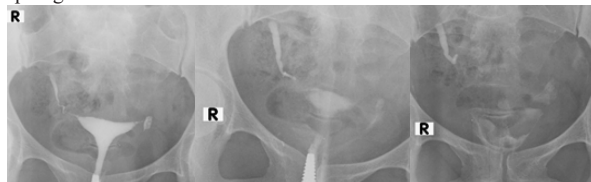


Figure 16: Right Distal Hydrosalpinx With Normal Spillage Of Contrast On Left Side. Delayed Images Show Retention Of Contrast In The Right Distal Fallopian Tube.

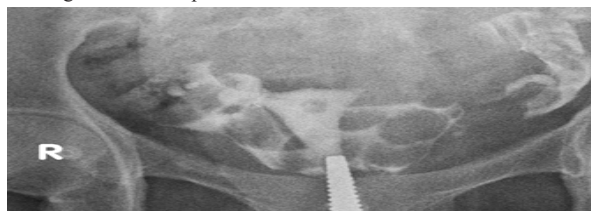


Figure 17: Filling defect noted in the uterine cavity can be mistaken for intrauterine mass. Subsequent film shows disappearance of the filling defect suggesting it is due to air bubble.

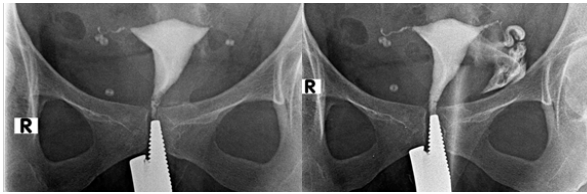


Figure 18 : HSG Image Of A Patient With History Of Tubal Surgery Showing Right Sided Block At The Mid Portion(ampullary Region). Tubal Clips Seen On Both Sides(more On Right Side).

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