

DOI: <https://dx.doi.org/10.18203/2320-1770.ijrcog20220062>

Original Research Article

Diagnostic accuracy of hysterosalpingography and laparoscopy in tubal patency

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Received: 26 December 2021

Accepted: 10 January 2022

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ABSTRACT

Background: There is no doubt that health care providers face a great deal of challenge to deal with the infertility issue, a serious and tragic gynecological problem encountered in developing countries. Laparoscopy is considered as the gold standard for assessment of tubal factors of infertility, although because of its invasive nature, cost and the need for anaesthesia and hospitalization, HSG seems to be a basic routine procedure for tubal factors. Hence, the present study was designed to compare the accuracy of HSG with SSG for evaluation of tubal factor infertility. Laparoscopy is considered as the gold standard for assessment of tubal factors of infertility, although because of its invasive nature, cost and the need for anaesthesia and hospitalization, HSG seems to be a basic routine procedure for tubal factors. Currently with the availability of the ultrasonography machines with very good resolution, SSG can be simultaneously practiced with ultrasonography during day 7-9 of the menstrual cycle to assess tubal patency. Hence, the present study was designed to compare the accuracy of HSG with laparoscopy for evaluation of tubal factor infertility.

Methods: The present prospective study on the diagnostic accuracy of hysterosalpingography (HSG) in the evaluation of infertility due to tubal patency has been conducted at Lala-Ded Hospital, Srinagar from September 2015 to February 2016. All the patients with infertility having regular menses, normal male partner with semen analysis and aging 20-30 years old have been included in the study. However, females who underwent HSG previously, case of unovulation despite clomiphene citrate, acute PID, salpingectomy, endometriosis, past history of oophorectomy and women beyond 35 years of age have been excluded in this study.

Results: The average age of patients was observed as (26.7±4.81) years with majority of patients belonging to (25-29) year age group. We performed sensitivity analysis of HSG procedure by taking laparoscopic findings as gold standard; evidently, we found the sensitivity and specificity of HSG as 91.3% and 88.9% respectively. Interestingly, the diagnostic accuracy of HSG was observed as 89.7%.

Conclusions: We found that HSG has satisfactory predictive value in identifying the factor of infertility. Laparoscopy is still a gold standard but if the purpose is attained with minimally invasive and cost-effective procedure having a good accuracy rate then over diagnosis should be avoided.

Keywords: Tubal patency, HSG, Laparoscopy

INTRODUCTION

There is no doubt that health care providers face a great deal of challenge to deal with the infertility issue, a serious and tragic gynecological problem encountered in developing countries. There are multifarious factors that are responsible for its rising trend. However, it has been

seen that tubal occlusion is one of the most frequent causes of infertility in women.^{1,2} It has been observed by that tubal peritoneal factors are responsible for 35% to 40% of reproductive couples.^{3,4} Therefore the evaluation of tubal patency is necessary to plan the precise treatment protocol for the management of infertility. Laparoscopy and HSG are two most commonly exploited procedures used in the

assessment of morphological exploration of fallopian tubes in developing countries. But sometimes due to lack of funds gynecologists have no choice but to prescribe only HSG. The HSG is a contrast enhanced fluoroscopic and flat plate study used to evaluate the endometrial cavity and fallopian tubes. It has been a test in the workup of infertile couples as a minimally invasive method of evaluating tubal patency and is performed as the first line approach for assessing tubal pathology. While as laparoscopy is considered the clinical reference test for diagnosing tubal pathology.⁵ Laparoscopy allows visualization of peri-adnexal adhesions and the presence of endometriosis, which cannot be done with HSG.⁶ However, the likelihood that a laparoscopy will show tubal occlusion after a normal HSG is very low. The present study has been conducted to evaluate the diagnostic accuracy of HSG in the detection of tubal patency and pelvic adhesion and compared it with laparoscopic investigations

METHODS

The present prospective study on the diagnostic accuracy of HSG in the evaluation of infertility due to tubal patency has been conducted at Lala-Ded hospital, Srinagar from September 2015 to February 2016. All the patients with infertility having regular menses, normal male partner with semen analysis and aging 20-30 years old have been included in the study. However, females who underwent HSG previously, case of anovulation despite clomiphene citrate, acute PID, salpingectomy, endometriosis, past history of oophorectomy and women beyond 35 years of age have been excluded in this study. Initially on the basis of inclusion and exclusion criteria, a random sample of 82 patients were included in the study, however, 14 patients conceived spontaneously and they were excluded and hence 68 patients remained in the study. After patients understood the mechanism of HSG and laparoscopy, they were assessed with both HSG and laparoscopy in a standard manner and chromo-perturbation test was done to confirm finding of HSG. All HSG's were performed in outpatient clinic of department of radiology between 7th to 10th days of menstrual cycle. Tubal-occlusions (one-sided tubal occlusions or two-sided tubal occlusions) were taken up as a single entity. Additional abnormalities of the uterine cavity were recorded as well. Tubal occlusions detected at HSG were compared with occlusions detected at laparoscopy. Sensitivity, specificity, positive predictive value, negative predictive value of HSG in the diagnosis of tubal occlusion was calculated regarding laparoscopy as the reference standard.

Statistical methods

The recorded data was compiled and entered in a spreadsheet (Microsoft excel) and then exported to data editor of SPSS version 20.0 (SPSS Inc., Chicago, Illinois, USA). Statistical software SPSS (version 20.0) and Microsoft excel were used to carry out the statistical analysis of data. Continuous variables were expressed as Mean±SD and categorical variables were summarized as

percentages. Diagnostic accuracy (Sensitivity, Specificity, PPV and NPV) of HSG in diagnosis of infertility was obtained taking laparoscopy as gold standard.

RESULTS

In this section we will present the results obtained in the study in tabular form.

We observe that the average age of patients was (26.7±4.81) years with majority of patients belonging to (25-29) year age group. The minimum and maximum age of studied patients was observed as 20 years and 33 years respectively instead of was reported a 11.8 years and 61.8 years.

Table 1: Age distribution of study patients.

Age (years)	Number	Percentage (%)
20-24	18	26.5
25-29	42	61.8
30-34	8	11.8
Total	68	100
Mean±SD (Range)=26.7±4.81 (20-33)		

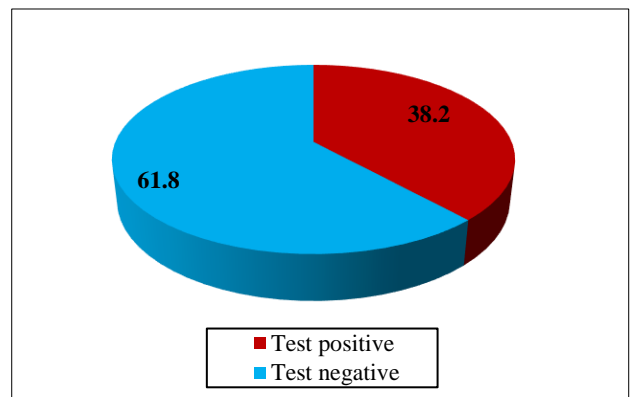


Figure 1: HSG findings of study patients.

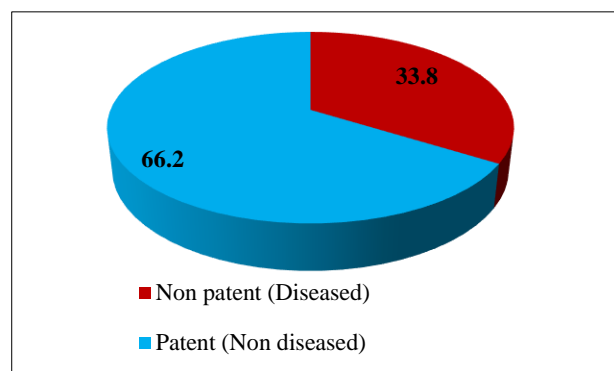


Figure 2: Laparoscopy findings of study patients.

We assessed patients with the help of HSG X-ray test and evidently 38.2% were tested positive and 61.8 were tested negative.

With the help of laparoscopic investigation, we observe that 33.8% had tubal blockage and 66.2% had patent tubes.

Table 2: Comparative findings of HSG and laparoscopy.

HSG	Laparoscopy		Total
	Non patent (diseased)	Patent (non-diseased)	
Test positive	21	5	26
Test negative	2	40	42
Total	23	45	68

We made a comparative analysis of HSG and laparoscopic investigation and observed that out of 23 non patent (tubal blockages) reflected by laparoscopy, 21 of them were shown positive by HSG procedure and only two patients had a negative HSG study. Likewise, out of 45 patent laparoscopic findings, of them HSG showed 40 are negative and only 5 patients had positive HSG finding.

Table 3: Diagnostic accuracy of HSG in diagnosis of infertility taking laparoscopy as gold standard.

Variables	Values	95% CI
Sensitivity	91.3	73.20-97.58
Specificity	88.9	76.51-95.16
PPV	80.8	62.12-91.49
NPV	95.3	84.21-98.68
Diagnostic accuracy	89.7	80.24-94.92

We performed sensitivity analysis of HSG procedure and observed that it has sensitivity of around 91.3% and 88.9% specificity. Interestingly, the diagnostic accuracy of HSG was observed as 89.7%

DISCUSSION

In the present study, we comprehensively analyzed the role of HSG and laparoscopy in the evaluation of infertility. We observed the average age of patients as (26.7±4.81) years and majority of infertile patients were belonging to (25-29) age group with minimum and maximum age of studied patients was respectively recorded as 11.8 years and 61.8 years. Farideh et al in a likewise study reported that mean age of such patients is 29.3±62.5 which is almost similar to our observation.⁷ We made a comparative analysis of HSG and laparoscopic investigation and observed that out of 23 non patent (tubal blockages) reflected by laparoscopy, 21 of them were shown positive by HSG procedure and only two patients had a negative HSG study. Likewise, out of 45 patent laparoscopic findings, of them HSG showed 40 are negative and only 5 patients had positive HSG finding. Interestingly out of all 26 cases of positive HSG results, 21 patients were shown non-patent by laparoscopic investigation which means an agreement in (80.76%) cases. Similarly, out of 42 HSG negative results, 40 cases were shown non-patent by laparoscopy which means good agreement. The diagnostic precision of HSG was reported by a good corpus of scholars. For

instance, authors like Fayaz et al reported that out of 420 patients, it was demonstrated that HSG is as good as laparoscopy in the detection of tubal patency and associated obstruction; however, they did not rule out the superiority of laparoscopy in the evaluation of peritubal adhesions and other associated pathologies.⁸ The potential of laparoscopy over the use of HSG cannot be ignored but sometimes due to lack of funds, inadequate health facilities, noninvasive and cost effectiveness, gynecologists have no choice but to prescribe only HSG. In the present study, we performed sensitivity analysis of HSG procedure and observed that it has a sensitivity of around 91.3% and 88.9% specificity. Interestingly, the diagnostic accuracy of HSG was observed as 89.7%. However, the false positive and false negative rate of HSG for diagnosing tubal patency was respectively observed as 8.69% and 12.5%. These results are contemporary to the results reported by numerous authors, for instance; Goreekhanloo et al reported the sensitivity and specificity of HSG in detection of bilateral occlusion are 89.5% and 90% respectively, which is in agreement with our results. In a study due to Jain et al it was found that the sensitivity of HSG is around 93.33% and specificity was 91.11%.⁹ However Tvarijonaviciene et al reported that the sensitivity, specificity, and accuracy of HSG for the detection of unilateral and bilateral tubal occlusion were 75%, 91.2%, 89.5%, 75%, 97.2%, and 96.6%, respectively.¹⁰ Comparative analysis of (HSG vs laparoscopy) on a patient population of 102 infertile women was performed by Vasiljevic et al and it was demonstrated that the HSG and laparoscopy are yielding almost same results on unilateral and bilateral tubal blockages in 61.5% and 70.4% cases respectively.¹¹ We observed the diagnostic accuracy, negative predictive value and the positive predictive value of HSG in the present study as 89.7%, 95.3% and 80.8% respectively. In a likewise study by Jain et al the positive predictive value and negative predictive value was respectively reported as is (77.77%) is (97.61%) which is almost similar to our observations. The present study demonstrated the high diagnostic value and consistency HSG in tubal patency compared with laparoscopy. Therefore, HSG must be used as a first tool for the assessment of underlying reasons that leads to infertility. However, for highly suspicious results laparoscopy can be exploited to minutely observe the subtle differences.

HSG is useful in making decisions regarding further procedures for the diagnosis of infertility and should still serve as a useful primary investigation. HSG and laparoscopy are not alternative, but are the complementary methods in the examination of tubal blockage and since in the present study, the patient population was small therefore there is scope to conduct a study on larger sample size.

CONCLUSION

The present study revealed a good sensitivity, specificity and an impressive diagnostic value in the evaluation of

infertility due to tubal blockages. We found that HSG has satisfactory predictive value in identifying the factor of infertility. Laparoscopy is still a gold standard but if the purpose is attained with minimally invasive and cost-effective procedure having a good accuracy rate then over diagnosis should be avoided

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Banotra P, Ahmad Z. Diagnostic accuracy of hysterosalpingography and laparoscopy in tubal patency. *Int J Reprod Contracept Obstet Gynecol* 2022;11:543-6.