

Comparison of hysterosalpingography and hysteroscopy in evaluating the uterine cavity in infertile women

Abstract

Background: Infertility in women is predominantly associated with uterine cavity abnormalities. Uterine cavity anomalies and damage to the fallopian tubes may occur due to various reasons such as endometriosis, polyps, adhesions and scar tissues.

Objective: To investigate the diagnostic value of hysterosalpingography (HSG) in comparison to hysteroscopy (HSC) for various structural and intracavitary uterine pathologies in women with infertility.

Materials and methods: An observational study of 280 women with infertility was carried out to compare the diagnostic values of HSG and HSC in the diagnosis of uterine pathologies in women enduring infertility. The specific uterine conditions evaluated were intrauterine synechiae, intrauterine fibroids/polyps and Mullerian congenital anomalies. The main outcome measures were sensitivity, specificity, positive and negative predictive values of HSG relative to hysteroscopy in diagnosing the following uterine pathologies: intrauterine synechiae, intrauterine fibroids/polyps and Mullerian anomalies.

Results: HSG had a sensitivity of 75% in detecting intrauterine synechiae, specificity of 86.5%, positive predictive value of 63% and negative predictive value of 91.8%. For fibroids or polyps, the equivalent values were 82.3%, 40.9%, 56.4% and 71.4%. Finally, for Mullerian congenital anomalies, the corresponding values were 86.6%, 76.3%, 48.1% and 95.7%. The study has indicated that the HSG remains a useful screening test in evaluating the uterine cavity of infertile women.

Conclusion: It has been subsequently concluded that HSG remains a valuable screening modality for the evaluation of uterine cavity of infertile women if office sonohysteroscopy or hysteroscopy is not available in absence of tubal pathology. HSG was an ideal procedure to detect intrauterine synechiae, fibroids and to a lesser extent, congenital Mullerian abnormalities. Hysteroscopy should be considered to make a definitive diagnosis and treatment. These two procedures are complementary to each other in evaluation of uterine cavity.

Keywords: infertility, hysterosalpingography, hysteroscopy, fibroids, tubal, pathology

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Introduction

Infertility in women related to uterine cavity abnormalities has been persistent in approximately 34%–62% of infertile women. There are a host of reasons that cause female infertility and prevent normal conception. Approximately 15% of women enduring infertility suffer uterine abnormalities, while between 30-40% are shown to have tubal pathologies as a cause of their infertility. Some of the uterine abnormalities that are responsible for infertility are intrauterine adhesions, uterine fibroids and endometrial polyps.¹ Apart from this, 20%-40% of women infertility is related to their male counterpart and between 20%-40% is found to have ovulatory dysfunction.² Comprehensive and detailed evaluation is imperative to explore the exact cause of the infertility.³ Some of the pre-treatment evaluations include physical examination, hormonal testing and imaging to examine the uterus, endometrium, and fallopian tubes for anomalies or abnormalities, which might be potentially preventing normal conception.

The standard method for assessing these structures classically involves a blend of Transvaginal Sonography (TVS),

Hysterosalpingography (HSG), and Hysteroscopy (HSC). Hysteroscopy (HSC) and Hysterosalpingography (HSG) are used for screening purposes in routine infertility evaluation.⁴ They are used in many infertility centers as an initial investigation tool to find the exact cause of the inability to conceive a child. As the name indicates, Transvaginal Sonography (TVS) comprises of a transvaginal ultrasound that examines the reproductive organs of a female that might include the fallopian tubes, cervix, uterus, ovaries and vagina. It is a common routine modality that is used to detect the cause of infertility in women. However, uterine abnormalities such as submucous fibroids, adhesions and polyps are difficult to diagnose with this procedure. Furthermore, transvaginal sonography shows poor positive predictive value (PPV) rates and poor sensitivity, particularly in the diagnosis of polypoid adhesions.⁵

Diagnostic hysteroscopy is a safe procedure, which is performed to evaluate the uterine cavity in infertile women and to ascertain the cause of infertility. Hysteroscopy is a diagnostic modality in which the endometrium, which is the inner lining of the uterus; is seen with a camera that is placed in the cervix of a patient.⁶ In addition, it is also performed to decide the cause of repeated miscarriages or to help

locate uterine abnormalities such as polyps and fibroids. Hysteroscopy is used as a diagnostic, a treatment and a management tool.⁷

HSG has been the most commonly used investigative technique in the diagnosis of both congenital and acquired intrauterine abnormalities.⁸ HSG is the examination of a woman's uterus with the help of an x-ray. However, it employs a different form of x-ray, which incorporates the use of a contrast material. It is performed on women who are having problems in conceiving or are having recurring miscarriages. In addition, it is performed to ascertain the existence of uterine tumors, adhesions and fibroids/polyps. Apart from this, it is also used to investigate miscarriages resulting from abnormalities within the uterus. Hysterosalpingography is also performed to open fallopian tubes that are blocked and to allow the probability of future pregnancy.⁹ Therefore, the aim of this observational research study is to investigate the diagnostic value of hysterosalpingography (HSG) for intracavitary and structural uterine pathologies in comparison with hysteroscopy (HSC) in women with infertility. HSC and HSG are diagnostic modalities that have been performed in detecting intrauterine synechiae, intrauterine fibroids/polyps and mullerian congenital anomalies. Intrauterine synechiae is a uterine abnormality in which intrauterine adhesions are formed. Typically, they are a result of a previous injury to the endometrium that can lead to infertility.¹⁰ Intrauterine adhesions are called Asherman's Syndrome, and they happen when the scar tissue forms in the uterine cavity of the uterus. This results in the binding together of the walls of the uterus. Intrauterine adhesions are commonly diagnosed with the HSG procedure. Women suffering from pregnancy loss or recurrent miscarriages (RM) are suspected to be diagnosed with congenital uterine anomalies.¹¹ HSG remains a beneficial procedure for the examination of the uterine cavity of infertile women, primarily in the absence of tubal pathology and is an ideal modality in the detection of gross intrauterine pathology. However, adhesions and small polyps are hard to detect in HSG. In this scenario, hysteroscopy is a better option in the diagnosis of small polyps and adhesions as these can be detected on magnification with the hysteroscope or an endoscope.²

A retrospective analytic study was conducted by Taşkın¹² to investigate the diagnostic value of hysterosalpingography for uterine intracavitary and uterine pathologies. In addition to HSG, hysteroscopy was performed in patients that were undergoing intracytoplasmic sperm injection (ICSI) and embryo transfer. This research was conducted to specify the patients who should be subjected to HSC in the early stages of an infertility work-up. The two procedures were also compared to reveal the best approach that must be taken in the diagnoses of uterine pathology in infertile women. The study showed general agreement between the two diagnostic procedures, namely; the HSC and the HSG, which was approximately 68.9%. Apart from this, it was observed that risk of abnormal HSC increased with the length of infertility duration and the advancing age of the patient. In spite of the presence of a normal HSG, the increase of risk with regard to the age of the patient has shown to continue and persevere. Patients above the age of 35 were shown to be at added risk of infertility. Furthermore, despite normal HSG indications, patients still underwent increasing number of assisted reproductive techniques (ART). It was concluded that the HSC must be performed in patients who have undergone earlier assisted reproductive technique trials. In addition, it is highly suggested that HSC should be performed in patients older than 35 years of age, who are susceptible to having difficulty in conceiving or in retaining pregnancy.¹²

In another study by Phillips¹³ three diagnostic approaches were used to compare the uterine and tubal pathologies of infertile women. The three diagnostic procedures were transvaginal sonography, hysteroscopy and hysterosalpingography. Out of the 1274 patients that received baseline TVS, 327 participants undertook the HSG test and out of which, 55 endured the HSC procedure. The results revealed that HSC performed better than TVS and HSG with regard to endometrial abnormalities. On the other hand, HSG outdid HSC for the diagnosis of tubal obstruction. It was concluded that HSG may not detect sub-serosal and intramural fibroids. However, it may diagnose submucosal fibroids. A study was conducted by Shukla, Yadav & Mishra¹⁴ to examine the diagnostic precision of hysteroscopy in relation to vaginal ultrasound and hysterosalpingography in infertile patients. A total of 60 patients participated in the study. The findings of the HSG displayed a specificity of 100% and a sensitivity of 90%. Furthermore, the positive predictive value of the test was 100% and a negative predictive value was 66.6%. HSC procedure displayed variations in 65 percent cases that included endometrial polyp, chronic endometritis and synechiae. Apart from this, no complications occurred after performing hysteroscopy. The results also revealed a moderate agreement between HSG and HSC modalities. It was concluded that HSC showed the most accurate results when diagnosing small intrauterine abrasions, in comparison to HSG and TVS. Makled, Farghali & Shenouda¹⁰ conducted a study to investigate the role of endometrial biopsy and hysteroscopy in women with inexplicable infertility. Diagnostic hysteroscopy was performed on a hundred infertile women. The results revealed that 6 patients suffered from submucous myomas, 6 had cervical stenosis and seven endured intrauterine synechiae. In addition, 15 were diagnosed with endometrial hyperplasia, 14 with endometritis and 31 were shown to have endometrial polyps. However, 14 women were found to have no uterine anomalies. It was concluded that endometrial biopsy and regular hysteroscopy are essential for women with infertility issues that were incomprehensible.

In a study by Maiti & Lele,¹⁵ HSG was performed along with laparoscopy and HSC to analyze the effectiveness of HSG. All three procedures were performed on 50 patients enduring primary and secondary infertility and the results were evaluated and compared. In comparison to HSC and laparoscopy, the specificity was 88% and the sensitivity of HSG was 75%. Amongst the total patients enduring infertility, pelvic-inflammatory disease was detected in 7 (14%), congenital anomaly were found in 7 (14%) and Tubal factor defect was diagnosed in 6 (12%) patients. Apart from this, 5 (10%) patients had asherman syndrome and 3 (6%) suffered from fibroids. Furthermore, HSG displayed 12% false negative with regard to various uterine factors and a false positive rate of 25% for the tubal factors. It was concluded that owing to HSGs low sensitivity and specificity, HSG must be followed up by other tests for the diagnosis of various anomalies of the genital tract of infertile women. These tests include video endoscopic examination of the peritoneal cavity and the endometrial, through the laparoscopy and hysteroscopy modalities.

Methodology

This study is an observational research design of women undergoing comprehensive infertility investigation. In total, 280 women with primary or secondary infertility were recruited for this observational study. Both hysteroscopy (HSC) and hysterosalpingography (HSG) diagnostic procedures were performed in all women after the basic

infertility workup. The main outcome measures were sensitivity, specificity, positive and negative predictive values of HSG relative to hysteroscopy. Hysteroscopy and HSG were performed in diagnosing the following uterine pathologies: intrauterine synechiae, intrauterine fibroids/polyps and Mullerian anomalies. The sensitivity indicator is the measurement of the number of people who truly have the disease and who test positive. On the contrary, specificity is a measure of the number of people who do not have the disease and who subsequently test negative sensitivity. The ideal screening test for the diagnosis of tumor masses, adhesions and uterine fibroids or polyps is needed to be highly sensitive and specific.

Results

HSG Findings have been presented in Table 1, detecting normal uterine cavity among 47.3% patients. Whereas, intrauterine synechiae 17%, fibroids/polyps findings in 20.2%, and Mullerian congenital anomalies in 15.5%. HSC Findings, detecting normal uterine cavity among 56.8% patients. Similarly, the extent of endometrial polyp/fibroids was noted another major finding in HSC tests among patients 34.3%, intrauterine adhesion/synechiae counted for 2.7% and mullerian anomalies for 6.3%. HSG had a sensitivity of 75% in detecting intrauterine synechiae, specificity of 86.5%, positive predictive value of 63% and negative predictive value of 91.8%. For fibroids or polyps, the equivalent values were 82.3%, 40.9%, 56.4% and 71.4%. Finally, for mullerian duct anomalies, the corresponding values were 86.6%, 76.3%, 48.1% and 95.7% (Table 2).

Table 1 Percentage of the normal and abnormal findings in both HSG and Hysteroscopy

Findings	HSG	Hysteroscopy (HSC)
Normal cavity	47.30%	56.80%
Fibroids or polyps	20.20%	34.20%
Intrauterine adhesions/Synechiae	17%	2.70%
Mullerian congenital anomalies	15.50%	6.30%

Table 2 Comparison on uterine cavity findings on HSG and Hysteroscopy

	PPV	NPV	Sensitivity	Specificity
Fibroids or polyps	56.40%	71.40%	82.30%	40.90%
Intrauterine Synechiae	63%	91.80%	75%	86.50%
Mullerian congenital anomalies	48.10%	95.70%	86.60%	76.30%

Discussion

The results of the present study with regard to the diagnosis of intrauterine abnormalities are consistent and similar to the results of the study conducted by Roma Dalfó¹⁶ that revealed similar values. Additionally, 78 patients were evaluated for infertility through HSC and HSG modalities for uterine wall inconsistencies and single or multiple filling defects. The findings revealed a specificity of 80.4% and a sensitivity of 81.2%. In addition, HSG also showed a positive predictive value of 63.4% and a negative value of 83.7%. These values are consistent with the values of the present study that showed that HSG had a specificity of 86.5%, a sensitivity of 75%, a positive predictive value of 63% and negative predictive value of 91.8%. Similarly, comparable results were obtained by the study conducted

by Shukla, Yadav & Mishra,¹⁴ in which 60 patients suffering primary and secondary infertility issues were examined. The three spectrums of diagnostics modalities used were transvaginal sonography (TVS), hysteroscopy (HSC) and hysterosalpingography (HSG). The pathologies detected were chronic endometritis, endometrial polyps and uterine synechiae. Hysterosalpingography procedure showed a specificity of 100%, sensitivity of 90% and a positive projecting value of 100% and negative analytical value was 66.6% in comparison to the other two procedures. On the other hand, undergoing hysterosalpingography in the detection of congenital cervical anomalies or mullerian duct anomalies does not always provide the best results. The findings of the study conducted by Zafarani, Ahmadi & Shahrzad¹⁷ suggest that though HSG proves of assistance in the diagnosis of a range of Mullerian duct anomalies (MDAs), there are certain limitations too. One of the restrictions is that HSG is not the most ideal modality for patients suffering from isolated congenital maldevelopment, either agenesis or dysgenesis of the cervix. The best choice of a diagnostic imaging system for the most accurate detection of mullerian duct anomalies currently popular is the MRI.

Conclusion

Diagnostic techniques have proven to be indispensable tools in the detection of uterine anomalies in women enduring infertility issues. The standard modalities commonly used are the Transvaginal Sonography (TVS), Hysterosalpingography (HSG) and Hysteroscopy (HSC). Moreover, in recent years, MRI has also been included in the list of modalities, specifically in the detection of mullerian duct anomalies. Summarizing the findings of the study and following the evaluation of the diagnostic values of the HSG; it can be safely concluded that HSG is the ideal diagnostic system for the detection of intrauterine synechiae, fibroids and to a lesser extent, congenital mullerian abnormalities. It is also advantages in situations of non-availability of the HSC modality. Additionally, HSG is beneficial in cases where there is an absence of tubal pathology. However, it is recommended that more studies be conducted relative to the ideal procedure in detecting mullerian abnormalities in infertile women.

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Conflicts of interest

The author declares there are no conflicts of interest.

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