
Comparison between Hysterosalpingography and Saline Infusion Sonography in Patients with Recurrent Failed Implantation in Intra-Cytoplasmic Sperm Injection

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Abstract

Objective: Abnormal uterine findings are reported in up to 50% of women with recurrent implantation failure. Hysterosalpingography is commonly used in evaluation of these patients. The introduction of saline infusion sonohysterography has improved diagnosis of endometrial pathologies. Aim of work was to compare accuracy of Hysterosalpingography and Saline infusion sonohysterography in diagnosing uterine pathologies among infertile women with failed intra-cytoplasmic sperm injection.

Subject & Methods: 118 women with recurrent implantation failure underwent hysterosalpingography and saline infusion sonohysterography. The reports were reviewed and findings including submucous fibroids, intrauterine septum, synechia and polyps were compared to those obtained by hysteroscopy. Sensitivity, specificity, and accuracy of procedures were measured.

Results: Regarding submucous fibroids, Hysterosalpingography had sensitivity, specificity and accuracy 80%, 96% and 92.9% respectively, whereas, Saline infusion sonohysterography had sensitivity, specificity and accuracy 95.2%, 98% and 97.5% respectively. Regarding intrauterine septum, Hysterosalpingography had sensitivity, specificity and accuracy 85%, 95.3% and 93.7% respectively whereas Saline infusion sonohysterography had sensitivity, specificity and accuracy 89.5%, 97.1%, and 95.9% respectively. Regarding intrauterine synechia, Hysterosalpingography had sensitivity, specificity and accuracy 75.5%, 94.4% and 88.1% respectively. Saline infusion sonohysterography had sensitivity, specificity and accuracy 70.8%, 97.7%, and 88.1% respectively. Regarding endometrial polyps, Hysterosalpingography had sensitivity, specificity and accuracy 64.7%, 97.7% and 85.5% respectively. Saline infusion sonohysterography had sensitivity, specificity and accuracy 66% and 97.7% and 86.1% respectively.

Conclusion: Saline infusion sonohysterography is comparable, in sensitivity, specificity and accuracy, to Hysterosalpingography in evaluation of uterine abnormalities.

Key word: Recurrent ICSI, hysterosalpingography, saline infusion sonohysterography

Introduction

Approximately 15% of couples are affected with subfertility, of which up to 20% remain unexplained. Uterine cavity abnormalities can be a contributing cause of subfertility and recurrent implantation failure. Uterine cavity assessment has been suggested as a routine investigation in the evaluation of subfertile women. (1)

The success of in-vitro fertilization (IVF) treatment is low. Failure of IVF treatment is generally due to embryonic, uterine or transfer factors, but remains unexplained in most cases. A number of interventions have been proposed to improve IVF outcome, many of which may not be evidence-based and their efficacy is uncertain. One of the common investigations proposed following IVF failure is to re-evaluate the uterine cavity. (2)

Traditionally, hysterosalpingography (HSG) has been the most commonly used technique in the evaluation of uterine cavity. The introduction of saline infusion sonohysterography (SIS) has significantly improved sonographic diagnosis of various endometrial pathologies. This procedure entails instillation of warm saline into the uterine cavity transcervically to provide enhanced visualization of the endometrium during transvaginal ultrasound examination. (3)

We aimed to compare the accuracy of HSG and SIS for diagnosing uterine pathologies among infertile women with recurrent failed intra-cytoplasmic sperm injection (ICSI).

The sensitivity, specificity, positive, negative predictive values and accuracy for HSG and SIS were determined for the diagnosis of endometrial pathology.

Subjects & Methods

A prospective interventional study was introduced to the emer- This study included one hundred and fifty infertile women with unexplained recurrent implantation failure (defined as at least two failed previous ICSI cycles, during which good quality embryos were transferred (4)). A written consent was obtained from all candidates and the study was approved by the medical ethics committee of Ain Shams University. All patients were subjected to HSG, SIS and diagnostic hysteroscopy (DH) which is the gold standard investigation.

The HSG was performed under fluoroscopy in an outpatient of- fice setting at least 48 hours after menses had ceased. The patients were routinely premedicated with Hyoscine Butylbromide 10 mg (Buscopan®, Boehringer Ingelheim) prior to the procedure. The patient was placed in a lithotomy position, and a sterile Graves speculum was inserted to expose the ectocervix. Using a tenacu- lum, to fix and apply traction on the cervix, the cervical os was cannulated with a Leech Wilkinson Uterine Canula of suitable size. In order not to obscure the lower uterine segment, the Graves speculum was withdrawn slowly and carefully, not to dislodge the uterine canula. Ten cc of urographin contrast were injected intrauterine with fluoroscopic control (OEC 9800, General Electric Company, Fairfield, CT). A combination of pulse fluoroscopy (8 frames per second) and continuous fluoroscopy were used with automated exposure control. Static image capture was achieved by use of the fluoroscopic last image hold feature. Images of early and maximal opacification of the uterine cavity, fallopian tubes, and peritoneal contrast spillage were obtained.

SIS was performed by the same operator, during the follicular phase of the cycle. In lithotomy position, the ectocervix was exposed using a sterile warm Collin speculum (to facilitate its removal during the procedure). After cleaning with povidone-iodine, a sterile 5-F catheter, with an occlusive balloon, was flushed with sterile saline solution before being inserted through the cervical os. A ring forceps was used for advancement of the catheter approximately 5–10 cm to position the tip beyond the endocervical canal and not touching the uterine fundus. The speculum was removed while the catheter was left in place. Next, transvaginal sonographic sagittal and coronal or transverse scanning of the pelvis, adnexae, and uterus was performed during instillation of sterile saline solution. Various amounts (5–20 ml) of saline solution were used; only 2–5 ml are needed to distend the uterine cavity adequately. A study was considered normal when serial sagittal and coronal views of the distended endometrial cavity failed to reveal any distortion, cavitory defect, or undistended regions. Intracavitary defects were described and a likely diagnosis was suggested.

DH was performed using rigid hysteroscope 5.2 mm (Karl Storz, Germany). The scope was advanced under direct visualization. The uterine cavity was distended with normal saline, installed from a 500 ml bag wrapped in a pressure bag connected to a manometer and pumped to 120–200 mmHg.(5) Either positive or negative findings were recorded, and applicable therapeutic procedures were completed. The presence of fibroids, an intrauterine septum, intrauterine synechia, or endometrial polyps were reported. In the absence of these findings, the cavity was described as normal.

Statistical analysis:

All data were transferred to IBM cards using IBM personal computer, analyzed with statistical program for social science “SPSS V11.0, SPSS Inc., Chicago, IL, USA”. The data obtained were expressed as descriptive statistics (mean ± standard deviation, range and percentage). Chi-squared test was used for the analysis. A P-value of <0.05 was considered statistically significant. Considering hysteroscopic findings as the gold standard confirmatory test, sensitivity, specificity, positive predictive value, negative predictive value and accuracy were calculated.

Results

Of the 150 patients, only 118 patients continued the study. Their age ranged between 19 and 42 years with a mean±SD 32.81±4.32. Five patients had previous pregnancies while 113 were nulligravida. Seventy nine patients had two failed ICSI attempts while the other 39 patients had more than two failed ICSI procedure.

Figure (1): Comparison between DH, HSG and SIS as regards detection of specific intrauterine lesions:

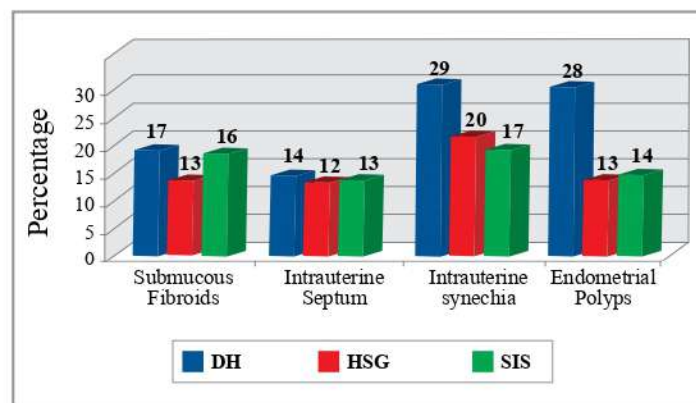


Table (1): Comparison between HSG and SIS as regards sensitivity and specificity for intrauterine lesions:

	Sensitivity			Specificity		
	HSG (%)	SIS (%)	P	HSG (%)	SIS (%)	P
Submucous Fibroids	80	95.2	>0.05	96	98	>0.05
Intrauterine Septum	85	89.5	>0.05	95.3	97.1	>0.05
Intrauterine synechia	75.5	70.8	>0.05	94.4	97.7	>0.05
Endometrial Polyps	64.7	66	>0.05	97.7	97.7	>0.05

Table (2): Comparison between HSG and SIS as regards positive predictive value and negative predictive value for intrauterine lesions:

	Positive predictive value			Negative predictive value		
	HSG (%)	SIS (%)	P	HSG (%)	SIS (%)	P
Submucous Fibroids	83.1	91	>0.05	95.1	99	>0.05
Intrauterine Septum	77.3	85	>0.05	97.1	98	>0.05
Intrauterine Synechia	87.2	94.4	>0.05	88.4	85.7	>0.05
Endometrial Polyps	94.3	94.3	>0.05	82.5	83.3	>0.05

Table (2): Comparison between HSG and SIS as regards positive predictive value and negative predictive value for intrauterine lesions:

	HSG (%)	SIS (%)	P
Submucous Fibroids	92.9	97.5	>0.05
Intrauterine Septum	93.7	95.9	>0.05
Intrauterine Synechia	88.1	88.1	>0.05
Endometrial Polyps	85.5	86.1	>0.05

Discussion

Structural abnormalities of the uterus may affect the reproductive outcome by interfering with implantation and causing spontaneous miscarriage. Abnormal uterine findings are reported in as many as 50% of women with recurrent implantation failure (6)

Hysteroscopy is generally considered to be the gold standard in the diagnosis of intrauterine pathologies, including endometrial polyps, submucous myomas, intrauterine adhesions and uterine septa.(7) Recently, the use of contrast media such as saline with transvaginal sonography is increasingly used to improve the delineation of uterine cavity abnormalities.(3)

In this study we compared HSG and SIS as regards rate of detection, sensitivity, specificity, positive predictive value, negative predictive value and accuracy of the test in diagnosing uterine abnormalities. Hysteroscopic findings were the gold standard and reference.

This study showed that hysteroscopy had a better diagnostic capability compared to HSG and SIS, diagnosing submucous fibroid, intrauterine septum, intrauterine synechia and endometrial polyps with a percentage of 17%, 14%, 29% and 28% respectively, while HSG showed percentages of 13%, 12%, 20% and 13% whereas, SIS showed percentages of 16%, 13%, 17% and 14% for the same lesions respectively (Figure 1).

Several studies have compared DH, HSG and SIS in detecting uterine abnormalities. One study comparing HSG with hysteroscopy reported sensitivity of 81% and a specificity of 80% with a false negative rate of 9% and a false-positive rate of 22%.(8) Another study conducted to assess the diagnostic reliability of hysteroscopy and HSG, demonstrated HSG to have a sensitivity

of 79% and a specificity of 82%, with an 18% false positive rate and a 19% false-negative rate. They concluded that even though HSG is mainly used for the assessment of tubal patency, it has a secondary role in the assessment of the uterine cavity.(9)

Furthermore, SIS has been found to be sensitive, specific and accurate in identifying intrauterine abnormalities such as polyps, submucosal fibroids, adhesions, septa and uterine anomalies. One study even showed that SIS had the same diagnostic accuracy as hysteroscopy for endometrial polyps.(10) Another study comparing SIS with hysteroscopy reported 87.5% sensitivity, 100% specificity, 100% positive predictive value and 91.6% negative predictive value for the detection of any cavity abnormality with SIS as compared with hysteroscopy.(11)

On the other hand, the accuracy of HSG in assessment of the uterine cavity integrity in infertile patients has been reported to be rather disappointing. The sensitivity and specificity were described to be 79–98% and 15–82%, respectively (12) and similar studies have also shown that hysteroscopy had a better diagnostic accuracy than SIS.(13)

In this study, as regards submucous fibroids, HSG had a sensitivity and specificity 80% and 96% respectively. Positive predictive value, negative predictive value and accuracy were 83.3%, 95.1% and 92.9% respectively, whereas, SIS had a sensitivity and specificity 95.2% and 98% respectively, positive predictive value, negative predictive value and accuracy of 91%, 99% and 97.5% respectively. These results are in agreement with Erdem et al. were SIS had a Positive predictive value, negative predictive value and accuracy of 91%, 99% and 97.5% respectively.(14)

In this study as regard intrauterine septum, HSG had a sensitivity and specificity of 85% and 95.3% respectively. Positive predictive value, negative predictive value and accuracy were 77.3%, 97.1% and 93.7% respectively whereas SIS had a sensitivity and specificity 89.5% and 97.1% respectively. Positive predictive value, negative predictive value and accuracy were 85%, 98% and 95.9% respectively. As regard intrauterine synechia, HSG had a sensitivity and specificity of 75.5% and 94.4% respectively. Positive predictive value, negative predictive value and accuracy were 87.2%, 88.4% and 88.1% respectively. SIS had a sensitivity and specificity 70.8% and 97.7% respectively. Positive predictive value, negative predictive value and accuracy were 94.4%, 85.7% and 88.1% respectively. Similar studies have shown HSG and SIS to have a sensitivity of 75% in the detection of intrauterine adhesions.(10)

In this study as regard endometrial polyps, HSG had a sensitivity and specificity 64.7% and 97.7% respectively. Positive predictive value, negative predictive value and accuracy were 94.3%, 82.5% and 85.5% respectively. SIS had a sensitivity and specificity 66% and 97.7% respectively, Positive predictive value, negative predictive value and accuracy of 94.3%, 83.3% and 86.1% respectively, which was in accordance with several studies, one showing sensitivity and specificity of 100% and 91.8% respectively,(14) and another study which showed that SIS had a sensitivity and negative predictive value 100% for endometrial polyps.(15)

Finally, in conclusion SIS is comparable to HSG in diagnosis of uterine abnormalities, but with the advantage of lack of ionizing radiation and of lower cost, more feasibility, and outpatient procedure with better tolerability; it can replace HSG as a primary diagnostic test for uterine anomalies prior to DH.

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