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## Comparison of Sonohysterography and Hysterosalpingography with Hysteroscopy in the Diagnosis of Intrauterine Lesions

**Background/Objective:** One of the causes of inevitable abortion is structural abnormalities of the uterine cavity and endometrium, which interfere with the implantation of the embryo. We performed this study to compare the efficacy of sonohysterography and hysterosalpingography with hysteroscopy in the diagnosis of these abnormalities.

**Patients and Methods:** This cross-sectional study was conducted on 72 infertile women who were candidates for hysteroscopy, attended to the Infertility Clinics of Vali-e-Asr Reproductive Health Research Center, affiliated to Tehran University of Medical Sciences. In this study, hysterosalpingography and sonohysterography were performed prior to hysteroscopy, which was considered as the gold-standard test for the diagnosis of the structural abnormalities of the uterine cavity and endometrium.

**Results:** Comparing to hysteroscopy, sonohysterography had a sensitivity of 30%, a specificity of 100%, a positive predictive value of 100% and a negative predictive value of 30%; hysterosalpingography had a sensitivity of 55%, a specificity of 68%, a positive predictive value of 41% and a negative predictive value of 60%.

**Conclusion:** Due to the absence of the complications associated with hysteroscopy, being an uninvase procedure, with high sensitivity, lower cost, and higher feasibility, sonohysterography seems to be a suitable choice for diagnosing intrauterine lesions.

**Keywords:** Sonohysterography, hysterosalpingography, hysteroscopy, intrauterine pathologic lesions

### Introduction

Disorders of the uterine cavity and endometrium may have adverse effects on the outcome of conception by interfering with implantation of the embryo, and ultimately causing inevitable abortion.<sup>1</sup> The prevalence of uterine anomalies is around 19%–50% in women who undergo *in vitro* fertilization (IVF) therapy.<sup>2</sup> Around 10% of all women are infertile; therefore, surgical reconstruction of these anomalies, prior to taking any other measures for conception, can improve the rate of pregnancy and the prevalence of live births in treatment-dependent cases.<sup>3</sup>

In most studies, hysteroscopy is the method of choice for evaluating the uterus. Hysterosalpingography is usually performed during the assessment of infertility and before IVF is performed. However, this technique possesses little diagnostic value, with a false-negative rate of 10%, and a high false-positive rate.<sup>4-7</sup> Therefore, hysterosalpingography is not reliable in diagnosing intrauterine lesions.<sup>8</sup>

Another method is by simultaneous ultrasonography and intrauterine normal saline infusion, the so-called sonohysterography (SHG), which in comparison to hysterosalpingography and hysteroscopy, is a newer method in the screening of intrauterine lesions.<sup>6</sup>

Hysterosalpingography is a highly sensitive, specific, and accurate method for

diagnosing disorders such as myoma, polyposis (Figure 1&2), and uterine adhesions, septate (Figure 3) or anomalies. As compared to hysteroscopy, SHG gives more information about the size and location of myomas and, in addition, has less adverse effects.<sup>9-11</sup>

Recently, there is a tendency to perform less invasive procedures such as SHG; which are cheaper and less painful. This procedure is used in patients with abnormal uterine bleeding (during both peri- and post-menopausal ages) (Figure 4&5), bleeding during tamoxifen use, suspected congenital uterine anomalies and Asherman's syndrome. It not only helps in diagnosing intra-uterine anomalies (polyps, myomas ...), but also indicates the extent of a myoma. It is clear that the size of a myoma will determine whether or not resection can be taken place by hysteroscopy.<sup>12</sup>

The study performed by De Kroon et al. in 2003, determined the accuracy of SHG in evaluating the uterine cavity in women with abnormal uterine bleeding (AUB). In this study, the efficacy of SHG was compared with hysteroscopy which considered as the gold-standard diagnostic method.

## Patients and Methods

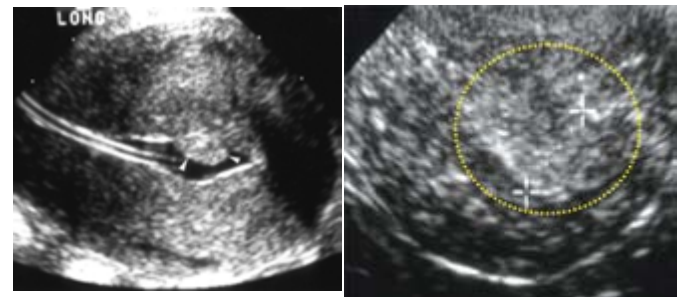
This cross-sectional study was performed on 72 women who attended the Infertility Clinic of Vali-e-Asr Infertility Research Center, affiliated to Tehran University of Medical Sciences. All of these patients were candidates for hysteroscopy after clinical examination and after that the necessary paraclinical tests had been performed.

First of all, hysterosalpingography was performed. Then, SHG and finally, hysteroscopy were done in the operation theater. In this study, all of the interventions (hysterosalpingography, SHG and hysteroscopy) were performed in a blind format and each procedure was done by a person who not aware about the result of two other procedure. Hysterosalpingography was done during the follicular phase, prior to SHG. The patients were given a regimen of one capsule of Indomethacin (25mg/single dose) followed by Doxycycline (100mg/BD) for five days after the procedure.

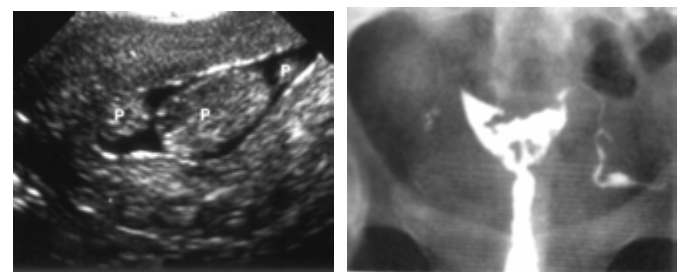
## Procedure of SHG

SHG is best performed in follicular phase. Administration of pain killers is suggested 30–60 minutes before starting the procedure. A basic trans-vaginal sonography (TVS) was done to assess the situation of uterus and ovaries. A vaginal speculum was applied and the cervix was evaluated. Then, the external os was cleaned by Povidone Iodine solution. A specified catheter (Rocket medical PIC) is traversed through the cervix into the uterus, avoiding manipulation of the cervix which might lead to redundant spasm. The catheter balloon was inflated with normal saline to fix the catheter in place. After insertion of speculum, again the probe (Sony RT 2800 – 5 MHZ) was passed trans-vaginally. If all things were going right, then the hypo-echoic image of the catheter's balloon could be seen inside the uterine cavity. Normal saline was gradually infused through the catheter. After the complete evaluation of the cavity, normal saline transfusion was continued to assess the course of the fallopian tubes.

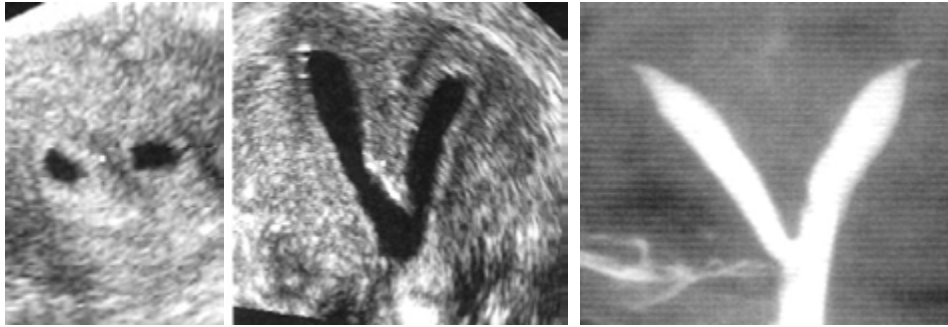
The balloon was then drained so that the area of uterine cavity which was masked by the balloon could be evaluated.



**Fig 1.** Comparison of polyp in SHG and TVS.  
SHG: Sonohysterography, TVS: Transvaginal Sonography



**Fig 2.** Comparison of multiple polyps in SHG and HSG.  
SHG: Sonohysterography, HSG: Hysterosalpingography



**Fig 3.** Comparison of septate uterus in TVS, SHG and HSG.

TVS: Transvaginal Sonography, SHG: Sonohysterography, HSG: Hysterosalpingography

## Results

The mean $\pm$ SD age of participants was 30 $\pm$ 6 years. They had a mean $\pm$ SD duration of infertility of 7 $\pm$ 5 years. Fifty-two percent of participants had primary and 42% had secondary infertility. Among the diagnostic techniques available, SHG, hysterosalpingography, and hysteroscopy were performed for all participants.

Of these 70 women, 37 (53%) were found normal by hysterosalpingography, 46 (66%) by SHG, and 43 (61%) by hysteroscopy (Table 1).

Assuming that the hysteroscopy is the gold-standard diagnostic method, SHG had a sensitivity of 30%, a specificity of 100%, a positive predictive value of 100% and a negative predictive value of 30% (Table 2); hysterosalpingography had a sensitivity of 55%, a specificity of 68%, a positive predictive value of 41% and a negative predictive value of 60% (Table 3). In our study there was no case of infection after SHG.

## Discussion

One of the important aspects of screening for infertility is to study the uterus for presence of abnormalities in implantation of the embryo and surgically correctable anomalies. Due to the high prevalence of uterine anomalies in infertile patients, currently, it is recommended that hysteroscopy be performed for screening purposes.<sup>2-4</sup> However, SHG provides more

information regarding the size and site of myomas;<sup>15</sup> it could also differentiate between a septate and bicornuate uterus.<sup>16</sup> SHG is capable of identifying even mild or small intrauterine lesions. There is evidence that mild uterine abnormalities may adversely affect pregnancy.<sup>4</sup> Brown et al. (2000) compared SHG, hysterosalpingography and hysteroscopy with each other and found that the diagnostic value of these three procedures was almost equal in diagnosing intrauterine lesions. They also found that hysterosalpingography and hysteroscopy were more painful than SHG, and that the mean duration for performing a hysteroscopy was clearly more than hysterosalpingography and SHG.<sup>7</sup>

We showed that SHG can be performed in outpatients with minimum complaints or infections. All patients who had previously undergone hysterosalpingography reported that they were more comfortable with SHG. Although antibiotics must be administered, overt infection rarely occurs especially, in the absence of sonographic findings of hydrosalpinx.<sup>6</sup> None of the patients in our study had infection, which is in accordance with the report of De Kroon et al.

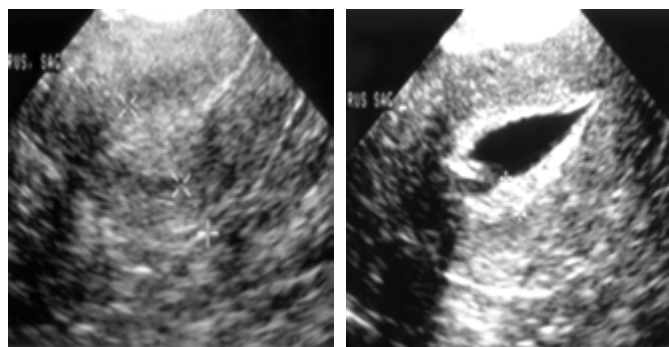
It should be mentioned that hysterosalpingography has a significant role in the diagnosis of intra-uterine and fallopian tube anomalies and SHG can only replace the diagnostic hysteroscopy.

Lopez Navarrete (2003) compared SHG and hysterosalpingography in diagnosing endometrial

**Fig 4.** Comparison of endometrial hyperplasia in SHG, HSG and TVS.

SHG: Sonohysterography, HSG: Hysterosalpingography, TVS: Transvaginal Sonography





**Fig 5.** Comparison of secretory endometrium in TVS and SHG.  
TVS: Transvaginal Sonography, SHG: Sonohysterography

anomalies in infertile women. Results showed that although both procedures were useful in assessing the intrauterine cavity, SHG has a higher sensitivity and specificity, takes less time, is easier to perform, is less painful and has fewer complications than hysterosalpingography. SHG is superior to hysterosalpingography in evaluation of the uterus since no ionized radiation is used.<sup>12</sup> In addition, SHG can help study both the ovaries and uterus, simultaneously. Before hysteroscopy becomes a uterine screening device,

another ultrasonography should have been performed.<sup>13</sup>

Due to the high positive predictive value (PPV=100%) of SHG, all positive cases must be confirmed by hysteroscopy for further evaluation of intrauterine lesions. However, in SHG, it is difficult to differentiate between blood clot and polyps or adhesions, especially, if they cannot be displaced by catheter insertion or by pulsatile normal saline infusion. In cases in with a suspected blood clot, it is recommended to repeat the SHG after the next menstrual cycle. In spite of the low probability of obtaining false-negative results with SHG, some small lesions may be unnoticed. Nonetheless in such cases, it has not been shown that these unnoticed lesions can produce any adverse effects on the pregnancy. Rogerson et al. (2002) compared hysteroscopy and SHG and concluded that both techniques are well tolerated and that SHG has a higher false-positive rate and is less painful than hysteroscopy.<sup>18</sup>

SHG is the cheapest technique that can easily be

**Table 1.** Frequency distribution of sonohysterography, hysterosalpingography and hysteroscopy findings in 70 infertile women

Method	Finding	Normal	Filling Defect	Bicornuate Uterus	Intrauterine Adhesions	Undiagnostic	Unicorns	Total
Sonohysterography		46(66%)	12(17%)	6(86%)	4(6%)	2(3%)	–	70
Hysterosalpingography		37(53%)	13(19%)	12(14%)	7(10%)	2(3%)	1(1%)	70
Hysteroscopy (gold-standard)		43(61%)	15(21%)	7(10%)	4(6%)	–	1(1%)	70

**Table 2.** Comparison of sonohysterography with hysteroscopy

Sonohysterography	Hysteroscopy		Total
	Abnormal	Normal	
Abnormal	8 (30%)	–	8 (11%)
Normal	19 (70%)	43 (100%)	62 (87%)
Total	27 (100%)	43 (100%)	70 (100%)

PPV=100%; NPV=30%; Sensitivity: 30%; Specificity: 100%

**Table 3.** Comparison of hysterosalpingography with hysteroscopy

Hysterosalpingography	Hysteroscopy		Total
	Abnormal	Normal	
Abnormal	11 (41%)	9 (21%)	20 (29%)
Normal	16 (59%)	34 (79%)	50 (71%)
Total	27 (100%)	43 (100%)	70 (100%)

PPV=41%; NPV=60%; Sensitivity: 55%; Specificity: 68%

used in infertility screening programs.

Since SHG is non-invasive and cheaper than hysteroscopy, it is a more suitable method for screening intra-uterine lesions when compared to hysteroscopy. We therefore, recommend SHG as a routine screening technique for diagnosing intrauterine abnormalities.

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