

# Role of Saline Infusion Sonography (SIS) for Endometrial Cavity Evaluation for Diagnosis Focal Intra-Cavitary Lesions in Sub-Fertile Women

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Received: 13-01-2022 / Revised: 17-02-2022 / Accepted: 10-03-2022

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Conflict of interest: Nil

## Abstract

**Aim:** To observe the role of Saline Infusion Sonography (SIS) for endometrial cavity evaluation for diagnosis focal intra-cavitary lesions in sub-fertile women

**Materials and Methods:** The present was a retrospective analysis done on the basis of record maintained in ultrasound register and case record sheets of 100 sub-fertile women who underwent infertility treatment and fulfilled the inclusion criteria for 1 year at department of reproductive medicine IGIMS, Patna, Bihar, India.

**Results:** A total of 100 patients were included in the study who full filled the inclusion criteria. The sensitivity of SIS in identifying endometrial pathology in infertile women was better than that of TVS. Specificity remains same for both modalities. Polyps were better identified and demonstrated with SIS, however both modalities were not very efficient in identifying synachiae. The accuracy rates of TVS and SIS were 90.3% and 95.77% for the diagnosis of intracavitary space-occupying lesions, respectively.

**Conclusion:** HSGM should be considered as an intermediate investigation after TVS to assess intracavity pathology and to confirm the diagnosis; hysteroscopy should become a therapeutic intervention.

**Keywords:** Saline Infusion Sonography, intra-cavitary lesions, sub-fertile patients

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## Introduction

Globally, around 10 percent of women are affected by infertility, according to WHO reports [1]. One of the most common reasons of female infertility is a fallopian tube anomaly, which accounts for as much as 40% of all female infertility [2,3].

As a result, checking for tubal occlusion is a critical initial step in the evaluation of fertility in sub fertile couples and should never be skipped. Saline infusion sonography (SIS) is gaining popularity and is being widely practiced and accepted as a screening tool in assessing tubal patency in

infertile patients attending infertility clinic [4] and has become popular as a routine test for the evaluation of the uterine cavity in the investigation of infertility and abnormal uterine bleeding [5-8]. SIS can be done with B mode ultrasound (US) and Doppler. SIS refers to a procedure in which fluid is instilled into the uterine cavity transcervically through a catheter to provide enhanced endometrial visualization during transvaginal US examination [9,10]. There are many studies that suggest application of SIS in

evaluating uterine defects in patients with recurrent pregnancy loss as well as in those undergoing in vitro fertilization (IVF) [11,12].

SIS can demonstrate a patent tube; however, if blocked, the site of block is difficult to elicit. SIS aids in improved sonographic detection of endometrial pathologies, such as polyps, hyperplasia, leiomyomas, and sometimes adhesions. In addition, it can help in avoiding invasive diagnostic procedures in some patients as well as can optimize the preoperative evaluation process for those women who require therapeutic intervention. It is a well-tolerated technique, could be easily and rapidly performed at minimal cost, and has virtually lower risk of adverse effects and severe complications. The current study was done to observe the role of SIS to diagnose focal intra-cavitary lesions in sub-fertile patients. Hence the present study was carried out to observe the role of Saline Infusion Sonography (SIS) to diagnose focal intra-cavitary lesions in sub-fertile patients.

### Materials and Methods

The present was a retrospective analysis done on the basis of record maintained in ultra sound register and case record sheets of 100 sub-fertile women who underwent infertility treatment and fulfilled the inclusion criteria for 1 year at department of reproductive medicine IGIMS, Patna, Bihar, India.

#### Inclusion criteria

- Women between 25-40 years of age
- All cases of Sub-fertility
- Previous history of recurrent spontaneous abortion

#### Exclusion criteria

- Suspected case of genital tuberculosis
- Pelvic infection
- Active vaginal bleeding
- Suspected pregnancy

- Genital malignancy

### Methodology

Initial workup of detailed clinical history to identify possible predisposing factors leading to infertility and the duration of symptoms was obtained from all the patients. According to standard treatment protocol, all patients had undergone detailed general examination as well as pelvic examination.

Routine laboratory investigations were done before undergoing SIS. SIS was performed on the 7th or 8th day of the menstrual cycle. Their outcome of diagnosing tubal patency was subsequently analyzed by an independent observer in the evaluation of uterine cavity and tubal patency. The primary outcome was to observe the role of SIS to find out endometrial pathology in sub-fertile patients.

### Procedure

Procedures were done after obtaining valid informed consent. Premedication with ibuprofen 500 or hyoscine 10 mg was given ½ h before the procedure. Emergency cart was kept ready for any vasovagal attack. A bimanual examination was performed, Cusco's self-retaining speculum inserted, antiseptic cleaning of the cervix and vagina was performed, and a Foleys catheter of size-8 was introduced into the external os with the help of artery forceps, which was kept intracervically. In patulous os, it was kept above internal os, 2–3 ml of normal saline was pushed to inflate the bulb. Around 20 ml normal saline was kept ready with a 20 ml syringe. After removing stellate of catheter, normal saline was slowly pushed into catheter. Maximum 50 ml of normal saline was instilled. Once adequate distension of uterine cavity achieved, a sagittal sweep from cornua to cornua followed by an axial sweep from fundus to external cervical os was performed with a transvaginal probe. The cavity was

evaluated for the presence of any abnormality. Subsequently, each tube was visualized separately for the presence of fimbrial turbulence (waterfall sign) which was taken as a sign of tubal patency. The presence of fluid in pouch of Douglas after SIS was also taken as a sign of tubal patency.

### Statistical analysis

Student's t test and chi-square test will be used for statistical analysis. A value of  $p < 0.05$  will be considered statistically significant.

### Results:

A total of 100 patients were included in the study who full filled the inclusion criteria. The patient's demographic characteristics are shown in Table 1. The mean age of patients was  $30.27 \pm 5.8$  years and 78% was primary infertility. The prevalence of intra-cavitary space occupying lesions was 21% and the prevalence of endometrial polyp and submucous fibroid were 17% and 1.55%, respectively.

Table 2 gives the diagnostic performance of TVS and SIS. The sensitivity of SIS in identifying endometrial pathology in infertile women was better than that of TVS. Specificity remains same for both modalities. Polyps were better identified and demonstrated with SIS, however both modalities were not very efficient in identifying synachiae.

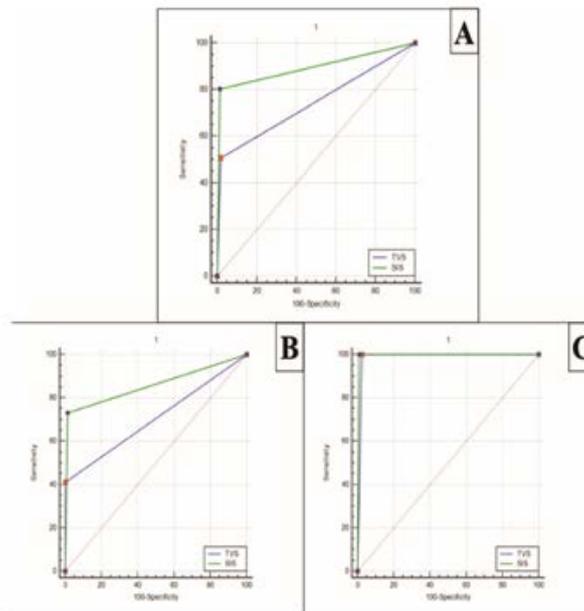
The ROC curves of TVS and SIS for the diagnosis of the intracavitary lesions were shown in Figure 1. Analysis for each intracavitary lesion (endometrial polyps and fibroid) to determine the differences between TVS and SIS (Figure 1B and 1C), but only 7 submucosal fibroid cases were observed. Hence, we primarily aimed to evaluate the diagnostic accuracy of TVS and SIS for overall intracavitary space-occupying lesions. The pairwise comparison of AUC determined which method was the most accurate diagnostic procedure. The AUCs showed that SIS had statistically significantly higher diagnostic reliability compared to TVS in the diagnosis of the only endometrial polyp (AUC=0.792 and AUC=0.7771, respectively;  $p < 0.0001$ ) (Figure 1B). Although there were only 7 cases for submucous fibroid, both of the two procedures had similar AUCs for the detection of submucous fibroid (AUC=0.872 and AUC=0.815 for TVS and SIS, respectively;  $p = 0.01$ ) (Figure 1C). In general, saline infusion sonography yielded better results compared to TVS in the diagnosis of the intracavitary space-occupying lesions (AUC=0.775 and AUC=0.697, respectively;  $p < 0.0001$ ) (Figure 1A). The accuracy rates of TVS and SIS were 90.3% and 95.77% for the diagnosis of intracavitary space-occupying lesions, respectively.

**Table 1. Demographic and clinical parameters of the patients**

	Mean (SD)
<b>Age(years)</b>	30.27 (5.8)
<b>Gravidity</b>	0.3 (0.5)
<b>BMI (kg/m<sup>2</sup>)</b>	24.62 (4.6)
<b>Duration of infertility (years)</b>	7.0 (4.0)
<b>Infertility n (%)</b>	
Primary	78%
Secondary	22%

**Table 2: Diagnostic performance of SIS and TVS:**

Test	Sensitivity	Specificity	Positive value predictive	Negative predictive value
SIS	85.62 %	91.86%	87.20%	93.71%
TVS	79.04%	91.86%	89.82%	82.96%



**Figure 1. The comparison of ROC curve of TVS and SIS for intracavitary lesions; A. Overall B. Endometrial polyp C. Submucous fibroid**

### Discussion:

HSGM has a higher sensitivity and specificity as well as positive and negative predictive values for the diagnosis of endometrial polyps and submucous fibroids when compared with TVS. It also confirms that the HSGM procedure has a low failure rate, in contrast to at least one other published study which claimed a failure rate of 7%. [13]

There are many tools used in diagnosis of intrauterine pathology, the most frequently used being TVS, SIS, and endometrial sampling, used individually or in combination. The choice of one test over another will depend primarily on its diagnostic accuracy. [14]

AUB is a very common symptom in women of all ages. For patients with AUB, TVS is performed as an initial investigation. In cases where TVS

demonstrates an abnormal endometrial thickness or if TVS is suboptimal, SIS is performed. SIS is also recommended in patients with normal TVS who are unresponsive to medical management. Evaluation of AUB is of special importance in postmenopausal women, because of the high prevalence of endometrial cancer in this women. [15]

Saline infusion sonography is recently being practiced in order to assess the endometrium. Adequate distension of the endometrium depicts intracavity lesions better than the routine TVS. The lesions stand out prominently within the distended endometrial cavity. A 3D reconstruction of the uterus along with tomographic imaging during the SIS study is very helpful in knowing the precise location of the lesion and help as a guide to the surgeon in treating the same. [16]

SIS can be done as an outpatient procedure and requires no anaesthesia. Most of the women are able to cooperate throughout the procedure. SIS is considered a better modality for imaging of endometrial and sub endometrial lesions. [17]

It is substantial that to diagnose the uterine abnormalities accurately, because surgical correction of the pathologies may improve the treatment success of the infertile women. [18,19] TVS is a simple and non-invasive tool to diagnose the uterine cavity abnormalities and it has good accuracy in some studies. [20] Although TVS is generally used to evaluate the uterine pathologies in gynecology practice, the diagnostic efficiency of TVS is poor with especially intracavitary masses. [21] Some studies have demonstrated poor diagnostic accuracy, sensitivity and positive predictive values in the detection of endometrial polyps. [22]

Other procedures used in the diagnostic protocol of infertility are: hysterosalpingography (HSG), which is a radiological procedure, which allows, through the introduction of a radio-opaque contrast medium inside the cervical canal, the assessment of uterine cavity, and Fallopian tubes; magnetic resonance imaging (RMI), particularly useful for evaluating the myometrium and ovaries; laparoscopy with chromopertubation (or dye) test, accurate to diagnose the causes of tubal occlusion and to study of the pelvic peritoneum. [23]

Luciano *et al.* [24] evaluated benefits and accuracy of hysterosalpingo-contrast sonography (HyCoSy) in the study of tubes, compared to HSG and laparoscopic chromopertubation; the sensitivity and specificity for HyCoSy in determining tubal patency compared with laparoscopic chromopertubation were 97% and 82%, respectively; the positive predictive value was 88% and the negative predictive value was 95%.

Reda *et al.* emphasized the important role of SIS in repeated implantation failure and they concluded that SIS might save the invasive procedure for selected cases. [25] SIS may be an effective choice to evaluate the endometrial cavity in infertile patients as it is of higher accuracy, better tolerability, cost-effective and decreases the necessity of invasive procedures. However, SIS could be used in gynecology clinics that do not have enough opportunity as the first-line screening tool especially in developing countries. [26]

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