

# Saline Infusion Sonohysterography in Evaluation of Uterine Cavity in Patients with Primary Infertility

Abeer Wali Ahmed<sup>1</sup>, Thekra Ali Mohammed<sup>2</sup>, Rasha Nadeem Ahmed<sup>3</sup>

<sup>1</sup>Lecturer, Department of Surgery, College of Medicine, Ninevah University, Mosul, Iraq

<sup>2</sup>Lecturer, Department of Gynecology and Obstetrics, College of Medicine, Ninevah University, Mosul, Iraq

---

## ABSTRACT

**Objectives:** Role of sonohysterography in the detections of endometrial polyps, endometrial hyperplasia and submucosal fibroids in women with primary infertility.

**Material and methods:** We conducted an observational study of 70 reproductive patients referred to the Department of obstetric and Gynaecology, the Medical University of Ninevah with a history of primary infertility & abnormal uterine bleeding or suspicion of endometrial pathology based on sonohysterography scan and histopathological investigations. In all 70 patients, a transvaginal sonography scan showed a possibility of an endometrial lesion. so they underwent saline infusion sonohysterography. Pathological examination was performed on material collected during hysteroscopy& dilatation and curettage.

**Results:** Saline infusion Sonohysterographic (SIS) detection of endometrial polyp had a 45% sensitivity and a specificity of 88%. The positive and negative predictive values of saline infusion sonohysterography in diagnosing endometrial polyps were estimated at 80% and 62%, respectively. Whereas, endometrial hyperplasia had a 42% sensitivity and specificity of 68%. The positive & negative predictive value of saline infusion sonohysterography in diagnosing endometrial hyperplasia was estimated at 57% and 54%, respectively .while sonohysterographic detection of uterine myoma had a 25% sensitivity and a specificity of 77%. The positive and negative predictive values were estimated at 52% and 50%, respectively.

**Conclusion:** Saline infusion sonohysterography (SIS) may become a standard method in the diagnostics of uterine cavity abnormality in reproductive-aged women with primary infertility.

**Keywords:** Saline Infusion Sonohysterography (SIS), Endometrial Polypendometrial hyperplasia, Usubmucosal fibroids.

---

## INTRODUCTION

Saline-Infused Sonohysterography (SIS) is a technique that may help improve visualization of the endometrium and endometrial cavity, distinguish between lesions of endometrial and myometrial origin, and assess tubal patency. It consists of the instillation of fluid into the endometrial cavity with simultaneous pelvic ultrasonography (US), typically transvaginal US. SIS is most commonly performed to evaluate abnormal uterine bleeding in pre- and postmenopausal women (1,2). Other indications include infertility, recurrent miscarriage, and suspected congenital uterine abnormalities (3). SIS is more accurate than transvaginal US for depicting endometrial conditions and is less invasive than hysteroscopy (4,5). Although tubal patency may be indirectly assessed at SIS by measuring the amount of free fluid that accumulates during the procedure. Planning and performing SIS involves considerations and techniques that are not commonly encountered in radiology training or that may not be widely known by radiologists. A potentially unsuccessful study may be salvaged by addressing issues before the procedure or employing less common techniques.

In this article, we discuss strategies and recommendations that will help improve the rate of successful implementation and interpretation of SIS, including scheduling issues, alleviating patient discomfort and anxiety, and pitfalls in image acquisition and interpretation.

Scheduling Issues SIS should be performed between days 4 and 10 of the patient's menstrual cycle when the endometrium is at its thinnest, and physiologic changes during the secretory phase that may simulate pathologic conditions are not present (6,7). Before day 4, the presence of blood may either obscure or simulate a pathologic condition. In women with a regular menstrual cycle, performing SIS before ovulation helps avoid the possibility of flushing out a fertilized ovum during the procedure. In patients with an irregular menstrual cycle, a pre-procedure pregnancy test may be performed unless the patient has recently confirmed (8,9).

Prophylactic antibiotics may be administered to patients who are at increased risk for infection, including those with an intrauterine device (IUD) and known tubal occlusion or peritubular adhesions that may cause increased stasis of saline in the pelvis (3,6). Color Doppler imaging may be of benefit when findings are positive for blood flow. For example, the presence of a feeding artery is indicative of a polyp rather than a blood clot. However, a lack of blood flow does not rule out the presence of a true mass. (10).

This study aimed to assess endometrial lesion in patients with primary infertility in whom the transvaginal US showing a possibility of the endometrial lesion.

## MATERIAL AND METHODS

This study was undertaken at the radiology & obstetrics & gynecology department, Ninevah medical college, Mosul, Iraq, between 1 February 2018 and 30 October 2019 and involved women with a history of primary infertility. patients excluded from the study those who did not complete TVS and the SIS technique, patients with clear infection at the time of procedures. All women participating in the study completing questioner with their menstrual and gynecological histories. Then all of them did a TVS examination (DC-30, Shenzhen Mindray Bio-Medical Electronics Co.,Ltd ) with a transvaginal ultrasound probe (6.5 MHz) by an experienced radiologist. The myometrium and endometrium were examined in longitudinal and transverse planes. An endometrial polyp was defined as an echogenic lesion , well defined margines ,with homogeneous texture and take different shape and size, some times with clear vascular pedicles seen on colour Doppler study. Fig(1,2). While, submucosal myoma was defined as a solid a may be of mixed echogenicity arising from myomaterium and protruded into uterine cavity, it should be covered by intact epithelium. Fig (3,4).In order to detect endomaterial hyperplasia, the maximum depth of thendometrium was measured in the longitudinal plane.



*Figure 1:* 26- year old female with history of vaginal bleeding and primary infertility. Coronal transvaginal US image of the uterus, obtained after instillation of saline with the catheter held in place, shows that modest distention was achieved, allowing visualization of a polyp.

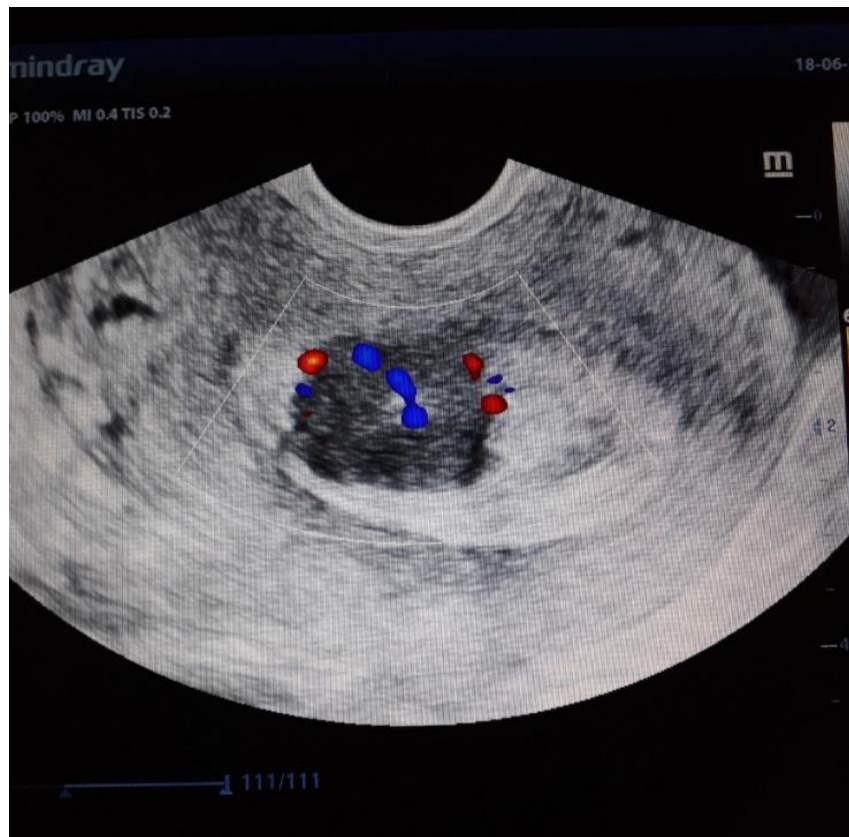


Figure 2: A 31-year old women with a history of infertility, Preprocedure coronal transvaginal US image obtained with colour Doppler shows an enlarged, globular uterus, indistinct endometrial echo complex, with vascular pedicles appear clearly indicative of polyp..



Figure 3: A 33 –year old female with vaginal bleeding .Sagittal transvaginal US image of the uterus obtained at SIS shows mixed echogenicity submucosal fibroid.



*Figure 4:* A 26 –year old female with vaginal bleeding and 4-year primary infertility. Sagittal transvaginal US image of the uterus obtained at SIS shows at least one submucosal fibroid on the ant uterine wall.

In the SIS examination, patients have lied in the dorsal lithotomy position. A standard speculum with bivalve was introduced and the uterine cervix was cleansed with an antiseptic solution (povidone-iodine). A sterile disposable catheter, 15 cm long and with diameter 2 mm, was introduced through the cervical os until it reached the fundus. The speculum was withdrawn and the transvaginal ultrasound (6.5 MHz) probe was introduced. Up to 18- 20 ml of sterile saline solution was infused into the uterine cavity; 5 – 10 ml usually proved to be sufficient to distend the cavity, and the distended cavity was observed directly by sonography (DC-30, Shenzhen Mindray Bio-Medical Electronics Co., Ltd). The anterior and posterior endometrial thicknesses were measured at its thickest part, in the longitudinal plane, and then in the transverse plane from the cervix to the fundus. These two measurements were added together to calculate the total endometrial thickness. Results for TVS and SIS were written using these criteria: normal; endometrial hypertrophy; endometrial polyp; submucosal myoma; and suspicious lesion (an irregular endometrial echo of variable echogenic texture). The location of any lesion was recorded according to uterine anatomy either ant or posterior concerning uterine fundus and isthmus. Then we scheduled every woman with an abnormal TV or SIS result for surgical interference either D&C or hysteroscopy. The resected tissues from the uterine cavity were placed in separate containers with 10% formaldehyde and sent for pathological investigation. After that, the result was compared with pathological results obtained from D &C and hysteroscopy.

The sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and diagnostic accuracy of TVS and SIS for all endometrial pathologies, endometrial polyps and fibroids were calculated by comparing the results of each method with those obtained by histological examination.

## RESULTS

Seventy patients were included in this study of these 9 patients (17%) found to have submucosal fibroids, endometrial hyperplasia without focal abnormalities was found in 15 patients (37%), and endometrial polyps were found in 20 patients (46%).

Pathologically confirmed polyp was diagnosed in 16 patients. The sensitivity of sonohysterography in diagnosing endometrial polyps was 45% and specificity was 88%. The positive and negative predictive values of SIS in diagnosing endometrial polyps were estimated at PPV = 80% and NPV = 62%, respectively. Pathologically confirmed submucous myoma was diagnosed in 8 patients. The sensitivity of sonohysterography in diagnosing submucous myoma was 25% and specificity was 77%. The positive and negative predictive values of SIS in diagnosing submucous myoma were estimated at PPV = 52% and NPV = 50%, respectively. Pathologically confirmed thickened endometrium was diagnosed in 11 patients. The sensitivity of sonohysterography in diagnosing thickened endometrium was 42% and specificity was 68%. The positive and negative predictive values of SIS in diagnosing endometrial polyps were estimated at PPV = 57% and NPV = 54%, respectively. Figure (5), Table (1).



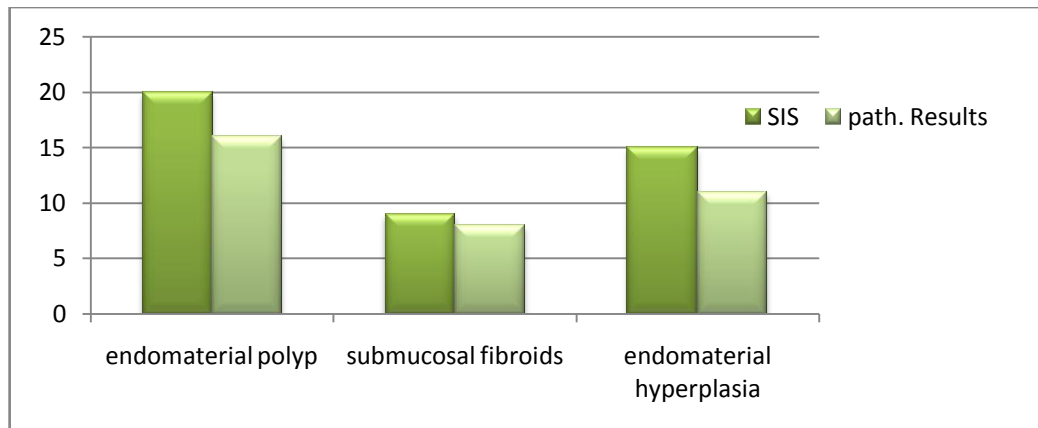


Figure 5: Showing difference & comparison between SIS & pathological results in reproductive age women with primary infertility.

Table 1: Diagnostic parameters of saline infusion sonohysterography (SIS) in the detection of endomaterial polyps, submucosal fibroids & Endometrial hyperplasia.

SIS results	Sensitivity%	Specificity%	PPV%	NPV%
Endomaterial polyp	45	88	80	62
submucosal fibroids	25	77	52	50
Endomaterial hyperplasia	42	68	57	54

## DISCUSSION

In this study we use a simple modality which is TVS that can give good imaging to uterus and endometrium, can well be tolerated by patients, and can be performed in hospital or clinic 11. However, we cannot see well all types of endomaterial pathologies as polyps, submucosal myoma, and endometrial hyperplasia; 12 and, even more, it not always distinguish submucosal fibroids from intramural one.

The diagnostic accuracy of TVS is lower than SIS when compared with the pathology results, especially for endometrial polyps compared with submucosal fibroids.<sup>12,13</sup> In our study, the sensitivity, specificity, PPV and NPV of SIS were 45.0%, 88.0%, 80.0% and 62.0%, respectively, in detecting endometrial polyps and 25.0%, 77.0%, 52.0% and 50.0%, respectively in detecting fibroids.<sup>14</sup> In a large series, reported that TVS had 80% sensitivity and 69% specificity for diagnosing submucosal fibroids. So, TVS cannot reveal the relationship of fibroids to the cavity Goldstein et al.<sup>15</sup> also found that small structural abnormalities can be easily missed and that it is not always possible to differentiate between endometrial and myometrial abnormalities by TVS and that it was inadequate in distinguishing between dysfunctional uterine bleeding and endometrial hyperplasia. SIS, when combined with TVS in the present study, showed markedly better sensitivity in the detection and localization of lesions in the uterine cavity. Knowing the correct location of lesions during the treatment, for example, if D&C is being planned, makes it possible to avoid proceeding blindly. Pre-operative use of SIS may assist in choosing the best conservative surgical treatment for the patient.<sup>16</sup> In a systematic review and meta-analysis of 24 studies, de Kroon et al.<sup>17</sup> found SIS to be both feasible and accurate in the evaluation of the uterine cavity in pre- and postmenopausal women. They concluded that SIS, in combination with an aspiration biopsy in selected cases, is suitable as the standard diagnostic procedure in pre- and post-menopausal women complaining of abnormal uterine bleeding. However, SIS is more effective than TVS because TVS generally fails to discriminate between endometrial hyperplasia, polyps, and submucosal myomas.<sup>18</sup> Besides, the exact location of the polyps or growths cannot be identified on TVS. Information obtained by SIS helps in determining whether a diagnostic or operative hysteroscopy is needed.<sup>19</sup> Thus, the pathological examination of material obtained by endometrial biopsy maintains its significance as the primary method in the diagnosis of endometrial hyperplasia and endometrial carcinoma, particularly in post-menopausal women.<sup>20</sup> Histological samples for analysis were obtained from all patients in the present study, hence it was possible to compare the results of TVS and SIS with those of histology. The most frequently observed abnormality was a benign polyp, followed by submucosal fibroids and endometrial hyperplasia and these data are consistent with the literature, although the frequency of benign pathology was higher in the present study.<sup>21,22,23</sup>

## CONCLUSIONS

Saline infusion sonohysterography is a simple tool in diagnosing endometrial polyps, thickened endometrium & submucosal fibroma in females with primary infertility. Our belief that SIS will decrease the number of not beneficial surgical interventions and will, thus, reduce costs and lower morbidity in the evaluation of uterus in women with infertility.

Patients in whom no intracavitary abnormality is detected by SIS require no further evaluation and are best treated with medical therapy

## REFERENCES

- [1]. Goldstein RB, Bree RL, Benson CB, et al. Evaluation of the woman with postmenopausal bleeding: Society of Radiologists in Ultrasound-Sponsored Consensus Conference statement. *J Ultrasound Med* 2001;20(10):1025–1036.
- [2]. Goldstein SR. Modern evaluation of the endometrium. *Obstet Gynecol* 2010;116(1):168–176.
- [3]. Lindheim SR, Adsuar N, Kushner DM, Pritts EA, Olive DL. Sonohysterography: a valuable tool in evaluating the female pelvis. *Obstet Gynecol Surv* 2003;58(11):770–784.
- [4]. De Kroon CD, de Bock GH, Dieben SW, Jansen FW. Saline contrast hysterosonography in abnormal uterine bleeding: a systematic review and meta-analysis. *BJOG* 2003;110(10):938–947.
- [5]. Erdem M, Bilgin U, Bozkurt N, Erdem A. Comparison of transvaginal ultrasonography and saline infusion sonohysterography in evaluating the endometrial cavity in pre- and postmenopausal women with abnormal uterine bleeding. *Menopause* 2007;14 (5):846–852.
- [6]. Berridge DL, Winter TC. Saline infusion sonohysterography: technique, indications, and imaging findings. *J Ultrasound Med* 2004;23(1):97–112; quiz 114–115....
- [7]. Parsons AK, Lense JJ. Sonohysterography for endometrial abnormalities: preliminary results. *J Clin Ultrasound* 1993;21(2):87–95.
- [8]. O'Neill MJ. Sonohysterography. *Radiol Clin North Am* 2003;41(4):781–797.
- [9]. Bonnamy L, Marret H, Perrotin F, Body G, Berger C, Lansac J. Sonohysterography: a prospective survey of results and complications in 81 patients. *Eur J Obstet Gynecol Reprod Biol* 2002;102(1):42–47.
- [10]. Davis PC, O'Neill MJ, Yoder IC, Lee SI, Mueller PR. Sonohysterographic findings of endometrial and subendometrial conditions. *RadioGraphics* 2002;22 (4):803–816.
- [11]. Emanuel MH, Verdel MJ, Wamsteker K, et al: A prospective comparison of transvaginal ultrasonography and diagnostic hysteroscopy in the evaluation of patients with abnormal uterine bleeding: clinical implications. *Am J Obstet Gynecol* 1995; 172: 547 – 552.
- [12]. Schwarzer P, Concin H, Bösch H, et al: An evaluation of sonohysterography and diagnostic hysteroscopy for the assessment of intrauterine pathology. *Ultrasound Obstet Gynecol* 1998; 11: 337 – 342.
- [13]. Erdem M, Bilgin U, Bozkurt N, et al: Comparison of transvaginal ultrasonography and saline infusion sonohysterography in evaluating the endometrial cavity in pre- and postmenopausal women with abnormal uterine bleeding. *Menopause* 2007; 14: 846 – 852.
- [14]. Vercellini P, Cortesi I, Oldani S, et al: The role of transvaginal ultrasonography and outpatient diagnostic hysteroscopy in the evaluation of patients with menorrhagia. *Hum Reprod* 1997; 12: 1768 – 1771.
- [15]. Goldstein SR, Zelster I, Horan CK, et al: Ultrasonography-based triage for perimenopausal patients with abnormal uterine bleeding. *Am J Obstet Gynecol* 1997; 177: 102 – 108.
- [16]. Mihm LM, Quick VA, Brumfield JA, et al: The accuracy of endometrial biopsy and saline sonohysterography in the determination of the cause of abnormal uterine bleeding. *Am J Obstet Gynecol* 2002; 186: 858 – 860.
- [17]. De Kroon CD, de Bock GH, Dieben SW, et al: Saline contrast hysterosonography in abnormal uterine bleeding: a systematic review and meta-analysis. *BJOG* 2003; 110: 938 – 947.
- [18]. Gaucherand P, Piacenza JM, Salle B, et al: Sonohysterography of the uterine cavity: preliminary investigations. *J Clin Ultrasound* 1995; 23: 339 – 348.
- [19]. Cepni I, Ocal P, Erkan S, et al: Comparison of transvaginal sonography, saline infusion sonography and hysteroscopy in the evaluation of uterine cavity pathologies. *Aust NZ J Obstet Gynaecol* 2005; 45: 30 – 35.
- [20]. Dijkhuizen FP, De Vries LD, Mol BW, et al: Comparison of transvaginal ultrasonography and saline infusion sonography for the detection of intracavitary abnormalities in premenopausal women. *Ultrasound Obstet Gynecol* 2000; 15: 372 – 376.
- [21]. Mencaglia L, Perino A: Diagnostic hysteroscopy today. *Acta Eur Fertil* 1986; 17: 431 – 439.
- [22]. Fedele L, Bianchi S, Dorta M, et al: Transvaginal ultrasonography versus hysteroscopy in the diagnosis of uterine submucous myomas. *Obstet Gynecol* 1991; 77: 745 – 748.
- [23]. Osmers R, Völksen M, Schauer A: Vaginosonography for early detection of endometrial carcinoma? *Lancet* 1990; 335: 1569 – 1571.