



Evaluation of Uterine Cavity Abnormality using Saline Infusion Sonohysterography Before *In Vitro* Fertilization

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Abstract

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BACKGROUND: Some studies suggested that saline infusion sonohysterography (SIS) has been used to detect uterine cavity abnormalities before *in vitro* fertilization (IVF) cycles to improve treatment success rates and decrease the number of cycle cancellations and embryo implantation failures. Some of the factors contributing to the dissemination and acceptance of the technique include the fact that it is a simple, less painful, less expensive, less invasive, and well-tolerated procedure when compared to hysteroscopy.

AIM: The aim of the study is to evaluate uterine cavity abnormality with SIS performed before IVF.

METHODS: A descriptive retrospective study involving 551 female partners who had SIS before IVF/ICSI treatment at private Halim Fertility Center from January 2014 until December 2017. Five hundred and fifty-one infertile woman was included in this study before IVF/ICSI cycles. Patients agreed to have an ultrasound assessment of the uterine cavity with the use of saline as the contrast medium. SIS procedure was scheduled postmenstrual period in the early-mid follicular phase and 1-3 months before starting IVF/ICSI treatment.

RESULTS: From 551 patients, we found 527 (94.4%) cases with the normal uterine cavity. The uterine cavity abnormalities were detected in 5.56% of cases included in this study (28 (5.02%) cases with endometrial polyps, two (0.36%) cases with intrauterine adhesions, and one (0.18%) case with Müllerian duct anomalies).

CONCLUSION: SIS before IVF treatment could be a good option for evaluating uterus cavity before IVF to improve success rates of pregnancy.

Introduction

Infertility is associated with the uterine cavity abnormalities that are thought to be a contributing factor of 10–15% of couples requiring treatment. An abnormal intrauterine finding is estimated to occur in about 34–62% of infertile women. Because of the high prevalence of uterine abnormalities, the evaluation of the uterine cavity is routinely performed on the basic evaluation of infertile women [1], [2]. The outcome of assisted reproductive technique largely depends on the receptivity of the endometrial lining of the uterus. Measures aimed at evaluating the uterine cavity before treatment are very vital for decision making and hence contribute to the overall success rate. The true prevalence of intrauterine lesions in infertile women is not known but some studies have reported an incidence of about 16–24% [3].

The diagnostic modalities that are commonly employed to evaluate the regularity and shape of the uterine cavity include a conventional 2-dimensional (2-D) and 3-D transvaginal scan, saline infusion sonography (SIS), hysterosalpingogram, and hysteroscopy [3], [4]. Over the last three decades, SIS

has become an integral part of ultrasound imaging in gynecology. SIS is a technique that can show better visualization of the uterine cavity than conventional transvaginal ultrasound (TVS). SIS is done by inserting the liquid gradually into the uterine cavity through a catheter inserted into the cervix. Some of the factors contributing to the dissemination and acceptance of the technique include the fact that it is a simple, less painful, less expensive, less invasive, and well-tolerated procedure when compared to hysteroscopy [4], [5]. In addition, SIS can provide detailed information about the uterus and endometrium.

SIS is indicated in the evaluation of the uterine cavity of women with abnormal pre- and post-menopausal uterine bleeding, infertility, recurrent pregnancy loss, suspected uterine cavity abnormality, myoma, polyps, or synechiae. SIS should not be performed on women who are pregnant or women planning to become pregnant or in women with pelvic infection or unexplained pelvic tenderness. SIS with the use of TVS for evaluation of abnormal uterine bleeding was first described by Bonilla-Musoles in 1992 [5], [6], [7]. SIS provides the benefit that saline is a negative contrast during TVS and is also useful in the distention of the uterus from

saline, as it may indicate structural abnormalities of the endometrium [5], [6], [7]. Nannini *et al.* (1981) describes the concept of synchronized SIS with TVS after the initial experience of increased uterine cavity features [7]. Small endometrial polyps or intrauterine adhesions may not be diagnosed in 2-D TVS. Implantation failure presents a major clinical challenge and is a cause of considerable stress to patients and clinicians in assisted reproductive technology. Even minor uterine cavity abnormalities, such as endometrial polyps, small submucous myomas, adhesions, and septa are considered to have a negative impact on the chance to conceive through *in vitro* fertilization (IVF).

Some studies suggested that SIS has been used to detect uterine cavity abnormalities before IVF cycles to improve treatment success rates and decrease the number of cycle cancellations and embryo implantation failures [3], [8]. The aim of the study is to evaluate uterine cavity abnormality with SIS performed before IVF.

Materials and Methods

A descriptive retrospective study involving 551 infertile females who had SIS before IVF/ICSI treatment at private Halim Fertility Center from January 2014 until December 2017. SIS was performed on individuals preparing for IVF who had not undergone uterine cavity evaluation through SIS for at least a year. Patients submitted to examination for other indications were excluded from the study.

Technique of SIS

SIS procedure was scheduled during the follicular phase (ideally on day 10) after menstrual flow has ceased and 1–3 months before starting IVF/ICSI treatment, when the endometrium was relatively thin and the endometrial polyps could see clearly.

Preparation for the examination involved counseling about the procedure and obtaining informed consent. SIS is performed in the lithotomy position, with a full bladder and using TVS. After speculum placement and visualization of the cervix and external orifice, the cervix was prepped with povidone-iodine. The catheter was placed at the external cervical os and then advanced into the endometrial cavity. Then the speculum was carefully removed and the transvaginal probe was inserted into the vagina toward the posterior catheter. We used foley catheter No. 8, when the catheter was inserted, the catheter balloon was filled slowly with 10–30 mL saline solution once the balloon full, the

endometrium was seen in the longitudinal direction, the uterine cavity was filled with saline solution. Using conventional 2D TVS, the anechoic fluid juxtaposed against the echogenic endometrium was visualized, providing a clear image of the uterine lining. At this time, an evaluation of the uterine cavity may be an endometrial polyp, intrauterine adhesions, congenital abnormalities of the uterus, and submucosum uterine myoma. At the end of the examination, the catheter balloon was emptied and then the catheter was removed from the cervix with a TVS guide. The cavity was deemed abnormal when polyps, submucous myomas, synechiae, or Müllerian duct anomalies were detected. The cases suspected of cavity abnormalities that might interfere with the outcome of IVF were referred for hysteroscopy.

Data were analyzed by computer applications in accordance with processing and analyzing data were using SPSS 17 (Statistic Package for Social Science) software. The main outcome measure of the study was SIS findings.

Results

From January 2014 and December 2017, we included 551 infertile women in this study. The mean age of the women was 34.17 ± 5.16 years and body mass index was 24.90 ± 4.14 kg/m². Duration of infertility was 7.00 ± 4.30 years and most of the etiology of infertility was mixed factor 285 (51.72%) and type of infertility was primary 450 (81.67%) (Table 1).

Table 1. Demographic data of the patients

Characteristic	n = 551
Female age (yo) (mean \pm SD)	34.17 \pm 5.16
Body mass index (kg/m ²) (mean \pm SD)	24.90 \pm 4.14
Duration of infertility (years) (mean \pm SD)	7.00 \pm 4.30
Type of infertility	
Primary	450 (81.67%)
Secondary	101 (18.33%)
Etiology of infertility	
Male factors	161 (29.22%)
Female factors	105 (19.06%)
Mixed factors	285 (51.72%)

From Table 2, from Five hundred and fifty-one infertile woman underwent hysterosonography within the time period comprised in the study. No abnormalities in the uterine cavity were seen in 519/551 of the cases (94.2%). Examination revealed endometrial polyps in 29 cases (5.26%), synechiae in two (0.36%), and Müllerian duct anomalies in one (0.18%).

Table 2: SIS Findings before IVF

SIS findings	n (%)
Normal	519 (94.2)
Endometrial polyps	29 (5.26)
Synechiae	2 (0.36)
Mullerian duct anomalies	1 (0.18)

IVF: *In vitro* fertilization



Figure 1: The distention of the uterine cavity produced after the infusion of saline solution. An endometrial polyp measuring 15.7 mm can be seen on the back wall

Discussion

In this study, uterine cavity abnormalities were found in 5.8% of the infertile patients submitted to SIS before IVF. Complications arising from the procedure were minor and not life-threatening.

The most common abnormalities in the uterine cavity findings were endometrial polyps, followed by synechiae and Müllerian duct anomalies. This finding agrees with the results published in another study, in which 13.3% of 60 infertile women analyzed had abnormalities on SIS (Sitimani *et al.*, 2016) [9]. Lopes *et al.* found that from 170 cases, normal test results were seen in 86.3% and 14% with anomalous findings [10].

Endometrial polyps were the most frequent pathologic finding in SIS in this study (Figure 1). Our study was similar to other studies reported that endometrial polyps as the most prevalent finding (12.5%) and (9.1%) (Vilela *et al.* 2012 and Lopes *et al.* 2017) [10], [11]. Radwan *et al.* (2014) performed a study that included 241 infertile women to evaluate the presence of endometrial polyps. The patients were submitted to hysterosonography and hysteroscopy, and the sensitivity, specificity, and accuracy in the detection of endometrial polyps by hysterosonography were 97.3%, 95.8%, and 96.2%, respectively [12].

In this study, intrauterine synechiae were the second most common finding (0.36%). This percentage was similar to what is found in the literature, with values ranging between 1.7% and 2% (Gupta *et al.*, 2016; Sitimani *et al.*, 2016) [9], [13]. Other authors reported lower incidences of uterine cavity disorders, with endometrial polyps and myomas seen in 5% and synechiae in 1.7% of patients (Sitimani *et al.*, 2016) [9].

Lopes *et al.* (2017) found that intrauterine synechiae in 3.5% of patients [10].

From this study, we also found Müllerian duct anomalies in 0.18% of patients. This percentage is similar to another study, with values of 0.5% (Lopes *et al.* 2017) [10]. Sallam (2016) found that saline sonohysterography was diagnostic of the bilateral tubal block with a sensitivity of 100%, a specificity of 91.3%, a PPV of 71.9%, NPV of 93.4%, FPR of 10.2%, and FNR of 7% and also, he found that the pregnancy rate and ongoing pregnancy rate were higher in the group who underwent IVF/ICSI with prior saline sonohysterography than the group who underwent ICSI without a prior saline sonohysterography (49% vs. 36% vs. 37% vs. 26%) [14]. Obajimi *et al.* (2016) found that forty-six percent of the patients had intra-uterine pathologies. Submucous fibroids accounted for almost half (48.57%) of the pathologies, followed by adhesions (28.57%) and endometrial polyps (22.86%) and they stated that SIS is a reliable, cost-effective, and safe diagnostic tool in the evaluation of the uterine cavity before assisted conception [3]. Seshadri *et al.* (2015) in the review stated that SIS is an established, reliable, and cost-effective method of diagnosing intrauterine abnormalities and plays an integral role in the baseline assessment of infertile women. SIS also can be complementary to other imaging modalities in infertile women [4].

Conclusion

The uterine cavities of most patients assessed by SIS before IVF were normal. The most common abnormalities in the uterine cavity findings were endometrial polyps, followed by synechiae and Müllerian duct anomalies. Most of these findings might compromise the outcomes of IVF procedures. SIS before IVF treatment can be a good option for evaluating uterus cavity before IVF to improve success rates.

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References

1. Hamilton JA, Larson AJ, Lower AM, Hasnain S, Grudzinskas JG. Routine use of saline hysterosonography in 500 consecutive,

- unselected, infertile women. *Hum Reprod.* 1998;13(9):2463-73. <https://doi.org/10.1093/humrep/13.9.2463>
2. Allahbadia GN, Kadam K, Allahbadia S. Saline infusion sonohysterography (SIS). *Rev Gynaecol Pract.* 2004;4:181-93. <https://doi.org/10.1016/j.rigp.2004.04.001>
 3. Obajimi G, Ogunkinle B. Routine saline infusion sonohysterography prior to assisted conception: A review of our initial experience. *Ann Ibd Postgrad Med.* 2016;14(2):99-102. PMID:28337095
 4. Seshadri S, Khalil M, Osman A, Clough A, Jayaprakasan K, Khalaf Y. The evolving role of saline infusion sonography (SIS) in infertility. *Eur J Obstet Gynecol Reprod Biol.* 2015;185:66-73. <https://doi.org/10.1016/j.ejogrb.2014.11.037> PMID:25528732
 5. Parsons AK, Lense JJ. Sonohysterography for endometrial abnormalities: Preliminary results. *J Clin Ultrasound.* 1993;21(2):87-95. <https://doi.org/10.1002/jcu.1870210203> PMID:8381140
 6. Syrop CH, Sahakian V. Transvaginal sonographic detection of endometrial polyps with fluid contrast augmentation. *Obstet Gynecol* 1992;79(6):1041-3. PMID:1579303
 7. Soares SR, dos Reis MM, Camargos AF. Diagnostic accuracy of sonohysterography, transvaginal sonography, and hysterosalpingography in patients with uterine cavity diseases. *Fertil Steril* 2000;73(2):406-11. [https://doi.org/10.1016/s0015-0282\(99\)00532-4](https://doi.org/10.1016/s0015-0282(99)00532-4) PMID:10685551
 8. Nannini R, Chelo E, Branconi F, Tantini C, Scarselli GF. Dynamic echohysterography: A new diagnostic technique in the study of female infertility. *Acta Eur Fertil.* 1981;12(2):165-71. PMID:7293673
 9. Sitimani A, Chawla I, Vohra P. Saline infusion sonography in evaluation of uterine cavity abnormalities in infertility: A comparative study. *Int J Reprod Contracept Obstet Gynecol.* 2016;5:2995-3000. <https://doi.org/10.18203/2320-1770.ijrcog20162972>
 10. Lopes VM, Barguil JP, Lacerda TS, Souza AL, da Rocha Filho AM, Roller MF, *et al.* An overview of the results of hysterosonography prior to *in vitro* fertilization. *JBRA Assist Reprod.* 2017;21(4):302-5. <https://doi.org/10.5935/1518-0557.20170051> PMID:28960053
 11. Vilela JR, Cardoso MT, Franco Júnior JG, Pontes A. Sonohysterography accuracy versus transvaginal ultrasound in infertile women candidate to assisted reproduction techniques. *Rev Bras Ginecol Obstet.* 2012;34(3):122-7. PMID:22488496
 12. Radwan P, Radwan M, Kozarzewski M, Polac I, Wilczyński J. Evaluation of sonohysterography in detecting endometrial polyps-241 cases followed with office hysteroscopies combined with histopathological examination. *Wideochir Inne Tech Maloinwazyjne.* 2014;9(3):344-50. <https://doi.org/10.5114/wiitm.2014.43024> PMID:25337156
 13. Gupta N, Dwivedi S, Dwivedi GN, Sharma B, Gupta P. Uterine cavity evaluation in infertile patients with transvaginal sonography, saline infusion sonography and hysteroscopy. *Int J Reprod Contracept Obstet Gynecol.* 2016;5:1879-82. <https://doi.org/10.18203/2320-1770.ijrcog20161682>
 14. Sallam S. Screening saline infusion sonohysterography before ICSI and its effect on success rate of assisted reproduction. *Int J Obstet Gynaecol Res.* 2016;3(9):455-61.