

**Original Article**

Transvaginal Ultrasound scan vs Saline Sonohysterogram in Evaluation of Uterine Intra-cavitary Lesions - Our Experience in India

Authors

Dr Suvarna Latha Penukonda¹, Dr Janani², Dr Bhawna³, Dr Usha Rani⁴, Dr Nidhi⁵
¹Assistant Professor, Dept of Diagnostic Imaging, Saveetha Medical College, Thandalam, Tamilnadu, India

²Resident, Department of Diagnostic Imaging, Saveetha Medical College, Thandalam, Tamilnadu, India

³Professor, Department of Diagnostic Imaging, Sri Ramachandra Medical College, Porur, Chennai, India

⁴Professor, Sri Ramachandra Dept of Obstetrics and gynecology Medical College, Porur, Chennai, India

⁵Department of Obstetrics and Gynecology, Saveetha Medical College, Thandalam, Tamilnadu, India

Corresponding Authors

Dr Suvarna Latha Penukonda

 Department of Diagnostic Imaging, Saveetha Medical Hospital, Thandalam
Tamilnadu – 600077 India

Phone numbers: Residence: +91 94458 41295, Mobile: +91 75500 85295

 Email: kiranlathap@yahoo.co.in
Abstract

Objective: To assess the positive predictive value and accuracy of sonohysterogram, by performing retrospective analysis of sonohysterographic findings correlated with hysteroscopic and biopsy findings, based on the data from two of our local hospitals.

Materials and Methods: A total of 865 Saline sonohysterograms were performed, for a period of 3 years, from 1ST February 2013 to 30th November 2016 for those women, who showed abnormality on transvaginal Ultrasound. These results were correlated with hysteroscopic and biopsy findings.

Results and Conclusion: Saline sonohysterogram is highly accurate in evaluating the endometrial cavity. It is a simple outpatient procedure that shows the details of endometrial lesions thereby helps treatment planning and avoids unnecessary hysteroscopy and biopsy.

Keywords: Sonohysterography, Transvaginal Ultrasound, Hysteroscopy, Polyps, Endometrium.

Introduction

Sonohysterography is a technique which was first described by Richman et al in 1984 ^[7], where in the saline or sterile water is instilled into the endometrial cavity to evaluate the endometrial lesions like polyps or sub mucosal lesions ^[1].

A large majority of our cases were performed for pre procedural evaluation of women presenting to the department of reproductive medicine for

assisted reproductive therapy. Other patients included those with abnormal vaginal bleeding, hypertrophied endometrium and suspected polyps found on routine transvaginal scan.

Objective

To assess the positive predictive value and accuracy of sonohysterogram, by performing retrospective comparative analysis of transvaginal

ultrasound findings and sonohysterogram findings correlated with hysteroscopic and biopsy findings. Our main objective is to publish how useful the sonohysterography is, in evaluating the patients and how helpful it is in treatment planning, based on the data from our hospital. We also attempted to prove the superior capability of sonohysterography over the transvaginal scan in evaluating the endometrial cavity.

Materials and Methods

Majority of our patient population for Sonohysterography, mainly consists of women presenting for sub fertility, where we need to demonstrate the normalcy or evaluate the abnormality of endometrial cavity and endometrial lining in order to help the clinician decide their suitability for IVF and to plan appropriate treatment when needed, before going for IVF.

Retrospective analysis has been performed of 560 cases of saline sonograms performed in our institutes for a period of three years, from 1ST February 2013 to 30th November 2016. And these results were correlated with hysteroscopic findings and biopsy reports.

Out of total 560 Sonohysterograms evaluated, the majority of cases were done for pre-procedural evaluation for In-vitro Fertilization (IVF). They constituted 350. One hundred and fifty-six cases were done for evaluation of thickened endometrium and questionable polyps or sub mucosal lesions detected on transvaginal sonography, 9 cases were done in patients with previous miscarriages to find out any uterine causes for miscarriage and 45 Cases for evaluation of abnormal vaginal bleeding. [Table 1]

Shape of the endometrial cavity, presence or absence of polyps, their location and size was assessed [Table 2]. Results compared with findings of transvaginal scan followed by hysteroscopic and surgical findings, which are further followed up with histopathology findings [Table 3,4,5].

In all those patients whom prior transvaginal scan was done we also compared the findings of

transvaginal scan with those of sonohysterography findings [Table 7].

Almost all the patients with positive findings on sonohysterogram underwent hysteroscopy and polypectomy. The endometrial scrapings were sent for histopathologic examination.

Out of 8 patients did not undergo hysteroscopy. They included four with submucosal fibroid, two with a polyp less than 5 millimeter size, and two with abnormal shape of the uterine cavity.

Those cases in which the saline Sonohysterogram shows normal endometrium, hysteroscopy was not performed, considering the negative predictive value of Sonohysterogram as 100%.

Results

Out of 560 cases 350 cases presented with subfertility. 45 cases presented with abnormal uterine bleeding and 9 patients presented with previous miscarriage [Table 1]

Among 560 cases of saline Sonohysterogram performed, 494 were found to be normal and 66 were found to have abnormal findings like polyps, adhesions, abnormal uterine anatomical configuration etc.[Table 2a]

Out of 66 positive cases polyps were found in 5 cases, adhesions were found in 4 cases, submucosal fibroids were seen in 2 cases and abnormal shape of the uterus demonstrated in 2 cases. [Table 2b]

Hysteroscopy was performed in 58 cases among which 56 were abnormal and 2 were normal. Out of the 56 abnormal cases 53 were polyps where polypectomy was performed and specimen sent for histopathological examination. 3 patients showed adhesions, and were treated by hysteroscopy guided adhesiolysis. [Table 3 and 4]. Hysteroscopy was not performed in four patients due to loss of follow-up.

Out of 53 cases where the endometrial scrapings were sent for histopathology, 49 were positive for polyps while four cases showed proliferative endometrium [Table 4]

Transvaginal scan was performed in all 66 cases out of which 51 cases showed abnormal findings

and 15 cases (23%) failed to show any abnormality. [Table 5]

Twenty cases showed thickened endometrium, 18 cases showed polyps and 8 cases showed heterogeneous endometrium.[Table 6]

The results of transvaginal scan were compared with saline sonohysterographic results in correlation with histopathology and hysteroscopic findings [Table 7]

50% of these cases were proved to be polyps on sonohysterogram another 50% showed other abnormalities like submucosal fibroid, adhesions.

Among eight cases of heterogeneous endometrium on Transvaginal scan, five cases showed polyps on saline sonohysterogram.[Table 7]

All the 18 cases of polyps diagnosed on TVS were proved to be polyps on Sonohysterogram.[Table 7]

Out of 20 cases where the TVS could not specify if it is a polyp or SMF, Sonohysterogram clearly differentiated 15 as polyps, two as adhesions, two as nodular hyperplasia and the other as submucosal fibroid.[Table 7]

Negative predictive value of Sonohysterogram was proved to be 100%.

Out of the 66 cases of abnormal Sonohysterographic findings, hysteroscopy was performed in 58 cases. Out of 58 cases, positive hysteroscopic findings were found in 56 and two cases showed normal endometrial cavity. Based on these values, Positive predictive value of Sonohysterography is 92% [Table 3a].

Hysteroscopically negative cases constituted those with proliferative endometrium with undulated appearance.

Table1: Various clinical symptoms the patients presented with

Clinical presentation	Number
Sub fertility	350
Abnormal vaginal bleeding	45
Miscarriage	9
Thickened endometrium, questionable polyps	156
Total	560

Table 2a: Sonohysterogram results

Result	Number	percentage
Total	560	
Normal	494	88%
Abnormal	66	12%

Table 2b: Sonohysterogram results

Total abnormal	66	
Polyps	56	85%
Adhesions	4	6%
Anatomical abnormalities	2	3%
Submucosal fibroids	4	6%

Table 3a: Hysteroscopy results

Hysteroscopy done in	58	
Normal	2	3.5%
Abnormal	56	96.5%

Table 3b: Hysteroscopic interventions done

Abnormal	56	
Polyps	53	Polypectomy done
Adhesions	3	Adhesiolysis done

Table 4: Histopathologic examination results

Total	53	
Positive	49	90%
Negative	4 (proliferative endometrium)	9.7%

Table 5 Transvaginal scan

Total	66	
Normal	15	23%
Abnormal	51	77%

Table 6 TVS Findings

Total	66
Normal	15
Heterogeneous endometrium	8
Polyp	18
Thickened endometrium	20
SMF	3
Polyp/ SMF	2

Table 7

TVS finding		Sonohysterogram findings				
		Polyp	Normal	Adhesions	Nodular hyperplasia	SMF
Thickened endometrium	20	15		2	2	1
Heterogeneous endometrium	8	5			3	
Polyp	18	18				
Normal	15	11	2	2		
SMF	3	1				2
Polyp/ SMF	2	1				1

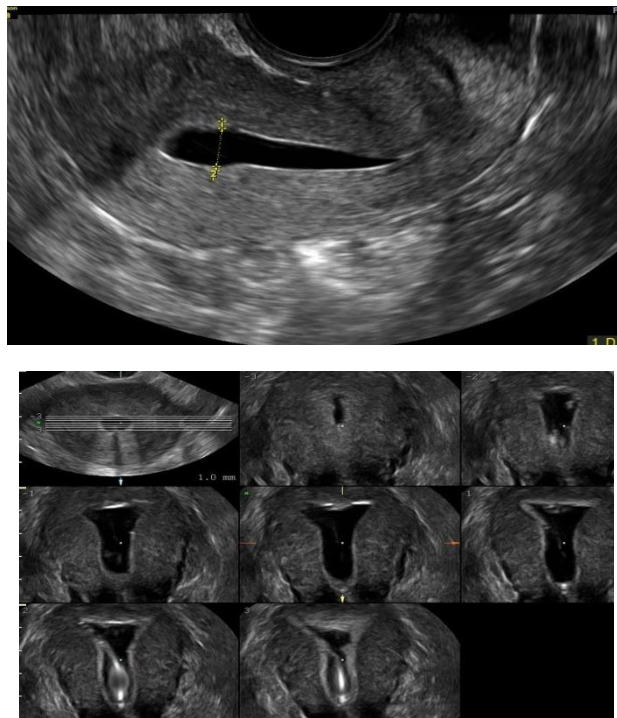


Image 1: Normal saline sonohysterogram. Sagittal image (Image 1a) and multislice 3D coronal reconstructed images (Image 1b). Uterine cavity is uniformly filled with fluid and lined by thin layer of endometrium.

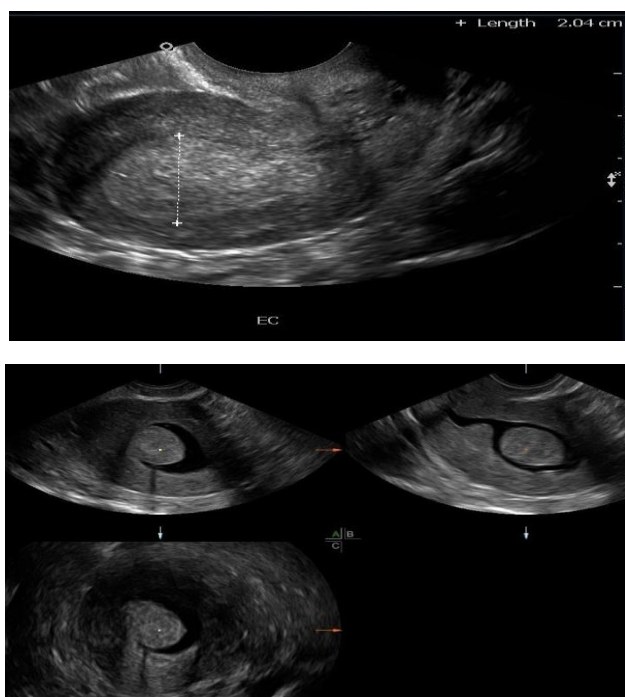


Image 2: 2a-Preprocedural sagittal trans vaginal ultrasound shows thickened endometrium
2b- Saline sonohysterogram of the same patient shows a polyp outlined by saline



Image 3: Saline sonohysterogram images in coronal, sagittal and oblique coronal planes show multiple small endometrial polyps seen along the right wall



Image 4: A small polyp, clearly delineated with saline sonohysterogram

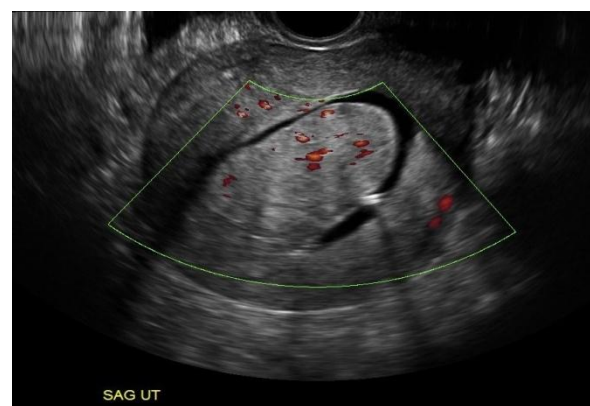


Image 5: Sagittal image shows a giant polyp outlined by saline



Image 6: Sagittal sonohysterogram shows a large polyp with heterogeneous echoes and cystic spaces. Histology proved to be adenocarcinoma.

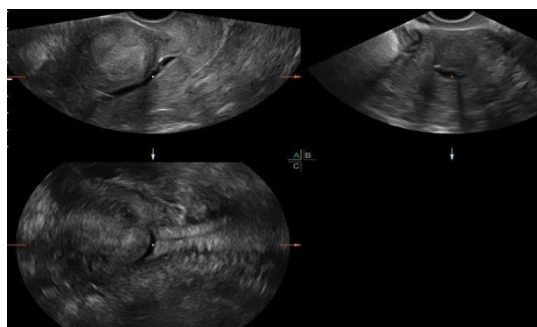


Image 7: Large anterior wall submucosal fibroid, indenting on the endometrial cavity.

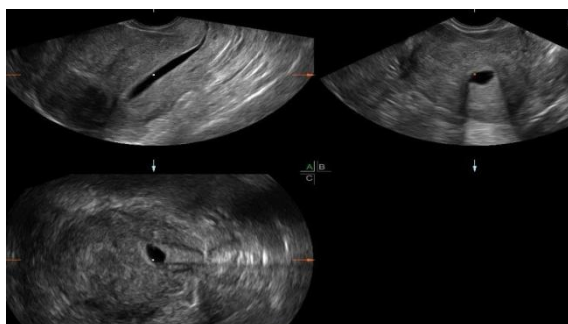


Image 8: Adenomyotic bulky uterus with a large anterior wall adenomyoma and slit like endometrial cavity due to poor distensibility



Image 9: 9a- Septate uterus: A thick vertical muscular septum dividing the endometrial cavity into two. Note the normal convex outer contour of the fundus.

9b- Post operative Sonohysterogram shows mild indentation of the cavity at the site of previous septum.



Image 10: Thick septum, extending across the endometrial cavity demonstrated in a woman who had D&C four years back for incomplete miscarriage.

Discussion

Saline Sonohysterography is a technique that has been introduced more than two decades ago.

Saline Sonohysterogram is a simple, cost effective, outpatient procedure^[1]

Saline sonohysterogram has got a problem solving role when the routine transvaginal scan alone cannot detect or characterize the specific abnormality.

This procedure is indicated for pre-operative evaluation of endometrial cavity to establish the normalcy or to identify the abnormalities, so that it is corrected before the IVF is attempted. Saline sonohysterography is also used when the transvaginal scan is normal but the patient is having symptoms like abnormal uterine bleeding, recurrent abortions or infertility in order to

diagnose conditions like uterine anomalies, polyps, submucosal fibroids and uterine adhesions [3],[4], [8-10]

Procedure

Informed consent was obtained from all the patients after explaining the procedure, possible complications like pain, bleeding and infection. [3]

Inclusion criteria

- Our study included women of age ranging from 20- 50 years.
- All the women presenting to fertility clinic were evaluated sonohysterography [8].
- Women with increased endometrial thickness and polyps found on transvaginal ultrasound scan. [8]
- Women presenting with abnormal vaginal bleeding [8]

Exclusion criteria

- Pregnant women [1], [3], [4]
- Women with pelvic infection and purulent vaginal discharge [1], [3], [4]

Patients were asked to present within ten days of commencement of menstruation. Majority of cases were performed within 10 days. Our patients presented between 4-12 days. Those few cases performed after 10th day, were due to social obligations. The procedure was done as an outpatient procedure.

Position of the uterus was determined by a transabdominal ultrasound scan before the procedure.

Patient was asked to empty the bladder and lie down in lithotomy position. If the uterus is anteverted, pelvis was elevated using a small pillow placed underneath the buttocks in order to make the uterine cavity straight so that the cannulation will be easy. This was not required for retroverted uteri.

Perineum was cleaned with an antiseptic solution and the area was draped. Vagina opened with Cusco's speculum.

Fornices and vaginal vault cleaned with antiseptic solution.

Cervical os was cannulated using 5 French feeding tube [2],[8],[10] which is attached to a 10ml syringe filled with normal saline. The tube was prefilled with normal saline in order to avoid air bubbles which appear as echogenic foci on ultrasound scan and interfere with accurate interpretation [8], [10].

The tube was advanced into the uterine cavity for a reasonable length, for about 5-10 cm [10]. Patient was explained about possible cramping sensation during insertion of the tube. Very few patients experienced cramping during insertion of the tube and few patients during instillation of saline. Speculum was removed while taking care to avoid slipping of the cannula.

In patients with narrow cervical os 8 F feeding tube was used. In patients with patulous os 5F Foley's catheter was used and the bulb inflated with 1 ml of water to avoid slipping of the catheter.

We have not used any instrument to pull the cervix, as it is traumatic and painful to the patient. We preferred feeding tube over Foley's catheter as inflation of the bulb not only causes discomfort to the patient but also causes mucosal injury.

Normal saline was injected slowly, while performing real time ultrasound using 5-8 MHz transvaginal transducer with GE Voluson E8 ultrasound machine. Transvaginal transducer was covered with a sterile plastic wrap before inserting into the vagina in order to maintain sterility [8,9].

Images obtained in both sagittal and coronal planes, distending the uterine cavity with slow injection of normal saline. In order to avoid anxiety, the Patient was informed that the water will be leaking from the cervical os during the procedure.

Endometrial lining was observed, with close attention to any irregularities and polyps.

3-D Ultrasound was performed In all cases, followed by post processing to evaluate the shape of the uterine cavity, nature of the endometrial lining, using 1mm thin sections in all three orthogonal planes and volume reconstruction was performed, to evaluate the shape of the uterine cavity, endometrial lining and the nature and

location of the abnormalities like polyps, adhesions, septations, submucosal fibroids. Shape of the uterus was also evaluated with volume reconstructions.

Fallopian tubes were not evaluated in this study. Hysterosalpingography was performed for this purpose.

Catheter was removed followed by complete scan of the uterus and ovaries.

Ovaries were scanned in all patients routinely, and an approximate count of antral follicles was provided for all patients with sub fertility.

Patient was sent home immediately after the procedure. Those patients who are complaining of cramping sensation and pain were kept under observation for 30-60 minutes and analgesics were given if necessary.

Patients were advised to contact women's emergency if there are any symptoms of pelvic inflammation i.e. if she develops any fever or pain within 1 or 2 days of procedure.^[3]

Complications

This procedure is relatively safe with almost no known major complications.

Minor complications include cramping pelvic pain, spotting, Watery discharge^[4]

Current day available antiseptic precautions can keep the pelvic infection a very rare possibility.

In our study population 25 patients had cramping which was settled in 1-2 hours. We did not come across any pelvic infections. Only 8 patients had spotting for more than 1 day after the procedure.

Cannulation could not be done in 21 patients, with cervical stenosis and 2 due to acute cervico-uterine angle and one patient who was very apprehensive despite reassurance.

Advantages: This procedures can demonstrate the endometrial lining and the cavity to the best advantage and can detect congenital uterine anomalies, endometrial septae and polyps and sub mucosal lesions^[2]

Conclusion

Sonohysterography is a simple, safe, cost effective, minimally invasive outpatient procedure

which can effectively assess the endometrial cavity^[10]. It does not use ionizing radiation and is more accurate and sensitive than simple transvaginal scan with 100% Negative predictive value. Direct real time evaluation of the endometrial cavity and the lining is possible.

It requires little expertise and time and is the best procedure to evaluate the endometrial cavity.

Funding statement

This study is not funded

References

1. Sandra J. Allison, Mindy M Horrow, Anna S Lev. Toaff et al Pearls and pitfalls in sonohysterography ,Ultrasound clinics, April 2010 Vol 5, issue 2, pages 195-207,
2. Lucy E. Hann, Elissa M Gretz, Ariadne M Bache et al, Sonohysterography for women in evaluation of the Endometrium in women treated with Tomoxifen, American journal of Roentgenology, January 2001, 177, 337-342
3. Phyllis GlancMD, Carre Betel MD, Anna Lev Toaff FACR, Sonohysterography Technique and clinical applications, Ultrasound clinics July 2008, Volume 3 Issue 3, page 427-449
4. Hysterosalpingography and sonohystero-graphy Lessons in technique
5. Anna S Lev-Toaff MD, MichealE Toaff MD, Ji Bin Liu, MD et al, Value of sonohysterography in the diagnosis and management of abnormal uterine bleeding, Radiology 1996, 201 pages 179-184
6. Chiou Li Ong, Saline infusion sonohystero-graphy, Ultrasound clinics volume 2, Issue 1, page 121-132
7. Kimberly Feigin MD; Ruth Rosenbaltt MD; Rosalyn Kutcher MD et al, Applied Radiology January 2000, Volume 29, Number 1
8. Cullinan, J, Fleischer A, Kepple D et al: A sonohysterography: A technique for endometrial evaluation. Radiographics 152:501-504, 1995

9. Patricia C, Davis, MD, Mary Jane O'Neil, MD, Isabel C. Yoder, MD et al, Sonographic findings of Endometrial and Subendometrial Conditions. Radiographics: July 2002, volume 22,803-816
10. Johanna R. Jorizzo, MD, Gioria J. Riccio, MD, Michael Y. Chen, MD et al Sonohysterography: The next step in the Evaluation of the Abnormal Endometrium: Radiographics October 1999, 19, 117-130.