

Role of Sonohysterography in Evaluating the Spectrum of Endometrial Pathologies

*Surendhar Mohan¹, Dhivya Sri², Paarthipan Natarajan³, Kiran Gottumukkala⁴,
Rajasekhar K. V.⁵

¹Assistant Professor, Department of radiodiagnosis Meenakshi Medical college Hospital and Research Institute (MMCH & RI), Kanchipuram

²Post graduate, Department of radiodiagnosis, Meenakshi Medical college Hospital and Research Institute (MMCH & RI), Kanchipuram.

³Professor, Department of radiodiagnosis, Meenakshi Medical college Hospital and Research Institute (MMCH & RI), Kanchipuram

⁴Post graduate, Department of radiodiagnosis, Meenakshi Medical college Hospital and Research Institute (MMCH & RI), Kanchipuram.

⁵Professor and Head, Department of radiodiagnosis Meenakshi Medical college Hospital and Research Institute (MMCH & RI), Kanchipuram.

Abstract

Aim: To evaluate the endometrial pathologies with saline infusion sonohysterography, where ultrasound showed nonspecific endometrial thickening.

Proposed Materials And Methods: We studied 50 perimenopausal patients with non specific endometrial thickening on transvaginal ultrasound using saline infusion sonohysterography. A GE pro5 ultrasound machine was used with high resolution 7.5MHZ transvaginal probe. Baseline transvaginal sonography was performed and endometrial findings were recorded. Then under strict ascetic precautions, under ultrasound guidance a 5F canal was introduced upto mid cavity level and 10 to 20 ml of saline infused. The endometrial findings were recorded again.

Discussion: It is very difficult to clearly delineate pathologies such as focal endometrial hyperplasia, polyp, submucosal fibroids, endometritis, endometrial adhesions and endometrial malignancies and to distinguish these from one another on a transvaginal sonography. Most of them appears as non specific diffuse focal endometrial thickening. By infusing saline and distending the cavity. We depict the pathologies more clearly and increase our diagnostic accuracy. In a premenopausal patient the diagnosis of an abnormally thickened endometrium is dependent on the phase of the menstrual cycle. In general a thickness greater than 8mm during the proliferative phase or greater than 16mm during the secretory phase is considered abnormal. The examination is best performed on the day 4, 5 or 6 of the menstrual cycle when the diameter of the endometrium should be thinnest.

I. Introduction

Abnormal Uterine Bleeding (AUB) may be defined as any variation from the normal menstrual cycle, and includes changes in regularity and frequency of menses, in duration of flow, or in amount of blood loss. Abnormal uterine bleeding is common but complicated clinical presentation, because diagnosis is difficult as the cause may be from simple as DUB to complicated as endometrial carcinoma.

Endometrial abnormalities such as endometrial polyp, sub mucous myomas are the most common cause of abnormal uterine bleeding (AUB).

Transvaginal Sonography (TVS) is the standard imaging technique for the primary investigation for endometrial abnormalities in the case of AUB. This technique is effective in evaluating endometrial abnormalities in postmenopausal women caused by atrophy. But it is difficult to delineate the thickened and inhomogeneous endometrium and it has low specificity and limitations which can be overcome by saline infused sonohysterography. Dilatation and curettage (D&C) previously was the common method for diagnosing endometrial abnormalities in women with abnormal uterine bleeding. In curettage procedures where less than half the uterine cavity is curetted, affect the sensitivity of D & C. Hysteroscopy findings with endometrial biopsy is superior to curettage alone in effective diagnosis of endometrial abnormalities. But this procedure needs greater skills and expertise to reach the patient. Both D&C and hysteroscopy (HS) are invasive procedures can be done under general anaesthesia and with considerable cost. Both saline infused sonohysterography (SIS) & HS needs histological confirmation. HS can take biopsy using miniature forceps. In SIS biopsy can be made by using the same catheter used for saline infusion.

Bernard et al reported inadequate specimens for biopsy during SIS.

Saline infused Sonohysterography is an advanced method where saline is used as contrast medium to clearly visualise the pathology. It has been shown to be a safe, simple and effective method for evaluating endometrial pathology using transvaginal ultrasound in an outpatient setting. SIS can accurately differentiate focal lesions such as polyps and submucous myomas from diffuse lesions such as hyperplasia and cancer. If it is a diffuse lesion then endometrial histology gives more relevant information from which appropriate treatment is possible. An abnormally thick, irregular or indistinct endometrium is often seen at pelvic ultrasound. The differential diagnosis includes diffuse endometrial thickening like endometrial hyperplasia, the secretory phase of the menstrual cycle and focal diseases like endometrial polyps, carcinoma and to differentiate the subendometrial pathology like submucosal leiomyoma and adenomyosis.

The technique of sonohysterography and the results of patients with perimenopausal bleeding who underwent saline infusion sonohysterography are discussed. The aim is early detection of endometrial cancer in women over forty years and to identify pathology, in women below 40 years for effective treatment.

It's an inexpensive, non-invasive and convenient method to visualise the uterine cavity, conventional endovaginal ultrasonography especially in evaluating premenopausal and postmenopausal patients with abnormal uterine bleeding, as the thick endometrium is mistaken for a physiological state. It is very useful in surgical & medical management of patients. It is also helpful in determining the appropriate site for the biopsy. This contrast enhancement with saline has increased diagnostic accuracy. Infusion of saline into the endometrial cavity through a catheter into the endometrial cavity causes distension by separation of cavity walls and by clearly delineating the underlying disease.

In 1991 **Klug 5** described ultrasound of the uterine cavity after instillation of gel. Then, many authors have reported on the success of saline infusion Sonography in detecting intra-uterine abnormalities, such as polyps and submucous myomas.

Diagnostic accuracy of sonohysterography is superior to that of transvaginal ultrasound and has a sensitivity of 95% and a specificity of 88%, according to a meta-analysis in 2003.

Sonohysterography can be done in any setting as endovaginal ultrasonography (US) is performed and the patient preparation is similar to that used for radiologic Hysterosalpingography. It can be performed during the first phase of the cycle especially when the indication is sterility or thickened endometrium at transvaginal sonography. Sonohysterography is superior to Hysterosalpingography, hysteroscopy, MRI in evaluating the uterine pathology in abnormal uterine bleeding.

Disadvantages of Hysterosalpingography are irradiation and iodinated contrast material. It is expensive and provides indirect information about the uterine cavity. One can delineate fibroids and polyps but cannot comment on endometrial thickness. Hysteroscopy can be helpful in visualising the cavity but it cannot determine the extent of submucous myomas and endometrial thickness. MRI is an expensive modality provides excellent images of the uterus and myometrial pathology disrupting the endometrium; however, intracavitary lesions are not well demonstrated as compared to SIS.

Advantages of saline infusion sonohysterography:

1. Improved sensitivity /specificity in the detection of pathology.
2. Cost effective, avoidance of radiation and patient comfort.
3. It assists in determining the diagnosis or therapeutic approach.
4. It may also reduce or eliminate the need for surgical intervention.

II. Aim And Objectives

- To evaluate the peri-menopausal and post-menopausal women with abnormal uterine bleeding whose abdominal ultrasound showing endometrial thickening of more than 8 mm during proliferative phase or greater than 16mm during the secretory phase.
- To assess the role of sonohysterography in clearly delineating pathologies such as focal hyperplasia, polyps, submucosal fibroids, endometritis, endometrial adhesion and endometrial malignancies.
- To correlate with the histopathological results by hysterectomy, hysteroscopy biopsy.

Uterine pathology:

Leiomyoma or fibroid:

Most common, usually asymptomatic, if symptomatic usually present with abnormal vaginal bleeding. Classified in to 3 types depending on the location: Intramural - Confined to myometrium; Submucosal - Projecting into the uterine cavity; Subserosal - Projecting from peritoneal surface. Leiomyoma has variable appearance in sonography, they are mostly hypo-echoic or heterogeneous echo texture.

Fibroids can usually be differentiated from polyps or other endometrial abnormalities by shadowing.

Endometrial polyp:

It is a common benign lesion and common cause of abnormal vaginal bleeding. It appears as solitary or pedunculated. In TVS polyp appears as echogenic homogeneous texture and cystic areas can be found representing haemorrhage and infraction. Histologically representing dilated glands. Usually polyp appears as focal thickening of endometrium. Polyp can be identified most easily when the fluid is in the endometrial cavity so SHG is the ideal technique for demonstrating polyp. Polyp and submucosal fibroids can be differentiated by seeing the normal endometrium around the fibroid. Colour Doppler US shows pedicle artery sign.

Endometrial carcinoma:

It is the most common malignancy in North America. The most common clinical presentation is abnormal uterine bleeding. 10% of women with postmenopausal bleeding will have endometrial CA. There is a strong association with oestrogen therapy in postmenopausal women and anovulatory cycles in premenopausal women. The risk factors include age, obesity, diabetes, hypertension & low parity, polycystic ovary syndrome. 80% of the endometrial CA are adenocarcinoma and others include serous cell CA & clear cell CA. Sonographically thickened endometrium appears as well defined, uniformly echogenic and indistinguishable from hyperplasia and polyp. It can also be seen as inhomogeneous focal mass. A recent study reported that the uterus is poorly distensible in CA. This is the potential sign of malignancy.

Endometrial hyperplasia:

Endometrial Hyperplasia is defined as proliferative glands of irregular size & shape with increase in gland/stromal ratio. Hyperplasia develops from unopposed oestrogen stimulation in postmenopausal and perimenopausal women. It is the cause of PMB in 4-8% of patients. It is divided into 2 types. 1. hyperplasia with cellular atypia 2. Hyperplasia without cellular hyperplasia and further divided into simple and complex. In atypical hyperplasia there are chances of 23% for malignancies. In USG, endometrium is usually thick and echogenic with well defined margins. It can be focal or asymmetrical.

In a study by

Jorizzo et al on endometrial hyperplasia, cysts were seen in 57% of patients and endometrial polyps were found in 26%. TVS & SIS cannot distinguish the different types of hyperplasia. In addition the thickening of endometrium that occurs in the secretory and late proliferative phase of the menstrual cycle cannot be distinguished from diffuse thickening of endometrial hyperplasia.

Endometrial atrophy:

Atrophy of the endometrium is often a physiological postmenopausal phenomenon where it is more specifically termed as postmenopausal endometrial atrophy. While most patients are asymptomatic, it is one of the commonest causes of postmenopausal bleeding, accounting for approximately 60-75% of cases. Often the atrophic endometrium is associated with cystic dilatation of glands where it is then termed as endometrial cystic atrophy.

Other factors that can cause endometrial atrophy include

- Prolonged oral contraception.
- Hypo-oestrogenic state: ovarian dysfunction.
- Tamoxifen use.

Ultrasound

The endometrial thickness should measure:

- < 4-5 mm on a transvaginal ultrasound scan

The uterine body to cervix ratio will also tend to decrease and may approach 1:1.

Uterine adhesions:

On conventional transvaginal sonography, a subtle irregularity of the endometrial lining in the proliferative phase suggests that an adhesion may be present. When the uterine cavity is distended with fluid, synechia are more easily detected. Adhesions are described as filmy or dense. In addition, the extent of cavity involvement should be recorded. Saline infusion sonohysterography has a 75% sensitivity and 93% specificity for the detection of uterine adhesions. Both methods had a sensitivity and the specificity of 93% and 95%, respectively. In contrast, TVS did not detect any of the cases of intrauterine adhesions.

Adenomyoma:

An adenomyoma is a focal region of adenomyosis resulting in a mass, which is difficult to distinguish from a uterine fibroid, although in general the degree to which the contour of the uterus is distorted is less marked in adenomyosis. The 'mass' is poorly defined and blends with the surrounding myometrium. Uterine fibroids on the other hand often have a pseudo capsule of compressed myometrial tissue surrounding them.

III. Materials And Methods

A prospective study of 50 patients of age between 40-80 yrs who came to Obstetrics & gynaecology department, Meenakshi Medical College, Hospital, Kanchipuram between June 2013 & May 2015 with complaints of menorrhagia, continuous bleeding PV, metrorrhagia, polymenorrhea. The study was started after taking prior clearance and permission from the ethical committee and informed consent from patient. After taking thorough history and detailed clinical examination whose endometrial thickness was >8mm in USG were subjected to SIS. ALOKA-SSD4000 equipped with 7.5MHZ transvaginal probe was used. The procedure was done and findings were recorded. The samples were then sent to HPE to correlate the findings with our SIS findings.

Prior to SIS we did transabdominal USG for patients with clinical symptoms of menorrhagia, metrorrhagia, polymenorrhea or any continuous bleeding PV and endometrial thickness were assessed and those whose endometrial thickness of >8mm were taken in this study.

Techniques of SIS:

1. All our patients were priorly informed about the whole procedure and written consent was obtained from them.
2. All our patients were given analgesic before the procedure.
3. Under aseptic precautions patients were made to lie in lithotomy position.
4. With the tenaculum forceps the anterior lip of cervix is holded and then the transvaginal probe was inserted.
5. Catheter was passed through the endometrial canal and 10-20ml of saline infused.
6. The endometrial cavity was distended and findings were clearly shown.
7. Then complete sonographic analysis was done in both coronal and sagittal plane and complete evaluation done and the findings were noted.
8. The samples for HPE were sent from OBS & GYN Department from the hystrectomy or hysteroscopy samples.

Diagnostic criteria:

Polyp:

- Appears as echogenic homogeneous texture and cystic areas can be found representing haemorrhage and infraction.
- Polyp and submucosal fibroids can be differentiated by seeing the normal endometrium around the fibroid. Colour doppler US shows pedicle artery sign.

Fibroid:

- They are mostly hypo echoic or heterogeneous echo texture.
- Fibroids can usually be differentiated from polyps or other endometrial abnormalities by acoustic attenuation or shadowing.

Carcinoma:

- Thickened endometrium appears as well defined, uniformly echogenic and indistinguishable from hyperplasia and polyp.
- It can also be seen as inhomogeneous focal mass.

Hyperplasia:

- Endometrium is usually thick and echogenic with well defined margins.

Adenomyosis:

- It appears as hyperechoic sub endometrial linear striations.

Inclusion criteria:

1. Peri-menopausal & post menopausal women with unexplained vaginal bleeding.
2. Endometrial thickness of more than 8mm in proliferative phase and 16mm in secretory phase in USG.

Exclusion criteria:

1. pelvic inflammatory diseases
2. menstrual cycles
3. intra uterine contraceptives like copper T
4. patient not willing to have the diagnostic procedure
5. pregnancy

IV. Results And Analysis

In this study 50 patient of perimenopausal and post menopausal women with abnormal uterine bleeding who were full filling the inclusion and exclusion criteria are taken. 29% of premenopausal women included in the study and 21% of the post menopausal women were included in the study. The most presenting complaints was abnormal uterine bleeding. In this study most common findings found was fibroids of 36% in SIS. and the next common is polyp was 14% and endometrial carcinoma of 4% and hyperplasia 14% and adenomyoma of 2%. And out of 50 cases, in 2 cases endometrial cavity could not able to distended with saline due to adhesions and cervical stenosis. This procedure was well tolerated by the patients without any complications. 2% of the patient had minimal bleeding during the procedure. And few of the patient were complaining of tolerable pain. Nearly 39 cases were sent to histopathological examination. Out of 50 cases in our study 7 cases were found to normal and 2 other cases we could not able to distend the cavity so nearly 39 cases were compared with HPE. In that, 2 cases does not correlate with our findings

Age Distribution Among 50 Patients With Uterine pathology

AGE GROUP	FREQUENCY	PERCENT
40 - 49	7	14%
50 - 59	22	44%
60 - 69	18	36%
70 - 79	2	4%
ABOVE 80	1	2%

Table No 1. Showing frequency of age distribution of patients with uterine pathology

Incidence of age group in our study:

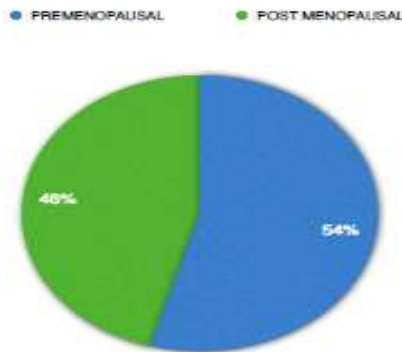


Chart No 2. Distribution of patient in two groups with Premenopausal and post menopausal

Incidence of Various Uterine Pathologies in AUB

Pathological Condition	Pre menopausal Women	Post menopausal Women	Total	Percent
Endometrial				
Focal				
Polyps	4	3	7	14%
Carcinoma	-	2	2	4%
Diffuse				
Hyperplasia	4	3	7	14%
Secretory	2	—	2	4%
Both				
Hyperplasia & Polyps	3	1	4	8%
Subendometrial				
Fibroids	12	6	18	36%
Adenomyoma	1	—	1	2%
Could not distend the cavity				
Adhesions	1	—	1	2%
Cervical Stenosis	1	—	1	2%
No obvious pathology found	3	4	7	14%
Total cases	29	21	50	100%

Table No 2. shows Incidence of Various Uterine Pathologies in AUB out of which highest incidence was Fibroids with 36% followed by Polyps & Hyperplasia with 14%, Both Hyperplasia and Polyps with 14%,

Carcinoma with 4%, Secretory with 4%, Adenomyoma with 2%, adhesions with 2% and Cervical Stenosis with 2% were seen in our study.

Incidence of clinical symptoms:

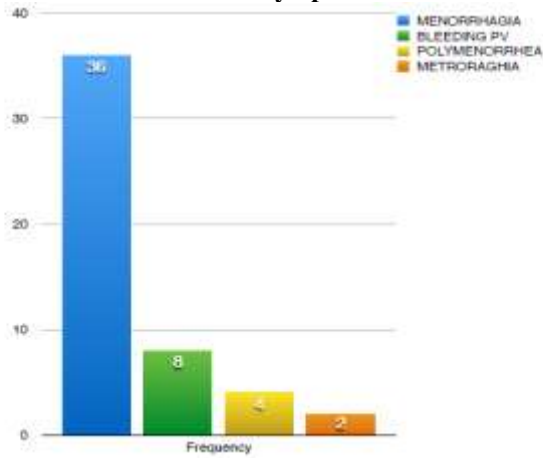


Chart No 4. Frequency of Clinical Symptoms in Uterine Pathology

Incidence of hpe report findings:

HPE REPORT	NO OF CASES	FREQUENCY
POLYP	6	12%
FIBROID	17	24%
HYPERPLASIA	7	14%
ADENOMYOSIS	1	2%
SECRETORY	2	4%
HYPERPLASIA AND POLYP	4	8%

Table No 4. Showing HPE Findings

Incidence of Various Uterine Pathologies in AUB

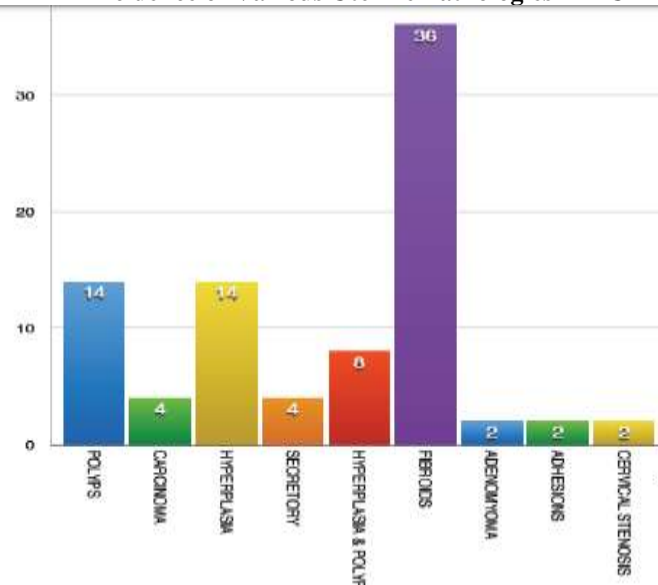


Chart No 3 Showing distribution of uterine pathology

Incidence of sis findings and correlation with hpe:

PATHOLOGY	SIS FINDING	HPE POSITIVE	HPE NEGATIVE	HPE NOT DONE
FIBROID	18	17	1	-
POLYP	7	6	1	-
CARCINOMA	2	2	-	-
HYPERPLASIA	7	7	-	-
SECRETORY PHASE	2	2	-	-
ADENOMYOSIS	1	1	-	-
HYPERPLASIA AND POLYP	4	4	-	-
NORMAL	7	-	-	7
COULD NOT DISTEND	2	-	-	-
TOTAL	50	39	2	7

Table No 5. Correlating our Findings with HPE

Risk factors in aub:

RISK FACTORS	FREQUENCY	PERCENTAGE
H/O CONTRACEPTIVES	5	10%
OBESITY	18	36%
DIBETUS MELITUS	22	44%
HORMONAL REPLACEMENT THERAPY	5	10%
TOTAL	50	100%

Table No 6. Risk Factors in AUB

Risk factors in aub:

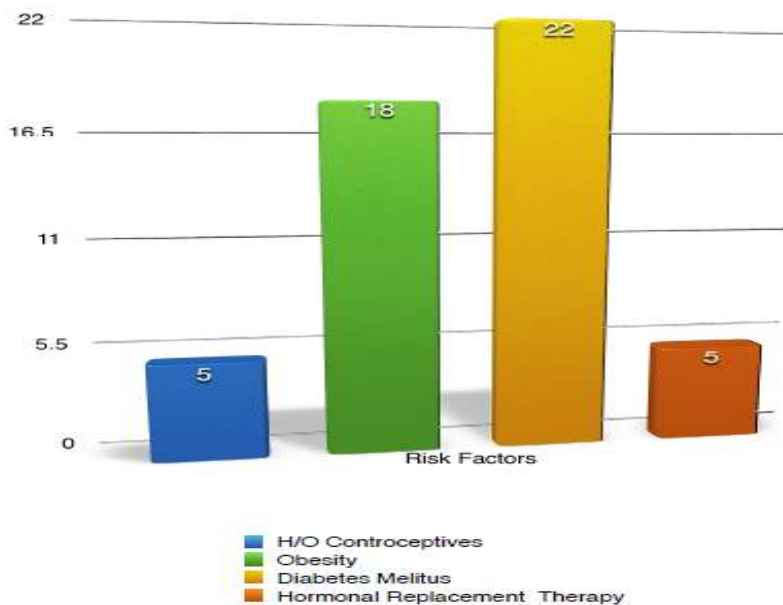


Chart No 5. Risk Factors in AUB

V. Discussion

In the last few decades due to advancement in the diagnostic imaging and ultrasonography is also in front step with the development of newer equipment. TVS is considered as safe, easily accessible as non invasive technique in evaluating endometrial cavity due to the proximity of endovaginal probe to the endometrium. sensitivity of TVS can be increased by instillation of fluid into uterine cavity. TVS often produces equivocal results but it does not exclude all polyps fibroid and other endometrial pathologies.

The present study evaluated the accuracy of saline infusion sonohysterography for the detection of intracavitary abnormality. Out of 50 cases 29 cases were premenopausal and 21 cases to be postmenopausal women. In our study out of 50 cases 36 % were found to be fibroids which was confirmed by histopathology. In this 18 cases 12 (24%) were premenopausal and 6 (12%) were postmenopausal women. 14% women were found to have polyp in that 4 were premenopausal women and 3 were postmenopausal women. 14% cases were found to have diffuse hyperplasia. In out of 50 cases 2 cases (4%) were found to have carcinoma. 4% of cases were of in secretory phase. And 1 cases of adenomyoma was also found in our study. Out of 50 cases in 14% of women the endometrial cavity does not have any obvious pathology.

In our study out of 50 cases we were not able to do the procedure in 2 cases due to cervical stenosis and cavity adhesions. We were able to do histopathology analysis in most of the cases and the result correlated in 95 % of the cases and in 2 cases the HPE does not correlate with our SIS findings. The 50 cases were grouped into 2 category as premenopausal and postmenopausal women. And further subdivided into endometrial and subendometrial pathology. In endometrial pathology it was further divided in to focal cases and diffuse cases. TVS is an inexpensive, non invasive and convenient way to directly visualise the endometrial cavity. Therefore it is recommended as a 1st line of diagnostic tool for assessing uterine pathology in premenopausal and post menopausal women presenting with AUB.

Since its introduction in the mid 1980s, TVS has become the standard way to imagine the female pelvis and served as important adjunct to radiologist & sonologist. The endometrium of the ovulating reproductive age woman fluctuates in single layer thickness from 2mm in the early follicular phase to 6mm in the luteal phase.

The correct method to measure the endometrial thickness is the sum of two adjacent layers of endometrium, and the measurement is called as endometrial echocomplex (EEC). The EEC in the menstrual phase is 4mm and up to 12mm in the luteal phase. In our study we have taken the cut off level of 8mm of ET for evaluating endometrial pathologies in saline infused sonohysterography. It is difficult to define the exact cause of abnormal or irregular uterine bleeding in pre and post menopausal women. However pathologic conditions of endometrium or myometrium are the causes. Anovulatory cycles are a common cause but hyperplasia, polyps, sub mucous myomas and carcinoma are possible and are of concern to the patients.

Saline infusion sonohysterography is a technique in which a catheter is placed into the endometrial cavity and sterile saline is instilled to separate the walls of endometrium. In 1993, a study by *Parson et al* in the journal of clinical ultrasound termed the technique sonohysterography. This technique has been known by many names SHG, Hysterosonography, SIS, TVS with fluid contrast augmentation and saline contrast sonohysterography.

A catheter (infant feeding tube of size 8) is placed in uterine cavity through cervical os and sterile saline is injected into the endometrial canal which distends the cavity, and the uterine wall is separated . The anechoic fluid is then juxtaposed against the echogenic endometrium giving the accurate details of the cavity wall. A complete evaluation of the endometrial cavity is performed in both the coronal and sagittal planes. Doppler evaluation can be quite helpful for distinguishing blood clots from polypoid lesions.

SIS can distinguish focal lesions from diffuse endometrial thickening. Polyps are focal lesions. TVS cannot distinguish endometrial hyperplasia from benign polyp because both the condition can cause thickening of the endometrium which appear as hyperechoic and can contain cystic spaces. In SIS hyperplasia can appear as diffuse thickening of endometrium although it can occasionally appear as a focal area of endometrial thickening.

In a study by *Jorizzo et al* on endometrial hyperplasia, cyst were seen in 57% of patients and concomitant endometrial polyp were found in 26% of patient. In a study by *Dubinsky et al* of 28 women with diffuse thickening of endometrium, all 28 had either a secretory or proliferative endometrium at biopsy. This underscores the importance of the timing of SIS in menstruating women, the procedure should be performed after the cessation of menses, ideally on day 4,5,6 of the menstrual cycle.

Endometrial hyperplasia is increased to about 1.3%-20% in tamoxifen treated women. SIS and TVS have been recommended as tools for evaluating these women.

Fong et al evaluated asymptomatic post-menopausal women being treated with tamoxifen and found endometrial abnormalities in 40% of their study group. TVS had a sensitivity of 85% and specificity of 56% whereas SIS had a sensitivity of 90% and a specificity of 79%.

Tepper et al prospectively evaluated asymptomatic women with a history of breast cancer and tamoxifen therapy who had a thickened endometrium >8mm on TVS. The incidence of endometrial abnormalities in the study group was 32%.

A study by **Hann et al** evaluated 46 sonohysterograms in patients who received tamoxifen for a mean of 2.6 years. SIS revealed endometrial polyps in 62% of patients; 12% had a thickened endometrium, and 8% had subendometrial cysts. 63% of sonohysterograms with prior negative endometrial biopsy results had endometrial abnormalities including 10 polyps. They also found that in 14% of cases, the finding of a normal endometrium on SIS allowed these patients to avoid further intervention.

De kroon et al in a meta-analysis reviewed 16 studies comprising 877 procedures to determine the diagnostic accuracy of SIS in perimenopausal women with AUB and comparing it with hysteroscopy with or without HPE or hysterectomy. And found sensitivity of SIS for evaluating the uterine cavity was 0.95 and pooled specificity was 0.88 and the sonographic procedure was successful in 86.5% of the postmenopausal women and 95% of premenopausal women.

Laifernarinsl et al (transvaginal saline hysterosonography – characteristics distinguishing malignant and various benign conditions) studied 63 SIS with histological confirmation. They found 26 polyp, 16 submucosal myomas, 3 endometrial CA. 15 SIS revealed no abnormality and in 2 cases revealed both polyp and fibroid, which slightly correlated with my study.

Reddi rani et al studied 52 patients in which 92% were postmenopausal and 8% were premenopausal. Menorrhagia was the common symptom and the most common finding was myomas. The overall sensitivity and specificity when correlated with intraoperative hysterectomy findings and HPE were 66% and 88% for TVS and 82% and 95% for SIS and concluded SIS is a simple, highly sensitive and specific technique to detect intrauterine pathology in the evaluation of AUB.

F.P.G. Leone et al did a comparative study of SIS and endometrial sampling and hysteroscopic endometrial biopsy in that 88 cases were premenopausal and 40 cases were postmenopausal cases and concluded SIS as a tolerable as hysteroscopic biopsy in thickened endometrium.

kelecsi et al found TVS, SIS and DH had sensitivity of 56%, 81% and 85% respectively and specificities of 72%, 100% and 100% respectively.

kramp et al found that TVS, SIS, and DH had sensitivities of 23%, 94% and 100% and specificities of 93%, 84% and 87% respectively.

Complications of SIS:

It does not have very serious complications. In our study many people experienced mild pain (which is bearable, that occurs when the catheter inserted reaches the fundus of uterus or when saline distends the endometrial cavity). One patient had experienced pelvic inflammatory diseases but it is very rare complication. And other complications like dizziness or nausea can also occur in SIS but in our study we did not experience this kind of complication.

VI. Summary

Ultrasonography plays a key role in screening and diagnostic triage for uterine abnormalities. TVS is often the first imaging test undertaken for evaluation of the uterus in women with AUB. TVS is used to identify mural abnormalities such as fibroids and adenomyosis and screening for thickened endometrium. Saline infused sonohysterography is a powerful tool for evaluating endometrial cavity for focal abnormalities such as polyp or submucosal fibroids. SIS allows accurate detection of focal lesions. Our study confirms that SIS is very safe, cost effective, easy. Can be done as an outpatient procedure for evaluating endometrial pathologies. And it can be included in any standard protocol flowchart in management of AUB. Our study well correlated with the histopathology findings.

VII. Conclusion

Saline infused sonohysterography is safe, well tolerated, accurate, cost effective and easy to perform investigation, acceptable to patient as it is done as an outpatient procedure. It is highly sensitive in diagnosing intracavitary uterine endometrial pathologies by comparing with histopathological results. SIS can be considered as initial investigation in patients with abnormal uterine bleeding and in differentiating focal and diffuse endometrial lesions.

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Ix. Legends



Fig No. 1 Typical tray set for SIS. Equipment includes Speculum, Clamp, Uterine Catheter for Saline Injection

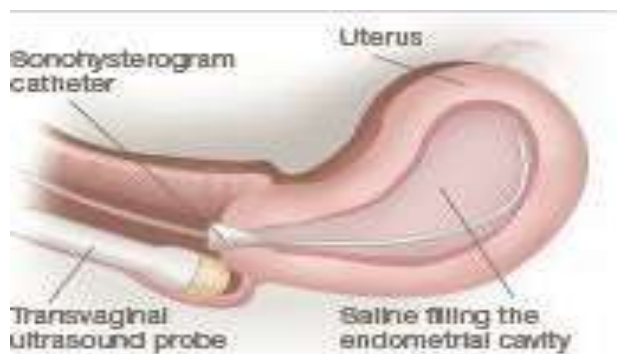


Fig No. 2 Sonohysterography Procedure



Fig No 3 Ultrasonography of lower abdomen showing normal anatomy of uterus

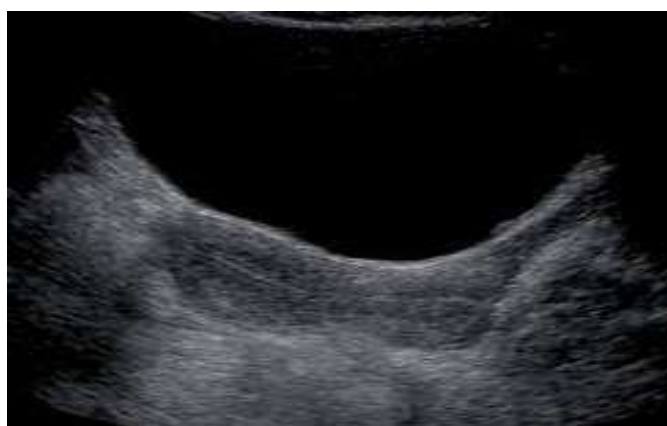


Fig No 4 Ultrasonography of the uterus in Sagittal plane



Fig No 5 SIS showing normal uterine cavity



Fig No 6. ultrasound abdomen with thickened endometrium



Fig No 7 saline infusion sonohysterography of endometrial cavity showing multiple echogenic polyp.

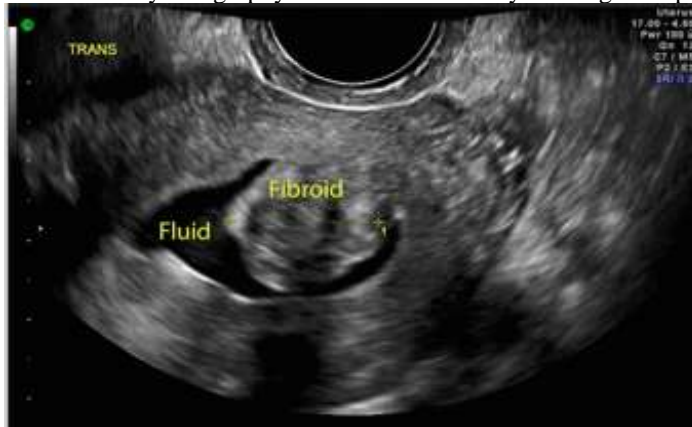


Fig No 8 saline infusion sonohysterography of endometrial cavity with large hypo echoic fibroid

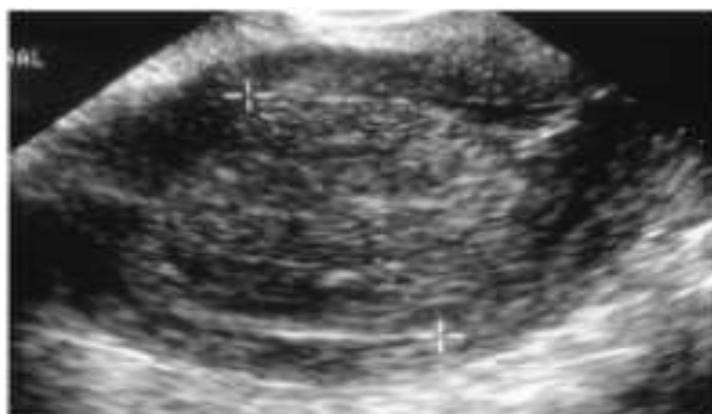


Fig No 9 TVS before saline infusion showing inhomogeneous thickened endometrium

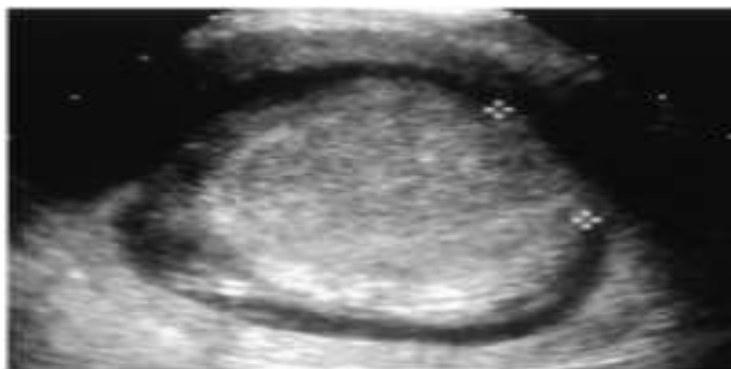


Fig No 10 TVS after saline infusion showing large diffuse mass

**Histopathology examination slides:
Biopsy slide with hyperplasia:**

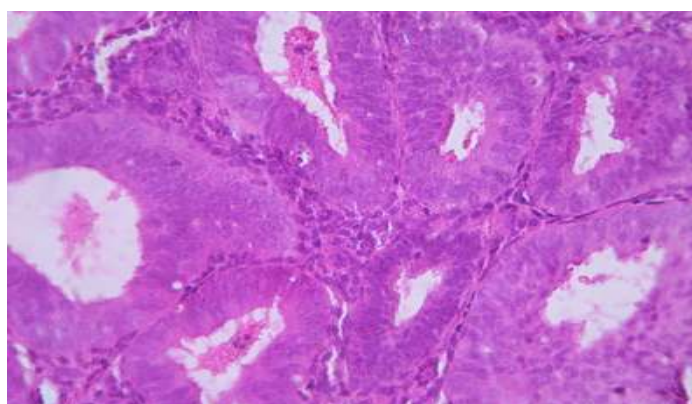


Fig No 11 Microscopic appearance of endometrium with hyperplasia

Biopsy Slide With Leiomyoma:

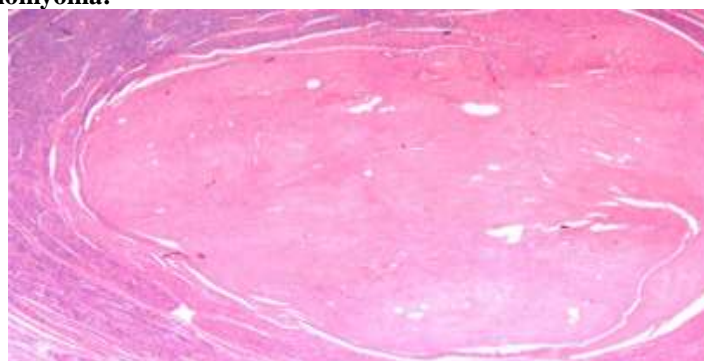


Fig No 12 microscopic appearance showing endometrial leiomyoma whorled fascicles of smooth muscle cells separated by a fibrovascular stroma

Biopsy slide with endometrial carcinoma:

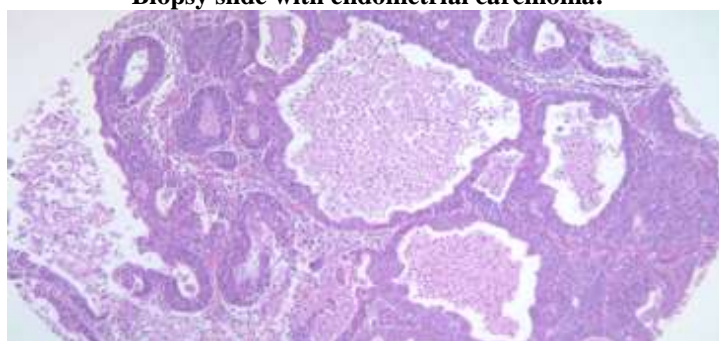


Fig No 13 Microscopic appearance of endometrium with carcinoma

Biopsy slide with endometrial polyp:

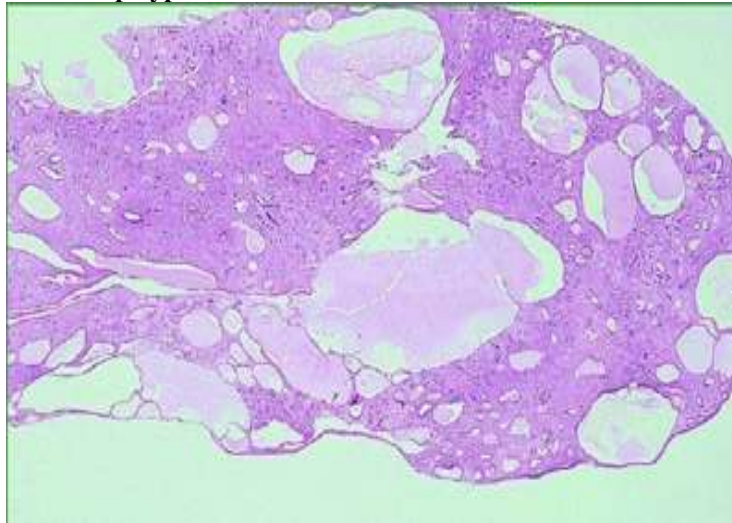


Fig No. 14 Endometrial polyp (low power) showing markedly dilated glands of various sizes and shapes.

Biopsy slide with endometrial polyp:

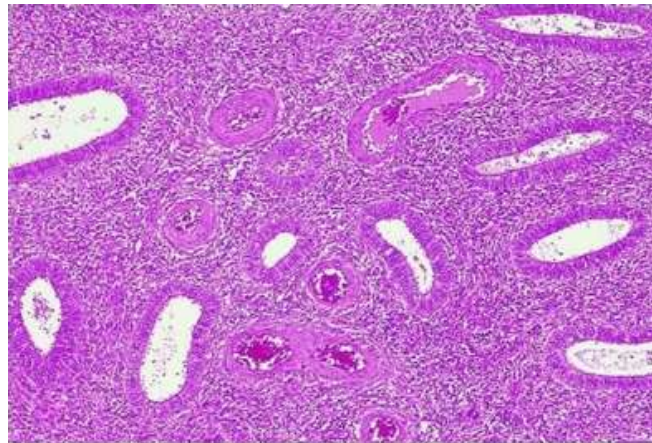


Fig No. 15 Endometrial polyp (high power) characteristic features of thick walled blood vessels in a fibrous core.