

# Saline Infusion Sono Hysteroscopy and Hysteroscopy in Evaluation of Abnormal Uterine Bleeding among Premenopausal Women - A Prospective Comparative Clinical Study

Banapurmath Sudha T. R.<sup>1</sup>, Parvathamma<sup>2</sup>, Sudha A. L.<sup>3\*</sup>

<sup>1</sup>Associate professor, Department of OBGY, SSIMS & Research Centre, Davanagere, Karnataka, INDIA.

<sup>2</sup>Professor, <sup>3</sup>Resident, Department of OBGY, J. S. S. Hospital, Mysore, Karnataka, INDIA.

\*Corresponding Address:

[sudha.tr2009@gmail.com](mailto:sudha.tr2009@gmail.com)

## Research Article

**Abstract: Objective:** To compare the reliability, efficacy and patient acceptance of saline infusion sonohysterography with hysteroscopy in evaluation of abnormal uterine bleeding among premenopausal women. **Study design:** This is a prospective comparative controlled study of 120 cases of abnormal uterine bleeding among premenopausal women attending the OBG out patient department. After enrollment to the study, the cause of abnormal uterine bleeding is evaluated by clinical examination, transvaginal ultrasonography, saline infusion sonography, Hysteroscopy and guided biopsy of the lesion/curettage of endometrium. The patient reported discomfort was recorded based on the perception and tolerance of pain by the patient. The data were statistically analysed and compared for agreement of two methods along with histopathological correlation. **Results:** SIS and Hystero scopy were performed in 120 premenopausal women. out of them, 44% of patients had menorrhagia, 10.6% metrorrhagia, 12.5% polymenorrhoea, 20.5% dysfunctional uterine bleeding. The diagnostic potential of sis compared with hysteroscopy as standard had sensitivity of 0.92 and specificity of 0.88. The k value measuring the agreement between the two techniques was K >0.6 indicating a high level of agreement between both tests in detecting Intra uterine lesions. Analysis of patient reported discomfort based on Chi Square  $\chi^2=6.7$  test, showed no statistical difference between both tests ( $p=0.14$ ). Average time for SIS was 15 minutes and >30 minutes with hysteroscopy. SIS detected additional myometrial and adnexal pathology. Severe complications were observed in 3.33% during hysteroscopy.

**Key words:** Saline infusion sono hysterography, Hysteroscopy, Myoma, endometrial polyp, Hyperplastic –endometrium

## Introduction

Abnormal uterine bleeding (AUB) is one among the complaints among women for attending the Gynaecology out patient department. Various causes of Abnormal uterine bleeding are dysfunctional uterine bleeding due to abnormal HPO axis function, hormonal medication, IUCD, lesions of vagina and cervix, and structural lesions of the uterus. The management AUB depends upon the pathology and hence the underlying cause of AUB needs to be evaluated. The various methods for

evaluation of AUB are Transvaginal sonography, Endometrial biopsy, Pap test, and Hysteroscopy which is the gold standard method for evaluation of uterine cavity. Transvaginal Sonography has the sensitivity of 88% and specificity of 96% in detecting endometrial lesions. Small lesions and adhesions may be missed and obscured by large myomas. Hysteroscopy is accurate in detecting 100% of uterine cavity lesions, but cannot detect myometrial and adnexal lesions. Hysteroscopy needs expensive instruments and special training to acquire skills of hysteroscopy, and special O.T setup. Hence a simple reliable, accurate technique, which can be repeated and easily accepted by patients, is necessary in evaluation of AUB. Saline infusion sonohysterography (SIS) is a out patient technique that involves placement of a sterile catheter into uterine cavity and distention of endometrial cavity is done by sterile normal saline instillation, to provide sharp negative contrast on ultra sonography for detection of the lesions in the uterine cavity. The present study has been performed in department of OBG among women with AUB. This study aims to determine the acceptability, accuracy, and reliability of SIS in comparison with Hysteroscopy, and histopathological correlation of uterine lesions.

## Method

This was a prospective comparative controlled study conducted on 120 premenopausal women who attended the OBST & Gynaec department with abnormal uterine Bleeding. The study period was between 2003-2004 and 2007-2008 in two centers. The sample size was determined for test reliability at 80%, and confidence interval 95%  $\pm 5\%$ . All pre menopausal women with abnormal Uterine bleeding were enrolled with .the following exclusion criteria such as local vulvo-vaginitis, cervical lesions ,acute pelvic inflammatory disease,

pregnancy related conditions, hormone intake/contraception, haemorrhagic disorders, active severe vaginal bleeding, adolescent DUB, suspicious Genital neoplasms, uterine enlargement of >12 weeks and Adnexal pathology. A written informed consent of patient was taken after enrollment of the patient in the study. All voluntarily enrolled women in the study group underwent both of the tests. A general clinical examination was performed followed by speculum visualization of vagina and cervix and bimanual vaginal palpation for the exclusion of adnexal and uterine infection and mass. Routine investigations such as haemoglobin, blood grouping, complete blood counts, Blood sugar level, liver and renal function tests were performed to evaluate for surgical fitness of patient. A history of pregnancy complication, medical disorders, bleeding disorders, hormone intake was recorded. SIS and hysteroscopy was planned post menstrually, in proliferative phase of menstrual cycle (between 6-12<sup>th</sup> day of the menstrual cycle). Transvaginal ultrasonography was performed with a 5 mega Hertz vaginal transducer probe and uterus was viewed in sagittal and coronal planes for the size, presence of uterine and adnexal pathology and endometrial thickness was measured at the widest point within the fundus in sagittal plane with entire endocervical and endometrial stripe visible,. Then Immediately SIS was performed under asepsis with Povidine iodine paint preparation of vagina and cervix.<sup>(1,12)</sup> The patient was placed in dorsal position and vaginal walls were separated with vaginal Sims' retractors. The cervical canal was checked for patency and a No6 foley's self retaining catheter was placed inside the uterine cavity above the internal cervical os. The balloon at catheter tip was inflated with 1-2ml of distilled water. The catheter was withdrawn till the cervical internal Os and checked for retention by gentle traction. The vaginal speculum was removed and the vaginal transducer was introduced into vagina and imaging with real-time ultra sonographic imaging was performed with simultaneous instillation of 5-10ml of normal saline was infused slowly into the uterine cavity for adequate distension of cavity. Uterine cavity was re-evaluated in coronal and sagittal planes and endometrial thickness of both walls were measured separately. Any thickening, intra luminal mass, irregularity, abnormality in the underlying myometrium, and adnexae were visualized and images were printed as hard copy using image printer. The uterine cavity was visualized from one cornu to the other and the transducer was rotated by 90° and moved from above downwards till cervical canal while with drawing the catheter and the longitudinal plane was selected for measurement of length of uterus and endometrial thickness. The SIS findings were

reported as follows:- Normal cavity – smooth endometrium with regular thickness and sharp border to demarcate with the myometrium and cavity, endometrial polyp – smooth marginated ecogenic mass, Iso echoic with endometrium and homogeneous texture, sub mucous myoma – solid round mass of mixed echogenicity distorting the endometrial cavity, disrupting the myometrium and is covered by endometrium ; Hyperplasia – irregular or diffuse thickening of endometrium with intact interface with myometrium ; adenomyosis – Cystic spaces spread in thick myometrium ; Endometrial cancer – irregular thickening of endometrium with varied echogenicity and disruption of endometrial – myometrial interface<sup>(2)</sup>. Intra uterine synechia – bands of irregular tissue in the cavity and poor distension of cavity. Next the same patient underwent Hysteroscopy after suitable preparation, under general anesthesia in OT using normal saline as distension media. Hysteroscopy was performed with 4mm telescope with 30° oblique lens with a double sheath (a diagnostic Hysteroscope). The appearance of whole of the uterine cavity was inspected and lesions observed were documented with a digital camera. The biopsy of the lesions were taken and sent for histopathology. All patient's were requested to report the discomfort experienced during and after both procedures and were documented as no discomfort, minimal discomfort, tolerable discomfort like menstrual cramps, barely tolerable( can tolerate for short time), and intolerable pain as to stop the procedure. The discomfort was treated accordingly/ symptomatically. The data obtained after the study were analysed for sensitivity, specificity, positive predictive value, negative predictive value, and diagnostic accuracy were calculated, using hysteroscopy as standard. The agreement of methods was tested with P value and P ≤ 0.05 was considered significant. The patient acceptability of discomfort was tested with chi X<sup>2</sup> = 6.7 and P value≤ 0.05 was considered significant difference and vice versa.

## Results

This study was undertaken between 2003-2004 and 2007-2008 in two centers. Total of 120 women (subjects) were enrolled in the study after ruling out the exclusion criteria, after ethical clearance and informed written consent for the study was given by the women.

### A) The distribution of cases:

#### to 1) case distribution according age of subjects:

The subjects enrolled for the study were aged between 25-30yrs in 12%, 31-35yrs in 15%, 36-40yrs in 19%, 41-45yrs in 46%, 46-50yrs in 20% of women

#### 2) case distribution according to various types of AUB pattern:

The distribution of cases according to types of AUB is as shown in, table no.1, showing various patterns of menstrual abnormality based on history given by the subjects. The various types of menstrual abnormality were menorrhagia-42.3%, metrorrhagia-9.6%, polymenorrhoea-12.5%, Metropathia haemorrhagica-20.2%, oligo menorrhoea-5.8%, Hypo and or secondary amenorrhoea in 9.6%. The associated symptoms in the study group along with AUB were infertility in 18%, Dysmenorrhoea in 11% and PMT in 22%.

#### **B) SIS versus Hysteroscopy**

The uterine cavity lesions in SIS and Hysteroscopy are described in chart 1. Both of the procedures could be performed in all except 3, when SIS could not be performed, on out patient basis due to difficulty in insertion of catheter into cervical external os. However these women underwent Diagnostic hysteroscopy under general anesthesia with medical cervical dilatation by vaginal insertion of tablet Misoprostol 200 micro grams, 6 hours earlier to the procedure. SIS findings were as shown in chart no.1, showing false positive endometrial polyps in 8 cases (40%), which were not found on Hysteroscopy, on histopathology were blood clots and chunk of endometrium displaced during insertion of catheter. True positive myomas protruding into uterine cavity from myometrium were observed in 22 (64%) cases by SIS which were missed /not detected on hysteroscopy, indicating the advantage of myometrial and adnexal evaluation by SIS over hysteroscopy. Hysteroscopy could detect hyperplasia of endometrium in more number of cases while endometrial adhesions, foreign bodies (Lippe's loop & fetal bones) could be detected by both procedures equally. Adenomyosis (100%) was detected only by SIS due to the advantage of myometrial evaluation by SIS. In addition Doppler vessel visualization study was possible in SIS in cases of vascular intra uterine lesions (polyp & Ca endometrium) which was not possible with Hysteroscopy. Diagnostic potential of SIS compared with Hysteroscopy is depicted in table no 2, shows a sensitivity of 0.89 in detecting polyps, 0.86 in detecting hyperplastic endometrium and specificity of 0.92 and 1.00, with diagnostic accuracy of 0.93 and 0.97, respectively.

#### **C) SIS, Hysteroscopy and Histopathological correlation:-**

8(40%) of false positive polyps were reported on SIS which were chunks of endometrium displaced during procedure in 4 cases and blood clots in 2 cases, and no pathology was found in 1 case. False negative cases of endometrial hyperplasia were observed in SIS group which were detected on hysteroscopy and confirmed positive by histopathology. Only 1 case of irregular endometrial cavity lesion was missed by SIS, which was

biopsied under Hysteroscopy guidance and diagnosed as ca endometrium. Histopathology correlated well in both procedures. Kappa statistics was utilized to study the level of agreement between the two methods SIS and Hysteroscopy to evaluate AUB among premenopausal women. Kappa value is  $>0.4$  in measuring the agreement between both techniques, which indicates a high level of perfect agreement between both test methods in detecting intra uterine pathology in evaluation of AUB.

**d) Complications of procedures:-** Vasovagal shock was seen in 1 case during SIS on rapid distension of uterine cavity at the beginning of the study. Infection and failure to perform SIS was observed in 3 cases each, where as hypernatremia and perforation of uterus was the complication seen with hysteroscopy, when operative Hysteroscopy procedures were attempted with Glycine as distention media.

#### **e) Patient discomfort reported after the procedure:-**

*The patient reported discomfort is depicted in table no 3.* Minimal acceptable discomfort was reported in 100 women in SIS and 91 women after hysteroscopy. Tolerable discomfort and pain in abdomen were reported in 16 women SIS group and in 27 of hysteroscopy group. Pain was intolerable in one woman in SIS group. The test of difference in proportions among the two study groups were analysed by chi square test of significance and there was no significant difference with respect to the discomfort between the two test procedures ( $\chi^2=6.7$ ;  $P=0.14$  NS).

#### **F) Additional information with the test procedures:-**

SIS detected other lesions of uterus, myometrium and adnexa, they were intramural myoma 16, submucous extentions of leiomyoma 10, ovarian cysts and PCOD in 10, hydrosalpinx in 8, tubal patency was confirmed in 22 and Adenomyosis along with hyperplasia of endometrium in 8 women. The time taken to perform SIS on OPD basis was 15 minutes and for Hysteroscopy was  $>30$  minutes in O.T under Anaesthesia and hence cost of SIS was lesser compared with Hysteroscopy.

### **Discussion**

Evaluation of AUB in premenopausal women is initiated with Tran's vaginal sonography where small lesions and large myoma's obscuring the polyps may be missed. Hysteroscopy and biopsy is the gold standard in evaluation of uterine cavity lesions. But the poor availability, costly equipment, skilled practitioner to perform hysteroscopy in an O.T set up and the cost involved are the major draw backs in using Hysteroscopy as a diagnostic tool in evaluation of AUB.<sup>1,2,3,6</sup>. Hence in this study, a simple out patient procedure, Saline infusion sonography (SIS) was used to evaluate uterine cavity in pre menopausal women in comparison with Hysteroscopy<sup>5,9,13,14,15</sup>. The sensitivity

and specificity of hysteroscopy in AUB as reported by Theresa Wildrich, MD Et al<sup>(2)</sup> was 0.97 and 0.93 respectively and by SIS were 0.96 and 0.88 respectively. Lawrence P.Et al (3) observed that a combination of endometrial biopsy and SIS positively correlated with surgical findings in >95% of times with sensitivity and specificity of 94% and 96% which is almost similar in this study. Previous studies<sup>3,4,5,12,13,14</sup> reported prospective studies of women with AUB proved that SIS had a sensitivity of 86% and 100% specificity in detecting intra luminal masses. There was no statistically significant difference between both procedures in detecting endometrial polyps, uterine adhesions, hyperplasia, Foreign body, normal uterine cavity and carcinoma of endometrium. In addition, SIS could detect myometrial and adnexal pathology, that has been confirmed by many previous studies<sup>(2,3,5,9,10,11,12)</sup>. A overall agreement between the two methods was established in this study by Kappa value >0.4, which was in concurrence with previous studies<sup>(2,3,5,6,7,8)</sup>. Earlier studies on evaluation of premenopausal AUB demonstrated that neither TVS nor Endometrial biopsy were single reliable tests. They reported that saline contrast sono hysterography alone was very reliable, simple tool in evaluation of Pre menopausal AUB<sup>2,6,8</sup>. SIS had a high failure rate (34%) among postmenopausal women, usually because of cervical stenosis. In premenopausal women, that rate was lower (10.3%). The failure rate of hysteroscopy, was 10.6% in postmenopausal women and 2.9% in premenopausal women<sup>(7)</sup>. In our study 3 cases the procedure could not be performed due to difficult catheter insertion in SIS group. Assessment of discomfort reported by patients after the procedure were of not statistical significance in our study, which was not correlating with other previous study<sup>(2)</sup> where pain rating in hysteroscopy group was higher and the level of pain associated with the two study procedures differed significantly<sup>(1)</sup>.

## Conclusion

In our experience in present study, SIS appears superior to TVS, especially in the presence of multiple myomas obscuring the view. SIS appears to be simple, reliable accurate, safe, cost effective, easy to perform, acceptable to patients due to the procedure done on out patient basis, with less discomfort. SIS offers additional information on myometrial, adnexal lesions and hence is more informative. SIS may be used as a screening tool before subjecting the women with AUB to operative procedures such as surgical interventions for intra luminal masses,(Hysteroscopic myomectomy) and saves cost of the procedure<sup>1,2</sup>. Compared with hysteroscopy, SIS more reliably predicts uterine myoma in size permits its classification of location, size, and degree of intramural

extension. This allows the clinician to determine the resectability of the lesion and select the appropriate surgical approach. The limitations of this study are-limited sample size for detection of carcinoma endometrium and atrophic endometrium, as we evaluated pre menopausal women only. The Non availability of office hysteroscopy increased the cost and discomfort among women in Hysteroscopy group, as procedures were performed in O.T. under G.A.

## Acknowledgement

I thank the medical superintendents and ethical committee of J.S.S. Hospital, Mysore and SSIMS&RC, Davanagere for providing clinical subjects for the study, the statistician for helping during statistical analysis. The most important of all, thanks to all those women who participated in the study and contributed to the study.

## References

1. Debra. L, Berridge, M D and Thomas c. Winter, MD,J. of Ultra sound med:2004:23,97-112
2. Theresa Widrich. M. D, Linda D. Bradly, MD, Allison R. Hutchinson, et al. Comparison of Saline infusion sonography with office hysteroscopy for the evaluation of endometrium. Am J. Obst. Gynecol.1996 .174, no; 4, 11327-1334.
3. Lawrence P.O' Connol IP, Gries MH, Zeringue E, Brehm W. Triage of abnormal postmenopausal bleeding: a Comparison of enometrial biopsy and transvaginal sonohysterography versus fractional curettage with hysteroscopy. Am J Obstet Gynecol 1998;178(5):956-61.
4. Goldstein SR, Zeltset I, Horan CK, Snyder JR, Schwartz LB. Ultrasonography -based triage for perimenopausal patients with abnormal uterine bleeding. Am J Obstet Gynecol 1997;177(1):102-7.
5. Sergio Reis Soares M.D et al; Diagnostic accuracy of sonohysterography, TVS,& Hysteroscopy in pts with uterirn cavity diseases; Feriyl Steril;2000;73;406-11.
6. Goldstein RB, Bree RL, Benson CB, Benacerraf BR, Bloss JD, Carlos R, et al. Evaluation of the woman with postmenopausal bleeding. J Ultrasound Med 2001; 20(10): 1025 – 36
7. Khaled M. Elsayes, Amit Pandya, Joel F Platt, Ronald O. Bude, Technique and diagnostic Utility of saline infusion sonography: International Journal of Gyn and Obstetrics India2009.; 12,178-182
8. Salim B. Lee c,davies a, jolaso b, ofuasa E, Jurkovic D. A Comparative study of three dimentional saline infusion sonohysterography and diagnostic hysteroscopy for the classification of submucous fibroids.: Human Reproduction, 2005: 20(1);253-7
9. Robertson et al .A comparison of out patient Hysteroscopy with SIS : B JOG;2002:109:800-804
10. Clevenger Haeft, M Amp, Syrop, Craigh, M D et al, Sonohysterography in premenopausal women with and without abnormal uterine bleeding, Obstet and Gynocol 1999, Volume 94, 4, 516-520.
11. Desole S, Farina M, Rubattu G, Cosme E, Ambrosini G, Nadelli GB. Side effects and complications of sonohysterosalpingography. Fétil Steril 2003; 80 (3):620-4.

12. Saidi MH, Saacclr RK, ThVD, A right BD, G-Forhart SA, Villennera GR, 1997 "Comparison of Sonography, sonohysterography & hysteroscopy for evaluation of AUB. Journal of Ultrasound Med 16; 587-91.
13. Apichort Chitta Charoen, uruse Theppirai, varnet linsmita & J linsmita jithima Manonai, 2000: TVS v/s SHG in diagnosis of AUB J. Obstet Gynecol Res, 26: 277-281.
14. Peter W Callen M. D., Ultrasonography in obstetrics and Gynecology, 4<sup>th</sup> Edition, Saunders 828-843.

**Table 1:** Types of abnormal menstruation, shown in percentage (n=120)

Type of menstrual Abnormality	No. of cases	Percentage
Menorrhagia	44	42.3
Metrorrhagia	10	9.6
Poly menorrhagia	13	12.5
Metropath haemorrh	21	20.2
Oligo menorrhea	6	5.8
Sec.amenorrhoea	4	3.8
Hypomenorrhoea	6	5.8
<b>Total</b>	<b>120</b>	<b>100</b>

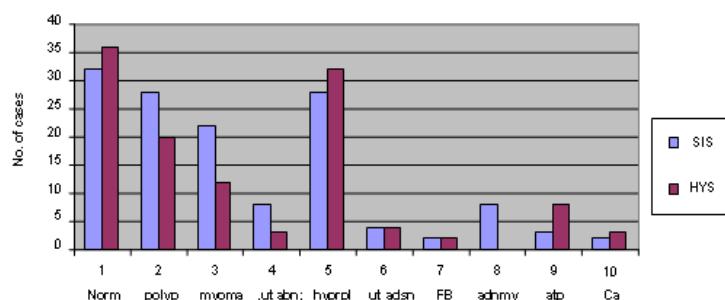
**Table 2:** Diagnostic potential of SIS compared with hysteroscopy (n=120)

SIS findings	Sensitivity	Specificity	PPV	NPV	Accuracy	Kappa stat
Normal	0.89	1.0	1.0	0.95	0.97	0.91
Polyp	1.0	0.92	0.71	1.0	0.93	0.79
Fibroid ut	1.0	0.91	0.55	1.0	0.92	0.66
Ut abnormality	1.0	0.96	0.38	1.0	0.96	0.53
Endometrial Hyperplasia	0.86	1.000	1.0	0.96	0.97	0.91
Intra Uterine Adhesions	1.0	1.0	1.0	1.0	1.0	1.0
Foreign body	1.0	1.0	1.0	1.0	1.0	1.0
Adenomyosis	-	0.93	-	1.0	0.93	-
Atrophic endom & Ca endomet	0.82	1.0	1.0	0.98	0.98	0.89

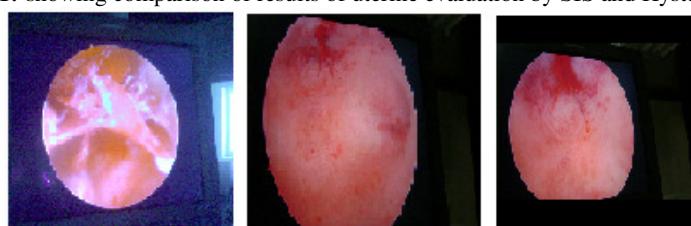
**Table 3:** Patient discomfort rating in both procedures. (n=120)

Symptoms	SIS	Hysteroscopy
Min discomfort	70	56
Acceptable discomfort	30	35
Tolerable discomfort	16	27
Barely tolerable	2	2
Intolerable	2	0
<b>Total</b>	<b>120</b>	<b>120</b>

Comparison of SIS v/s hysteroscopy



**Chart 1:** showing comparison of results of uterine evaluation by SIS and Hysteroscopy



**Photo 1                  Photo 2                  Photo 3**

**Photo (1, 2, 3):** Hysteroscopy of polp in the uterus