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Research Article

## Evaluation of abnormal uterine bleeding by transvaginal sonography, sonohysterography and correlation with endometrial histopathology

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### ABSTRACT

**Background:** Abnormal uterine bleeding (AUB) in reproductive-age women is common, leading to one-third of outpatient visits by this population and this proportion crosses the two-third threshold in peri or post-menopausal group. Annually 5-10% of women of reproductive age seek medical care for AUB, which negatively impacts quality of life. The aim of the present study was to study the role of transvaginal sonography (TVS) and sonohysterography (SHG) in abnormal uterine bleeding.

**Methods:** The present study was carried out at Department of Obstetrics and Gynaecology, Era's Lucknow Medical College, Lucknow in collaboration with Department of Radiology and Pathology, Era's Lucknow Medical College, Lucknow. It was a prospective study carried out over a period of 1 year. Detailed history regarding their present complaints, menstrual history along with thorough examination was noted on the proforma designed for the study. Those with active and heavy bleeding underwent TVS and D&C for diagnostic and therapeutic purposes in the same sitting. However others without active bleeding underwent TVS, SIS in mid cycle and D&C in premenstrual period.

**Results:** The present study was carried out at Department of Obstetrics and Gynaecology, Era's Lucknow Medical College, Lucknow in collaboration with Department of Radiology and Pathology, Era's Lucknow Medical College, Lucknow. It was a prospective study carried out over a period of 1 year. Detailed history regarding their present complaints, menstrual history along with thorough examination was noted on the proforma designed for the study. Those with active and heavy bleeding underwent TVS and D&C for diagnostic and therapeutic purposes in the same sitting. However others without active bleeding underwent TVS, SIS in mid cycle and D&C in premenstrual period.

**Conclusions:** The findings in present study show a relative supremacy of SIS over TVS in diagnosis of uterine abnormalities in cases of abnormal uterine bleeding.

**Keywords:** Abnormal uterine bleeding, Endometrial histopathology, Sonohysterography, Transvaginal sonography

### INTRODUCTION

Abnormal uterine bleeding (AUB) in reproductive-age women is common, leading to one-third of outpatient visits by this population and this proportion crosses the two-third threshold in peri or post-menopausal group.<sup>1,2</sup> The most frequent culprits in this age group include anovulation, polycystic ovary syndrome, structural abnormalities (polyps, fibroids), endometrial hyperplasia,

cancer, foreign bodies, pregnancy related complications, disorders of haemostasis, trauma and infection.<sup>3</sup> Annually 5-10% of women of reproductive age seek medical care for AUB, which negatively impacts quality of life.<sup>4</sup> Most women with AUB report that their leisure activities are at least moderately impacted by their bleeding and compared to women without AUB, women with AUB work almost 4 weeks less per year in the United States.<sup>5,6</sup> Approximately 6,00,000 hysterectomies are performed

annually in the United States with 11% of these for AUB and 33% for leiomyoma.<sup>7</sup> Goals of clinical management are primarily dependent upon attaining a correct etiological diagnosis. The history, physical and pelvic examination attempt to determine the site of bleeding and its source, Information gathered from this suggests what direction the investigation would take. Traditionally, dilatation and curettage (D&C) is one of the commonest investigations employed in the evaluation of the causes of abnormal uterine bleeding. D&C is a blind procedure and the endometrium has to be sent to the pathologist to study histological patterns. The cooperation of the pathologist is important. However, the discomfort caused to the patient and the numerous costs involved place a burden on its use as a screening tool. In the recent years, transvaginal sonography (TVS) has emerged as an important modality in investigating AUB. Transvaginal probe provides high resolution image of pelvic organs providing reliable information. Ultrasonography uses sound wave to create a view of the interior of the body so is free of any known adverse effect and thus can be repeated as often as required. It provides rapid assessment of uterine and adnexal pathology. The texture of endometrium can be evaluated for homogeneity or heterogeneity. Measurement of endometrium in AUB is helpful in determining the necessity for D&C or further imaging study. Sonohysterography (SHG) also called as saline infusion sonography (SIS) is a simple technique that can be used to outline the contour of uterine cavity under real time ultrasound guidance. SHG is used to predict either the presence or absence of intramural lesion in uterine cavity and in distinguishing these lesion from subendometrial or myometrial lesion. Being simple, less invasive and less expensive, it can be used as an office procedure. The technique has shown promising results and it has been shown that SHG with endometrial biopsy had high sensitivity and high negative predictive value 8. Keeping in view these findings, the present study was designed to correlate TVS and SHG with endometrial histopathology in patient with AUB.

The aim of the present study was to study the role of Transvaginal Sonography (TVS) and Sonohysterography (SHG) in abnormal uterine bleeding. The aim was fulfilled with the help of following objectives.

1. To evaluate the predictive values of non-invasive transvaginal sonography and sonohysterography in abnormal uterine bleeding.
2. To correlate the results of transvaginal sonography and sonohysterography with biopsy findings
3. To compare the diagnostic efficacy of non-invasive transvaginal sonography and sonohysterography.

## **METHODS**

The present study was carried out at Department of Obstetrics and Gynaecology, Era's Lucknow Medical College, Lucknow in collaboration with Department of Radiology and Pathology, Era's Lucknow Medical

College, Lucknow. It was a prospective study carried out over a period of 1 year.

### ***Inclusion criteria***

All women having AUB (a change in previously established menstrual pattern which adversely affects lifestyle) with age >18 years were included in the study.

### ***Exclusion criteria***

Pregnant women and up to 6 weeks post-partum mothers, those having any pelvic inflammatory disease, severe cervical stenosis, thyroid disorder, coagulation disorder or any other medical illness and patients with IUCD in situ or those on hormonal contraceptives were excluded.

Detailed history regarding their present complaints, menstrual history along with thorough examination was noted on the proforma designed for the study. Those with active and heavy bleeding underwent TVS and D&C for diagnostic and therapeutic purposes in the same sitting. However others without active bleeding underwent TVS, SIS in midcycle and D&C in premenstrual period.

### ***Equipment***

All TVS examination was performed on an ultrasound imager [Logiq GE 5 PRO (2 dimensional) transvaginal probe (6.5 MHz)].

### ***Transvaginal sonography***

The transducer was introduced into posterior fornix and uterus was scanned in longitudinal and coronal view with special emphasis on endometrium. Basic movements which were performed to visualize the pelvis using the transvaginal probe were:

1. Pushing pulling the entire probe
2. Rotating the probe 360° allows scanning of the entire pelvis in all longitudinal planes
3. Tilting or angling the shaft

### ***Sonohysterography***

A 5-7 French Foley's catheter was introduced into the uterine cavity and fixed by inflating the balloon. The transvaginal probe was introduced into vagina and 10-15 ml of normal saline was injected to distend the endometrial cavity. Any intramural lesion like polyp, submucous fibroid, irregular endometrial thickening was looked for. Ultrasonographic evaluation was followed by dilatation and curettage. Endometrial tissue was preserved in 10% formalin and sent for histopathological examination.

### Statistical analysis

The statistical analysis was done using SPSS (Statistical Package for Social Sciences) Version 15.0 statistical Analysis Software. The values were represented in Number (%) and mean  $\pm$  SD.

### RESULTS

The age of patients ranged from 22 to 55 years. Majority of the subjects (n=34; 94.4%) were housewives. Majority of the subjects (52.8%) had a history of complaints for <6 months followed by those having these complaints for 6-12 months (25%). The incidence of AUB seemed to be increasing with increasing parity. There were only 2 (5.6%) patients each in nulliparous and primiparous group. Clinically, 21 (58.3%) patients gave the impression of normal uterus. A total of 7 (19.4%) subjects had a bulky uterus. There were 8 (22.2%) subject with 10-14 weeks uterus.

**Table 1: Diagnosis based on transvaginal ultrasonographic findings (n=36).**

S.No.	Diagnosis	No. of cases	Percentage
1.	Normal	17	47.2
2.	Adenomyosis	5	13.9
3.	Atrophic endometrium	1	2.8
4.	Bulky uterus	2	5.6
5.	Hyperplasia	5	13.9
6.	Fibroid uterus	4	11.1
7.	Endometrial polyps	2	5.6

TVS revealed normal diagnosis in almost half, endometrial hyperplasia (13.9%) and adenomyosis (13.9%) were the most frequent findings detected. Saline infusion sonography revealed the majority of findings to be normal (60%). A total of 12 (40%) cases were observed to be abnormal.

**Table 2: Distribution of subjects according to saline infusion sonography diagnosis (n=60).**

S.No	Diagnosis	No. of patients	Percentage
1.	Endometrial hyperplasia	6	20.0
2.	Endometrial polyp	2	6.7
3.	Endometrial polyp + hyperplasia	1	3.3
4.	Small mucosal fibroid	3	10.0
5.	Normal	18	60.0

Table 2 shows the saline infusion sonography in which endometrial hyperplasia (20%) was the most common diagnosis followed by small submucosal fibroid (10%).

Endometrial polyp was diagnosed in 2 (6.7%) and in 1 (3.3%) case, the diagnosis was endometrial polyp with hyperplasia.

### Finding on histopathology

In 20 (55.6%) cases the histopathological diagnosis was proliferative. Hyperplasia (25%) was the next common finding. The correlations of histopathologic diagnoses were done with TVS and SIS for individual diagnosis. TVS diagnosis for histopathological proliferative case was observed to be normal in majority (n=11; 55%). SIS was found to be normal in 12 (70.6%) cases.

**Table 3: Diagnostic efficacy of TVS against HPE (n=36).**

TVS Findings	HPE Findings		Total
	Abnormal	Normal	
Abnormal	8	11	19
Normal	3	14	17
Total	11	25	36

$\chi^2 = 2.592$  (df=1); p=0.112

Sensitivity	Specificity	PPV	NPV	DA
77.7	56.0	42.1	82.4	61.1

On comparing the diagnostic efficacy of TVS against histopathology, its sensitivity, specificity, PPV, NPV and diagnostic accuracy was observed to be 72.7%, 56.0%, 42.1%, 82.4% and 61.1% respectively. On comparing the data statistically, this association was not significant statistically.

**Table 4: Diagnostic efficacy of SIS against HPE (n=36).**

SIS Findings	HPE Findings		Total
	Abnormal	Normal	
Abnormal	7	5	12
Normal	2	16	18
Total	9	21	30

$\chi^2 = 7.646$  (df=1); p=0.006

Sensitivity	Specificity	PPV	NPV	DA
77.8	76.2	58.3	88.9	76.7

On comparing the diagnostic efficacy of SIS against histopathology, its sensitivity, specificity, PPV, NPV and diagnostic accuracy was observed to be 77.8%, 76.2%, 58.3%, 88.9% and 76.7% respectively.

### Additional information provided by TVS and SIS

Although HPE was taken as the gold standard, yet information provided by TVS and SIS was useful in

making final diagnosis, especially in cases of adenomyosis and fibroid uterus which remained undiagnosed on HPE.

Final diagnosis revealed maximum cases to be anovulatory dysfunctional uterine bleeding (n=14: 38.9%). Another 3 (8.3%) Ovulatory dysfunctional uterine bleeding (n=3:8.3%). Among different abnormalities, fibroid uterus and endometrial hyperplasia (n=5: 13.9%) were most common. There were 2 cases of adenomyosis (5.6%). Adenomyosis with endometrial hyperplasia, adenomyosis with endometrial polyp, atrophic hyperplasia, atrophic endometrium, endometrial polyp, endometrial polyp with endometrial hyperplasia, fibroid uterus with adenomyosis and tubercular adenometritis were reported in 1 (2.8%) case each.

**Table 5: Final diagnosis (on the basis HPE+TVS+SIS Findings) (n=36).**

Final Diagnosis	No. of patients	%	Basis of diagnosis
Adenomyosis	2	5.6	TVS
Atrophic endometrium	1	2.8	TVS and HPE
Endometrial hyperplasia	5	13.9	TVS/SIS/HPE
Endometrial polyp	1	2.8	TVS/SIS
Fibroid uterus	5	13.9	SIS/TVS
Tubercular endometritis	1	2.8	HPE
DUB anovulatory	14	38.9	HPE (other pathologies ruled out by TVS and SIS diagnosis confirmed by HPE)
DUB ovulatory	3	8.3	HPE (other pathologies ruled out by TVS and SIS diagnosis confirmed by HPE)

**Table 6: Incremental Efficacy of Combined Diagnosis over HPE alone (n=36).**

HPE alone	Combined Diagnostic Findings		Total
	Abnormal	Normal	
Abnormal	9	2	11
Normal	10	15	25
Total	19	17	36

$\chi^2 = 5.361$  (df=1); p=0.021

Sensitivity	Specificity	PPV	NPV	DA
47.4	88.2	81.8	60.0	66.7

As compared to combined efficacy, HPE alone had a diagnostic accuracy of 66.7% alone. Thus combined diagnosis was useful in enhancing the HPE accuracy by 50%.

## DISCUSSION

The aim of the present study was to observe the role of TVS and SIS in AUB. For this purpose a total of 36 women with complaints of abnormal uterine bleeding were enrolled. Pregnant women and up to 6 weeks postpartum women mother were excluded as they might be having bleeding owing to some antenatal or postpartum disorders and those suffering from any pelvic inflammatory disease, severe cervical stenosis, thyroid disorder, coagulation disorder or any other chronic illness were also excluded as they all might be having the disease owing to some physiological reasons. For the similar reason those having IUCD in situ or those on hormonal contraceptives were excluded from the study.

On the basis of TVS ultra-sonographic findings a total of 17 cases were diagnosed as normal (table 1). Among different abnormalities reported on USG adenomyosis and hyperplasia and were most common (n=5, 13.9% each); fibroid uterus (n=4; 11.1%) was the next most common finding followed by 2 cases (5.6%) each of bulky uterus and endometrial polyps. There was 1(2.8%) case which was diagnosed to be having atrophic endometrium.

On SHG too, majority (n=18; 60%) (Table 2) subjects were diagnosed as normal. Among different abnormalities-endometrial hyperplasia was most common diagnosis (n=6; 20%), small sub mucosal fibroid (n=3; 10%) was the next most common finding while endometrial polyp (n=2; 6.7%) and endometrial polyp with hyperplasia (n=1; 3.3%) were the least common finding. A total of 6 cases did not undergo SHG owing to cervical stenosis or distension problems.

Out of a total of 11 cases detected to be having abnormalities on HPE, TVS could diagnose 8 cases truly. However the false positivity rate of TVS as observed in present study was quite high, there were 11 false positive cases in whom abnormalities have been diagnosed on TVS, but HPE confirmed them to be normal. This contributed to lowering of the positive predictive value of the test significantly (PPV= 42.1%) (Table 3). As regards the normal findings, out of 25 cases diagnosed to be normal on histopathology, the TVS diagnosis could match in only 14, thus making it to be 56% specific. Only 3% cases which were positive on HPE did not correlate in TVS findings. This negative predictive value was observed to be 82.4%. The diagnostic accuracy of the test was 61.1%. In the study of Islam et al., it was observed that TVS had a very good diagnostic value in finding normal endometrium i.e. proliferative and secretory phase.<sup>9</sup> In their study, TVS picked up 10 (5%) false positive cases and no false negative case was detected.

However, in present study, TVS was shown to be performing poorly. In present study, as many as a total of 11 (30.6%) case were diagnosed to be false positive on TVS while a total of 3 (8.3%) cases were diagnosed false negatively. In present study, TVS was found to be more sensitive than specific. These findings correlate with the findings of Islam et al., who also observed that TVS was more sensitive than specific.<sup>9</sup> However, the false positivity of the test was quite high; this was because in present study the incidence of histopathologic abnormalities was less than one-third. In the study of Dasgupta et al., the TVS findings suggestive of hyperplasia were quite common on USG.<sup>10</sup>

As regards SIS, a total of 6 patients did not undergo the procedure. The findings in present study are in consonance with the findings of Aslam et al., who too observed majority of their patients with abnormal uterine bleeding to be having normal uterus and encountered malignancy in only 1 case.<sup>11</sup> In terms of uterine abnormalities, they had observed the diagnostic efficacy of TVS in terms of sensitivity, specificity, PPV, NPV and diagnostic accuracy to be 71.43 & 67.7%, 54.35 & 81/48% and 695 respectively (Table 4). In present study, on the same parameters, we find the diagnostic efficacy of TVS to be 72.7%, 56%, 42.1%, 82.4% and 61.1% (Table 3) respectively. In both the studies, the sensitivity of TVS was observed to be higher as compared to specificity while owing to low prevalence; the positive predictive value is poor in both the studies. In the study of Aslam et al., the diagnostic performance of SIS was observed to be 92.86% sensitive, 89.65% specific, with positive predictive value of 86.67% and negative predictive value of 94.54%.<sup>11</sup> The diagnostic accuracy observed by them was a high 91%. However; in present study we could not achieve the similar level of performance by SIS. In present study it was 77.8% sensitive, 76.2% specific, with a PPV of 58.3% and a NPV of 88.9% while the diagnostic accuracy was 76.7% (Table 4). In present study apart from positive predictive value, for all the parameters the efficacy of SIS was over 75%. Despite this difference between two studies, in both the studies SIS was found to be more efficient in detection of uterine abnormalities in cases of abnormal uterine bleeding as compared to TVS. Although the findings, obtained by Mathew et al., provide a better efficacy of SIS as compared to the findings in present study.<sup>12</sup> They have reported the sensitivity, specificity, positive and negative predictive values for TVS to be 72.44%, 100%, 100% and 74% respectively, while for SIS the corresponding figures were 91.4%, 92.6%, 89.3% and 94.1%. In present study, no such distinguishing difference was observed which might be attributed to smaller size of study sample. Yildizhan et al too observed a better efficacy of SIS over TVS in detection of both uterine polyps and fibroids.<sup>13</sup> No doubt, SIS was a superior technique as compared to TVS but at the same time, its inability to be carried out in all cases is one of the restrictions for its use in all the patients. Epstein et al have also expressed similar reservations on SIS use when

they found that SIS failed in approximately 20% of their cases owing to similar reasons as encountered in present study.<sup>14</sup> This is one big limitation in the use of SIS as a routine and preliminary tool for diagnosis. One of the limitations of the present study was its small sample size. With this limited same size we could not get a true representation of the incidence of various uterine abnormalities and hence the results have a limited application. Despite this limited application, the trends obtained by us in general indicate that SIS is a better diagnostic tool as compared to TVS. However, in preparation of final diagnosis we found that the combined role of all the three techniques is quite useful. The findings in present study, are indicators for a larger study to be carried out at our centre so as to substantiate the results and with the cumulative evidence provide a much better opportunity to correlate and compare the two techniques.

## CONCLUSIONS

The findings in present study, show a relative supremacy of SIS over TVS in diagnosis of uterine abnormalities in cases of abnormal uterine bleeding. However, owing to limitations of sample size and time the relationship needs further exploration with larger spectrum of diagnoses.

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