

## Comparison of transabdominal sonography and transvaginal sonography in evaluation of endometrial thickness in the setting of abnormal uterine bleeding

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### ABSTRACT

**Background:** Abnormal uterine bleeding (AUB) is a common complaint in women of reproductive age for which they consult their gynecologist and is the direct cause of a significant health-care burden for women. Imaging plays a pivotal role in diagnosing and helping the clinicians choose an appropriate management strategy at the earliest possible juncture, thus relieving patients of their symptoms and preventing complications. This tertiary care hospital-based study aims to assess the role transabdominal sonography in comparison with transvaginal sonography in evaluation of endometrial thickness in the setting of AUB in of in female population of Kancheepuram and West Chennai district of Tamil Nadu. **Materials and Methods:** It is a prospective study conducted in the Department of Radiology, of a tertiary care hospital in Kancheepuram district of Tamil Nadu, India. One hundred adult females who presented with complaints of abnormal bleeding per vaginum underwent both transabdominal (TAS) and transvaginal ultrasonography (TVS). In addition, they were evaluated for AUB through assessment of endometrial thickness and the presence of other uterine and adnexal pelvic pathologies. **Result:** The results of the present study show that TVS is superior to TAS in assessing endometrial thickness accurately and has a slightly better role in diagnosing endometrial pathologies such as endometrial polyp, hyperplasia, endometrial carcinoma, and number and location of Submucosal/intramural leiomyomas. **Conclusion:** TVS is superior to TAS in assessing endometrial thickness accurately and have high sensitivity and accuracy in the diagnosis of pelvic pathologies and determination of the type of pelvic mass was improved significantly when a transvaginal study was performed after TAS in cases of AUB.

**Key words:** Endometrial thickness, Transabdominal sonography, Transvaginal sonography, Uterine bleeding

Abnormal uterine bleeding (AUB) is a major cause of outpatient consultation and inpatient admission of women during their reproductive age group. This causes significant health-care and socioeconomic and psychological burden for women. AUB affects 10%–30% women of reproductive age and 50% of perimenopausal women. The etiology of AUB relates to the patients' reproductive age, as does the likelihood of significant endometrial pathologies [1]. Specific diagnostic approach depends on whether the patient is premenopausal, perimenopausal, or postmenopausal as the endometrium demonstrates a wide spectrum of physiological and pathological appearances at menarche, through the reproductive ages as well as during the perimenopausal years [2].

AUB was redefined by Fédération Internationale de Gynécologie et d'Obstétrique (FIGO) in 2009 by the FIGO

Menstrual Disorders Group (FMDG) [3]. This was proposed to standardize definitions, nomenclature, and the underlying categories of etiology. It was hoped that this would facilitate ease of investigation and comparison of similar patient populations, and thereby aid research and improve evidence-based care; this would also be a practical tool for assessing contributing etiologies.

Chronic AUB was defined as “bleeding from the uterine corpus that is abnormal in volume, regularity, and/or timing that has been present for the majority of the past 6 months [4].” Values lying outside the accepted 5–95<sup>th</sup> percentiles indicated abnormality (Table 1).

With regard to volume, however, both the Royal College of Obstetricians and Gynecologists and American College of Obstetricians and Gynecologists prefer the patient-centered definition of HMB, that is, “excessive menstrual blood loss which interferes with a woman's physical, social, emotional, and/or material quality of life [4],” as an indication for investigation and treatment options. As such, objective measurements of volume are usually the preserve of

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**Table 1: Suggested Normal limits for menstrual parameters. Adapted from Fraser *et al.* [3]**

Clinical parameter	Descriptive term	Normal limits (5–95 <sup>th</sup> percentiles)
Frequency of menses (days)	Frequent	<24
	Normal	24–38
	Infrequent	>38
Regularity of menses, cycle to cycle (Variation in days over 12 months)	Absent	No bleeding
	Regular	Variation±2–20 days
	Irregular	Variation>20 days
Duration of flow (days)	Prolonged	>8.0
	Normal	4.5–8.0
	Shortened	<4.5
Volume of monthly blood loss (mL)	Heavy	>80
	Normal	5–80
	Light	<5

**Table 2: PALM-COEIN classification of AUB [4]**

Structural	Non-structural
Polyps	Coagulopathy
Adenomyosis	Ovulatory dysfunction
Leiomyomas	Endometrial
Malignancy and hyperplasia	Iatrogenic
	Not yet specified

**Table 3: Other findings in TAS and TVS**

Parameters	TAS	TVS
Endometrial hyperplasia	12	15
Endometrial polyp	8	10
Leiomyoma	25	28
Cervical polyp	4	3
Adenomyosis	1	6

research studies and surrogates such a pictorial blood-loss assessment chart scores are not recommended in routine clinical practice.

The endometrial appearance is influenced by several factors such as age, menstrual status, pregnancy, and hormonal therapy (Table 2). AUB is diagnosed by excluding pregnancy, iatrogenic causes, systemic conditions, and genital tract pathologies. The advent and use of sonographic imaging changed the diagnostic approach to AUB. It forms the primary mode of examination in its evaluation and provides information to plan out the right therapeutic approach required in the given situation.

## MATERIALS AND METHODS

This study was conducted in women presenting/referred to the Department of Radiodiagnosis, Saveetha Medical College and Hospital, a tertiary care hospital and post graduate teaching and research institute, with complaints of AUB. The study was started following Institutional Ethics Committee's approval and after obtaining written informed consent of the patient for participation in the study.

All the participants underwent both transabdominal (TAS) and transvaginal ultrasonography (TVS) for evaluation of AUB including assessment of endometrial thickness and also to look for the presence of other uterine and adnexal pelvic pathologies. In our study, TVS held a clear advantage over TAS in measurement of endometrial thickness and assessment of intrauterine pathologies. However, TAS had the upper hand over TVS in detecting extrauterine and pelvic pathologies due to wide field of insonation. Thus, both TAS and TVS had a complimentary role in better diagnosing pelvic pathologies and eliminating the use of invasive procedures for diagnosing cases of AUB.

The proposed study was planned as a prospective study of female patients with clinically suspected pelvic pathologies in cases of AUB for evaluation by TAS and TVS. The 100 patients included in this study were those attending the outdoor patients – outpatient department/admitted at a tertiary care hospital at Kancheepuram.

All the patients were assessed as follows.

### Criteria for Selecting Patients of AUB

Females of any age group with clinically suspected pelvic pathologies presenting with AUB, who were able to undergo TVS, and had no contraindications to it were included in this study. Prior informed consent was taken from all the patients.

### Exclusion Criteria

Pregnant women, recent history of trauma, patients in whom TVS was contraindicated, and patients who did not willingly consent to the examination were not included in the study.

### Clinical Assessment

All patients included in this study were subjected to detailed clinical history and examination.

### Radiological Investigations

#### TAS ultrasonography

It was done in all the patients as a primary investigation. It was done with convex 3.5–5 MHz probe on PHILLIPS AFFINITY 70. Before the sonography, patients were asked to drink plenty of water as urinary bladder acts as an acoustic window for ultrasonography. Patients were positioned lying face-up on an examination table. Endometrial thickness was measured from echogenic border to echogenic border across the endometrial cavity on a sagittal midline image (Figure 1).

#### TVS

Before it, patients were asked to empty the bladder completely. Transvaginal probes insonate at higher frequencies of 6–10 MHz. TVS was performed using a standard transducer (6.25 MHz transvaginal curvilinear array transducer probe) on PHILLIPS

AFFINITY 70. Endometrial thickness was measured from echogenic border to echogenic border across the endometrial cavity on a sagittal midline image.

*Before the test*

There was no need for any special preparation before the TVS. The patient may continue taking all the medications as prescribed by health-care provider.

*On the day of the test*

The patients were asked to empty the bladder before the test and change into the hospital gown.

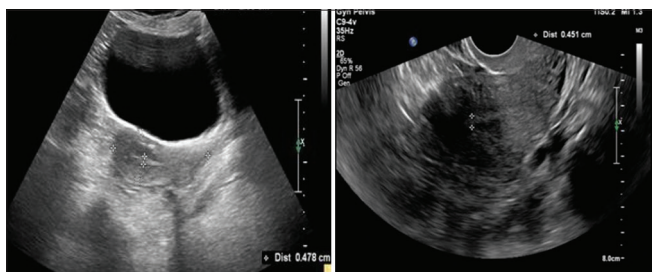


Figure 1: TAS and TVS sagittal image of uterus showing no significant difference in endometrial thickness as measured in TAS (4.8 mm) and TVS (4.5 mm)

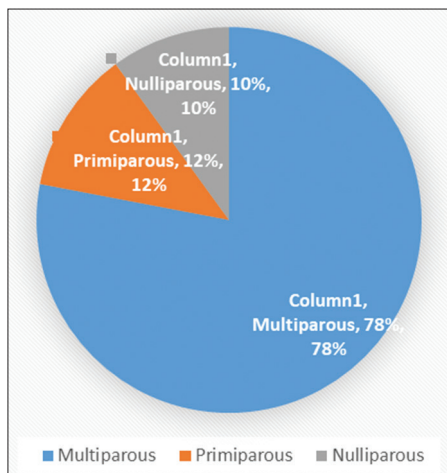


Figure 2: Image showing percentage of women included in the study in terms of parity

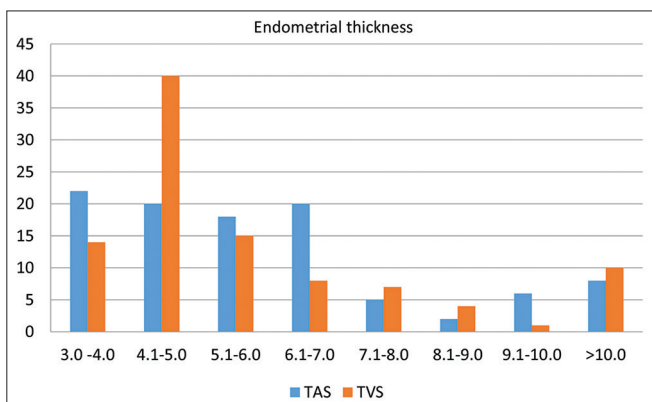


Figure 3: Image showing comparison between TAS and TVS

*During the test*

Patients lied on the bed in the lithotomy position on a table set to Trendelenburg position. The probe was gently inserted into the vagina. Longitudinal and transverse images of the uterus, ovaries, and adnexa were obtained. There was minimal discomfort during the test.

*After the test*

Patients were able to resume usual routine activities. A written report of TVS results was forwarded to the patient.

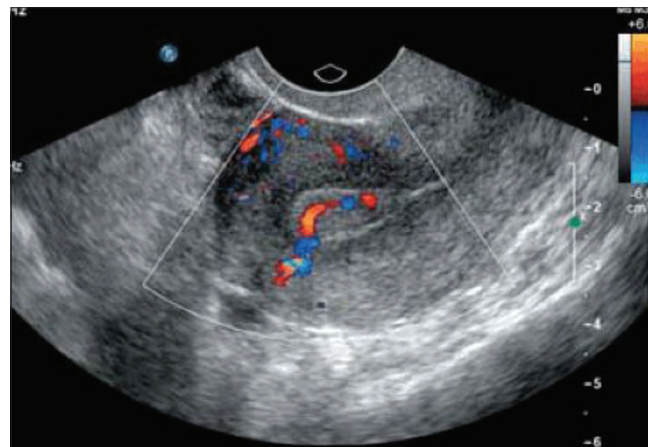


Figure 4: Transvaginal ultrasonographic view of an endometrial polyp appearing as an echogenic ovoid structure containing a feeding vessel visualized by Doppler

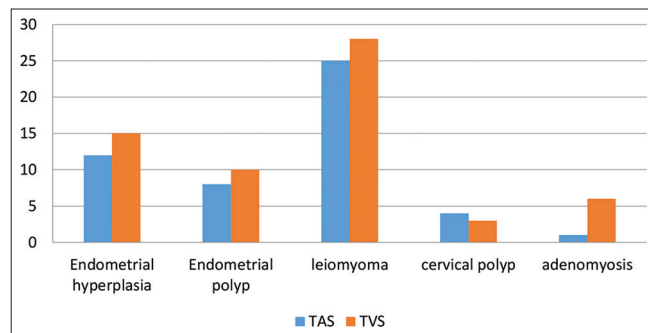


Figure 5: Graphical representation of other findings in TAS and TVS

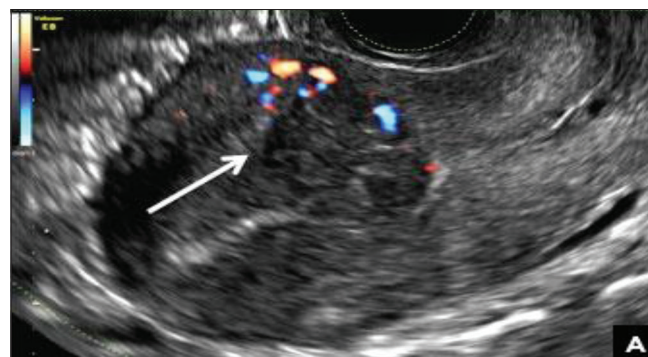


Figure 6: Transvaginal pelvic ultrasound with color Doppler demonstrates a heterogeneous hypoechoic/isoechoic lesion arising from the myometrium (long arrow) and distorting the endometrial cavity



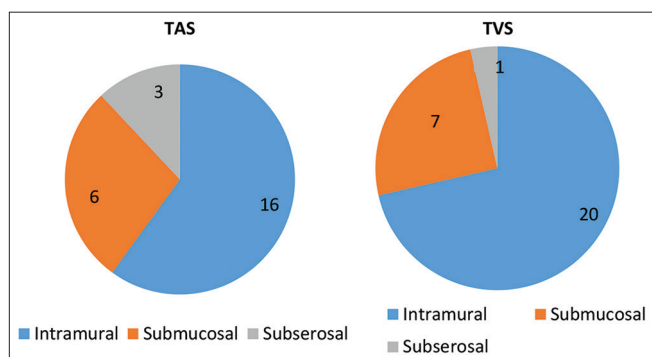


Figure 7: Pie chart of different types of leiomyomas in TAS and TVS

## RESULTS

Of 100 patients, majority of the patients in this study were in the age group of 25–30 and 36–40 years. The presenting patients were multiparous accounting for 78% of the total study, followed by primiparous (12%) and nulliparous (10%) women (Figure 2). Endometrial thickness is considered to be indicator of benign and malignant endometrium. Fifteen cases of endometrial hyperplasia were noted on TAS and twelve cases on TVS (Figure 3); however, with histopathological correlation in 15 cases, ten cases of endometrial carcinoma and five cases of benign endometrial hyperplasia were found.

The results of the present study show that TVS is slightly superior to TAS in diagnosing endometrial polyp (Figure 4), endometrial hyperplasia, and number and location of leiomyomas (Figures 5–7) and (Table 3).

## DISCUSSION

Ultrasonography is initial imaging study of choice in the evaluation of women with AUB. An ideal diagnostic test should be noninvasive, if not minimally invasive, easy to perform, well accepted and tolerated by the patient, inexpensive, and with high sensitivity and specificity. Unfortunately, no method meets all these criteria, some of them being unacceptable for focal pathologies and others being too invasive and not easily accepted by the patients. There is no consensus regarding these methods for the diagnostic evaluation of patients with AUB [5].

The present study was conducted to evaluate the role of TAS and TVS in the diagnosis of pathologies in cases of AUB with special focus on endometrial thickness and its changes in associated pathologies. The two techniques when used separately provided diagnostic information of near equal usefulness. The extent with TVS gaining an upper hand in evaluating endometrial pathologies and thickness with higher accuracy and TAS being superior for evaluating large uterine and adnexal lesions crossing the field of segmental insonation of TVS is the take home message [6].

Meldrum *et al.* [7] have reported similar findings in their study of TVS of ovarian follicles [7]. In the study, the data obtained transvaginally were analyzed by anatomic subgroup, and it was found that the TVS approach contributed more information for ovaries than for myometrium or endometrium.

Mendelson *et al.* conducted a study of sonographic findings in 200 patients who underwent concurrent TAS and transvaginal pelvic ultrasound and were reviewed [8]. The sonographic techniques were compared for image quality, completeness of anatomic detail depicted, and unique diagnostic information. Transvaginal image quality was better in 79%–87% of scans; TAS image quality was better in 3%–5% of scans; images of both techniques were equally good in 10%–18% of scans. However, in its ability to provide diagnostic information, transvaginal findings were found less striking. The techniques provided equivalent diagnostic information in 60%–84% of cases.

Tehrani *et al.* conducted a study of diagnostic accuracy of sonohysterography compared to endometrial biopsy in premenopausal women with AUB [9]. The study concluded that in reproductive age, women with AUB and thickened endometrium can be attributable to neoplasia, polyps, leiomyomas, and retained products of conception. Standalone TVS is not a reliable diagnostic modality in prediction of pathology in this population when compared to sonohysterography.

Dueholm *et al.* reported that polyps are the most frequently missed endometrial pathology [10]. Sensitivity using TVS has been reported to be 80% for endometrial polyps (n=344) and 94% for submucosal leiomyoma.

Individual organs and fine structures were better seen transvaginally, but the regional survey offered by the TAS full-bladder approach remains necessary to provide anatomic orientation, particularly when the patient has not been studied previously.

Transvaginal image quality was significantly better in visualization of endometrium and junctional zone pathologies than TAS which was good for other for pelvic pathologies. TVS had a better role in imaging of endometrial thickness in this study with the benefit of higher resolution images and less interobserver variation.

The results of the present study show that TVS is superior to TAS in assessing endometrial thickness accurately and has a slightly better role in diagnosing endometrial pathologies such as endometrial polyp, hyperplasia, endometrial carcinoma, and number and location of submucosal/intramural leiomyomas.

The limitations of TAS are in examination of obese patients, patient discomfort due to the need for a filled urinary bladder, woman with retroverted uterus in whom fundus may be located beyond the focal zone of the transducer. The major limitation of TVS is limited field of insonation and slightly increased learning curve in mastering sectoral anatomy.

## CONCLUSION

TAS should be the first modality of choice in all such cases, especially when the patient has not been studied previously. TAS and TVS can have complimentary roles. TAS by providing panoramic view helps evaluation of whole lesion and its relationship with other organs. TVS having better resolution provides better morphological characteristic of lesion. The advantage of TAS is that it visualizes the entire pelvis and gives

a topographical view. TVS is the gold standard noninvasive tool to know the structural causes of PALM and to know ovulatory dysfunction and endometrial hyperplasia. The results of the present study show that TVS is superior to TAS in assessing endometrial thickness accurately and had have high sensitivity and accuracy in the diagnosis of pelvic pathologies and determination of the type of pelvic mass was improved significantly when a transvaginal study was performed after TAS in cases of AUB.

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