

Correlation of endometrial thickness using transvaginal sonography with histopathology in women with abnormal uterine bleeding: A cross-sectional study



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ABSTRACT

Background: Abnormal uterine bleeding (AUB) is one of the most common complaints seen in gynecological practice, and transvaginal sonography (TVS) remains the first-line, non-invasive diagnostic tool in these women. **Aims and Objectives:** The aim was to study the endometrial thickness (ET) using TVS and correlate it with histopathological findings obtained through endometrial biopsy in patients with AUB. **Materials and Methods:** This was a prospective observational study conducted in a tertiary care center in Northern India, from January 2018 to June 2019. One hundred and sixty women in the reproductive age group presenting AUB were recruited. TVS was done to note (ET) and its echotexture with additional findings such as uterine, adnexal, or other pelvic pathology. The patient underwent endometrial aspiration using Karman Cannula, and its findings were correlated with TVS. **Results:** In our study, a majority of patients (40%, n=64) presenting with AUB belonged to the age group of 41–45 years, with fibroid being the most common cause (39.3%, n=63). Thickened ET (> 12 mm) was noted in 44 (27.5%) patients and 4 had an endometrial polyp. The mean ET was 11.48 ± 5.11 mm (range: 4–35 mm). The most common normal histopathology noted was secretory endometrium (29.37%, n=47), followed by proliferative endometrium (20.6%, n=33). The abnormal changes included disordered proliferative endometrium (23.1% n=37) and simple endometrial hyperplasia (6.8%, n=11). Four cases were found to have endometrial adenocarcinoma. On correlating TVS with histopathology, it was noted that out of 8 patients with ET of > 20 mm, 3 patients had endometrial carcinoma, 2 had disordered proliferative endometrium, and 1 each had pill endometrium, normal secretory, and atypical hyperplasia. **Conclusion:** TVS provides crucial information on echo-morphological features of the uterine cavity, and increasing ET mandates histopathological confirmation for ruling malignancy.

Key words: Abnormal uterine bleeding; Transvaginal ultrasonography; Endometrial aspiration

INTRODUCTION

Abnormal uterine bleeding (AUB) is characterized by a change in menstruation in terms of volume, duration, regularity, or frequency and affects the quality of life of women.

In 2011, the International Federation of Gynecology and Obstetrics introduced the PALM-COEIN classification, in which each letter indicates one of the etiologies of bleeding (uterine Polyp [P], Adenomyosis [A], Leiomyoma [L], precursor and Malignant lesions of the uterine body [M], Coagulopathies [C], Ovulatory dysfunction [O],

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Endometrial dysfunction [E], Iatrogenic [I], and Not yet classified [N]) that is widely used now and facilitates better understanding and evaluation of AUB cases.¹ Transvaginal ultrasonography transvaginal sonography (TVS) is an important non-invasive, cost-effective screening tool to evaluate for structural causes of AUB (PALM). Endometrial thickness (ET) measurement with different echotexture identification by TVS is one of the important tools to detect any endometrial pathology, and it is the established 1st step in the evaluation of AUB.² ET is actually measured and reported as the sum of the two adjacent layers of the endometrium, a measurement called the endometrial echo complex (EEC).³ EEC varies on the phase of menstruation; during the menstrual phase, it appears as thin, echogenic line 1–4 mm in thickness. During the proliferative phase, ET is found to be 4–8 mm and appears more echogenic relative to the myometrium, reflecting the development of glands, blood vessels, and stroma. During the secretory phase, the endometrium becomes even thicker (8–12 mm) and more echogenic. This increased echogenicity is thought to be related to stromal edema and glands distended with mucus and glycogen.^{4,5} In this study, we analyzed ET and echotexture through TVS and correlated with it various histological patterns such as proliferative, secretory, simple, or complex hyperplasia with or without atypia in a patient presenting with AUB.

Aims and objectives

To evaluate endometrial patterns by transvaginal scan and to compare it with histopathological report obtained by endometrial biopsy.

MATERIALS AND METHODS

This was a prospective observational study conducted in a tertiary care center in Northern India, for 18 months from January 2018 to June 2019. The study was approved by the Institutional Ethics Committee. The sample size was calculated assuming the sensitivity of TVS to predict hyperplasia as 90%.⁵ Considering 5% absolute error with 95% confidence interval and 80% power, the sample size came out to be 139. Considering approximately 10% of non-responders, a total of 160 women in the reproductive age group presenting with AUB were included as the study population. Exclusion criteria included unmarried females with AUB, postmenopausal women, having intrauterine devices those with pregnancy, or receiving anticoagulants, antipsychotics, corticosteroids, or hormonal therapy. The study population underwent detailed clinical and gynecological history with per speculum and per vaginal assessment. TVS was done using 6.5 MHz transvaginal probe. On TVS, the uterus was scanned in the longitudinal

and transverse planes. ET was measured on the sagittal section where the endometrium appears to be the thickest, measuring from the outermost border on one side to that on another. If the intracavitary fluid is present, ET was measured by subtracting the anteroposterior diameter of the fluid from the total thickness measured. After this, the same patient underwent an endometrial biopsy using Karman Cannula.

RESULTS

Out of 160 patients, a majority of patients presenting with AUB belonged to the age group of 41–45 years (n=64, 40%). Almost 64% were parity 3 and above (Table 1). Most of the patients presented with heavy menstrual bleeding (82.6%, n=132); out of which 102 (63.8%) patients had isolated heavy menstrual bleeding, while the rest 30 (18.8%) had irregular cycles. 12 (7.5%) patients had a complaint of irregular cycles only (Figure 1).

On evaluating with TVS, 63 (39.3%) patients were found to have fibroid uterus, 42 (26.3%) had adenomyosis, 44 (27.5%) patients had “thickened ET” (>12 mm), and 4 had suspected endometrial polyp (Figure 2). The endometrium was labeled as thick when ET was >12 mm; however, the minimum ET in the whole study population was 4 mm and the maximum was 35 mm. The mean ET was 11.48 mm with a standard deviation of 5.11. The different ETs as seen on TVS are shown in Table 2.

As seen in Table 3, normal histology (proliferative/secretory) was seen in 80 (50%) cases. The most

Table 1: Baseline characteristics of the study population

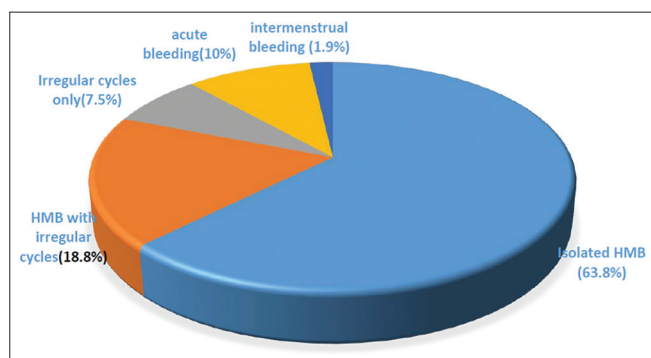
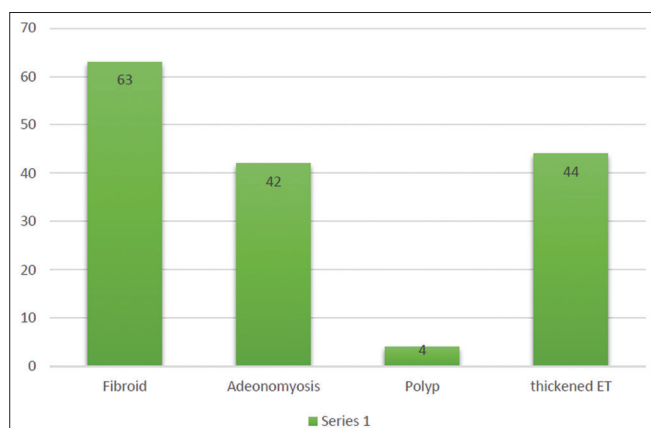
Variable	Distribution	Total (%)
Age	<35 years	7 (4.4)
	35–40 years	38 (23.8)
	41–45 years	64 (40.0)
	46–50 years	40 (25.0)
	>50 years	11 (6.9)
Parity	Nulliparous	4 (2.5)
	1–2	53 (33.12)
	3–4	83 (51.87)
	5 and above	20 (12.5)

Table 2: Endometrial thickness on TVS

Endometrial thickness (mm)	No. of patients	Percentage
4–8	47	29.4
8.1–12	65	40.6
12.1–16	28	17.5
16.1–20	12	7.5
>20	8	5.0

Table 3: Correlating endometrial thickness with histology

Histology	4–8 mm	8.1–12 mm	12.1–16 mm	16.1–20 mm	>20 mm	Total
Normal histology (proliferative/secretory)	26	37	13	3	1	80
Disordered proliferative endometrium	8	14	8	5	2	37
Simple endometrial hyperplasia	2	4	4	1	0	11
Atypical hyperplasia	0	0	0	1	1	2
Carcinoma endometrium	0	0	0	1	3	4
Pill endometrium	3	5	2	1	1	12
Atrophic endometrium	2	0	1	0	0	3
Inadequate sample	6	5	0	0	0	11

**Figure 1: Presenting complaints****Figure 2: Findings on transvaginal sonography**

common normal histopathology noted was secretory endometrium (29.37%, n=47), followed by proliferative endometrium (20.6%, n=33). The most common abnormal histology was disordered proliferative endometrium (23.1% n=37), followed by simple endometrial hyperplasia (6.8%, n=11). Histological changes secondary to exogenous hormone intake, also called “pill endometrium,” were seen in 12 (7.5%) patients, while 11 samples were inadequate. Out of 160 endometrial samples, 4 had malignancy on histopathology (endometrial adenocarcinoma).

When a different ET was compared with histopathology, it was found that with an increasing ET, the prevalence

of endometrial hyperplasia and carcinoma endometrium increases. Out of 8 patients with ET of >20 mm, 3 patients had endometrial carcinoma, 2 had disordered proliferative endometrium, and 1 each had pill endometrium, normal secretory, and atypical hyperplasia. One patient with carcinoma endometrium had ET between 16.1 and 20 mm.

With an ET of 12–16 mm, disordered proliferative endometrium was the predominant histopathological finding (n=8) after normal proliferative or secretory endometrium (n=13). 65 patients had ET of 8.1–12 mm; out of which 37 patients had normal secretory/proliferative histology, 14 had disordered proliferative endometrium, 5 patients had pill endometrium, and 4 had simple endometrial hyperplasia. 47 patients had an ET between 4 and 8 mm; histopathology was normal in the majority (n=26), 8 had disordered proliferative endometrium, 2 had simple endometrial hyperplasia, 3 had pill endometrium, and 2 had atrophic endometrium. Out of 11 samples, labeled as inadequate, 6 had ET between 4 and 8 mm and 5 had ET between 8.1 and 12 mm (Table 3).

DISCUSSION

AUB is the problem responsible for most of the gynecologic consultations; thorough evaluation is a must, especially to rule out endometrial cancer or its precursor lesion. Sonography in combination with histological assessment of the endometrial cavity remains the diagnostic modality in the current practice.

As per this study, a majority of women presented with AUB belong to the age group of 41–45 years (40%) followed by 46–50 years (25%). Similar age group presentation was seen in a study done by Singh et al. and Shobhita et al.^{6,7} However, Pillai SS, in their analysis of 88 women, noted that AUB was the most common in the age group of 48–51 years seen in 39.8% of cases.⁸

The most common presenting complaint in the present study was heavy menstrual bleeding. 82.6% of patients

presented with heavy menstrual bleeding, in which 63.8% had isolated heavy menstrual bleeding, while in 18.8%, heavy bleeding was associated with irregular cycles. Shobhita et al. also noted menorrhagia (40%) as the most common menstrual complaint.⁷

Secretory endometrium was the most common histopathological finding in our study seen in 29.37% of cases. Similar to ours, Nandwani et al., in their analysis of 110 cases, also observed secretory as the most common histology pattern; however, their incidence was higher (55.45%).⁹ However, proliferative endometrium was the most common pattern as seen by Pillai⁸ (27.2%), and this proportion was comparable to ours. Singh M observed only 6.7% to have secretory endometrium and 75% to be proliferative.⁶

Getpook and Wattanakumtornkul,¹⁰ in their analysis, noted that ET of ≤ 8 mm was less likely to be associated with malignant pathology; however, the upper limit for normal ET in perimenopausal women still remains controversial. The risk of developing malignancy may be as high as 29% in patients with complex atypical hyperplasia, and hence, any AUB requires evaluation. We noted that the endometrial curetting was scanty and reported as inadequate for diagnosis in 11 of our cases. In a study conducted at the School of Medicine, Philadelphia, the negative predictive value of endometrial tissue reported as inadequate for endometrial neoplasia was determined. This study concluded that an inadequate endometrial sample can be considered to rule out endometrial neoplasia due to its high negative predictive value.¹¹ In another study by Choudhary et al.,¹² at ET 5–8 mm, no endometrial pathology was found; however, in our study, although no malignancy or atypical hyperplasia was found at an ET of 4–8 mm, 2 patients had simple endometrial hyperplasia and 8 had disordered proliferative endometrium.

Limitations of the study

The main limitation of this study was that it was a single center study with small sample size.

CONCLUSION

Increased ET on transvaginal ultrasound had an association with abnormal endometrial tissue histopathology in women with AUB. However, no single cutoff for ET could be established to label it as pathological on TVS, and ET as low as 6 mm came out to be disordered proliferative on histopathology. Hence, both TVS and histopathology remain necessary modalities in the evaluation of AUB.

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REFERENCES

- Munro MG, Critchley HO, Broder MS, Fraser IS and FIGO Working Group on Menstrual Disorders. FIGO classification system (PALM-COEIN) for causes of abnormal uterine bleeding in nongravid women of reproductive age. *Int J Gynaecol Obstet.* 2011;113(1):3-13.
<https://doi.org/10.1016/j.ijgo.2010.11.011>
- Goldstein SR, Zelster I, Horan CK, Snyder JR and Schwartz LB. Ultrasonography-based triage for perimenopausal patients with abnormal uterine bleeding. *Am J Obstet Gynecol.* 1997;177(1):102-108.
[https://doi.org/10.1016/s0002-9378\(97\)70446-0](https://doi.org/10.1016/s0002-9378(97)70446-0)
- Granberg S, Wikland M, Karlsson B, Norstrom A and Friberg LG. Endometrial thickness as measured by endovaginal ultrasonography for identifying endometrial abnormality. *Am J Obstet Gynecol.* 1991;164(1 Pt 1):47-52.
[https://doi.org/10.1016/0002-9378\(91\)90622-x](https://doi.org/10.1016/0002-9378(91)90622-x)
- Hall DA and Yoder IC. Ultrasound evaluation of the uterus. In: Callen PW, editors. *Ultrasonography in Obstetrics and Gynecology.* 3rd ed. Philadelphia, PA: Saunders; 1994. p. 586-614.
- Fleischer AC. Sonographic assessment of endometrial disorders. *Semin Ultrasound CT MR.* 1999;20(4):259-266.
[https://doi.org/10.1016/s0887-2171\(99\)90071-9](https://doi.org/10.1016/s0887-2171(99)90071-9)
- Singh M, Sachan R and Yadav A. Significance of endometrial thickness on transvaginal sonography in heavy menstrual bleeding. *J Curr Res Sci Med.* 2019;5(1):28-32.
https://doi.org/10.4103/jcrsm.jcrsm_43_18
- Shobhita GL, Kumari VI, Priya PL and Sundari BT. Endometrial study by TVS and its correlation with histopathology in abnormal uterine bleeding. *IOSR J Dent Med Sci.* 2015;14(4):21-32.
<https://doi.org/10.9790/0853-14422132>
- Pillai SS. Sonographic and histopathological correlation and evaluation of endometrium in perimenopausal women with abnormal uterine bleeding. *Int J Reprod Contracept Obstet Gynecol.* 2014;3(1):113-117.
<https://doi.org/10.5455/2320-1770.ijrcog20140323>
- Nandwani M, Singh AS, Ananya D and Mishra J. A clinical study of perimenopausal uterine bleeding. *Word J Adv Healthc Res.* 2018;2(6):40-46.
- Getpook C and Wattanakumtornkul S. Endometrial thickness screening in premenopausal women with abnormal uterine bleeding. *J Obstet Gynaecol Res.* 2006;32(6):588-592.
<https://doi.org/10.1111/j.1447-0756.2006.00455.x>
- Harmanli OH, Shunmugham S, Shen T, Houck KL and Chatwani AJ. The negative predictive value of "inadequate" endometrial biopsy in diagnosing endometrial neoplasia. *J Obstet Gynecol Surg.* 2004;20(1):13-16.
- Choudhary J, Acharya V and Jain M. Evaluation of abnormal uterine bleeding with transvaginal sonography and hysteroscopy in perimenopausal women. *Int J Reprod Contracept Obstet Gynecol.* 2017;6(8):3607-3613.
<https://doi.org/10.18203/2320-1770.ijrcog20173494>

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RM- Concept and design of the study, prepared the first draft of the manuscript; result interpretation with literature review; **PK**- Concept and design of the study, prepared the first draft of the manuscript; result interpretation with literature review **AB**- Interpreted the results; manuscript preparation; **LC**- Data collection and manuscript preparation; **RS**- Literature review; **DS**- Literature review; **DKG**- Literature review; **JC**- Concept and design of the study, manuscript revision and literature review, critical analysis.

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