

To Study the Correlation Between Transvaginal Sonography and Endometrial Biopsy in Women Presenting with Abnormal Uterine Bleeding

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ABSTRACT

Background: Abnormal uterine bleeding (AUB) is a prevalent gynecological issue with multiple etiologies, requiring accurate diagnosis for effective management. The prevalence of AUB among reproductive-aged women ranges from 10% to 30%. Transvaginal sonography (TVS) is a first-line, non-invasive diagnostic tool; however, it lacks histopathological confirmation, which is provided by endometrial biopsy (EB). The FIGO PALM-COEIN system classifies AUB causes, but the correlation between TVS and biopsy findings remains uncertain. This study aims to evaluate the diagnostic accuracy and correlation between TVS and EB in AUB cases.

Methodology: This prospective observational study was conducted in the Department of Obstetrics and Gynecology at a tertiary health care centre, Lucknow, over 18 months. A total of 175 women aged ≥ 35 years with AUB underwent clinical assessment, TVS for endometrial thickness measurement, and EB for histopathological evaluation. Statistical analysis using SPSS 22.0 was performed.

Results: Among 175 patients (mean age 45.50 ± 18.27 years; range: 25–64 years), TVS detected abnormalities in 73.1% of cases, with fibroids (23.4%) and adenomyosis (18.9%) being most common. Endometrial hyperplasia (57.7%) was the predominant histopathological finding, followed by polyps (36.6%) and carcinoma (1.1%). A significant correlation ($p < 0.001$) was observed between TVS findings and biopsy results, particularly in cases with heavy menstrual flow, irregular cycles, and increased endometrial thickness.

Conclusion: In conclusion, TVS serves as a valuable, non-invasive diagnostic tool, while EB remains essential for definitive diagnosis, especially in high-risk cases. The combined use of both modalities enhances diagnostic accuracy, facilitating timely and effective AUB management.

Keywords: Non-invasive Screening, Histopathological Diagnosis, Diagnostic Tools, Women's Health, Clinical Management, Quality of Care

1. INTRODUCTION

Abnormal uterine bleeding is a prevalent gynecological complaint which affects women of all age groups and significantly affect their quality of life.[1] Menstrual abnormalities include deviations from the normal menstrual cycle in terms of frequency, duration, and volume of flow, which are the key indicators of underlying endometrial pathology.[2] Hence, early and accurate prognosis of the etiology of AUB is important for effective clinical management and for the prevention of life-

threatening conditions including endometrial hyperplasia and carcinoma..

In India, the prevalence of AUB among women of reproductive age has been reported from 10 to 30%.[3] Whereas, a recent study done by Mishra M, et al., observed a higher prevalence with 36% of women affected than reported in previous studies.[4] These statistics represents, the burden of disease as well as poor menstrual health. This condition may affects individual's physical, mental, social, emotional and financial well-being, highlighting the urgent need to early management of the disease.[5]

TVS has emerged as a non-invasive, readily accessible and cost-effective first-line imaging technique for evaluating the endometrium.[6] It provides valuable information on endometrial thickness and morphology, which helps to guide further diagnostic steps.[7,8] On the other hand, endometrial biopsy remains the gold standard for definitive diagnosis, offering histopathological understanding into the underlying cause of AUB.[9,10,11,12] Although, the understanding and knowledge among physicians about both diagnostic modalities have been well addressed in the previous literature. Till date, there remains lack of prospective data especially in our locality which directly correlating TVS findings with histopathological results from endometrial biopsy. To address this study gap, we conducted this prospective observational study which aims to assess the correlation between transvaginal sonography findings and endometrial biopsy results in patients presenting with abnormal uterine bleeding. By evaluating the diagnostic accuracy of TVS in predicting endometrial pathology, this study seeks to determine its reliability as a screening tool and its role in guiding the necessity for invasive procedures such as endometrial biopsy..

2. METHODOLOGY

This prospective observational study was conducted in the Department of Obstetrics and Gynecology at Integral Medical Sciences Institute and Research, Lucknow, over a period of eighteen months, from January 2023 to June 2024. Women aged 35 years or above who presented with AUB, whether premenopausal or postmenopausal, without any detectable pelvic pathology and who provided written informed consent were included.

Women were excluded if they had AUB due to medical conditions unrelated to gynecological causes, such as thyroid dysfunction; those diagnosed with carcinoma of the genital tract; those with active genital tract infections; women with severe systemic illnesses, including uncontrolled hypertension or diabetes mellitus; those presenting with pregnancy-related bleeding; individuals with known coagulation disorders; and women with congenital anomalies of the genital tract.

Based on the above-mentioned inclusion and exclusion criteria, a total of 175 women presenting with AUB were enrolled in the present study. A detailed history, including menstrual, obstetric, and medical history, was obtained, and a thorough clinical examination was performed. All participants subsequently underwent TVS using a transvaginal transducer. The endometrial thickness was measured in the anteroposterior dimension as a two-layer thickness. If intrauterine fluid or blood was detected, each layer was measured separately and the values were added together.

After TVS, an endometrial biopsy was performed for each participant, and the obtained tissue samples were sent for histopathological examination to determine the underlying endometrial pathology. Based on the data collected, the following outcomes were assessed:

The primary outcome was the correlation between endometrial thickness measured by TVS and the histopathological findings of the endometrial biopsy.

TVS findings were classified based on endometrial patterns, such as atrophic endometrium, hyperplasia, or findings suggestive of carcinoma.

Histopathological outcomes were categorized to identify benign, premalignant, or malignant conditions of the endometrium.

Statistical analysis

Data were collected using a pre-structured proforma and entered into MS Excel. Statistical analysis was carried out using SPSS version 22.0. Descriptive statistics summarized the demographic and clinical characteristics of the participants. Chi-square tests assessed associations between categorical variables. Kappa statistics evaluated the agreement between TVS and endometrial biopsy findings. Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of TVS in detecting endometrial pathology were calculated using biopsy as the gold standard

RESULTS

In this study, 175 participants with AUB were included with average age 44.8 ± 12.5 between age ranges from 35 to 64 years, as shown in Table 1. Histopathological (biopsy) examination showed that, endometrial hyperplasia was the most frequent finding (57.7%), followed by polyps (36.6%), and only 1.1% had endometrial carcinoma.

Table 1: Demographic and Clinical Characteristics, TVS Findings, and Histopathological Results in Women with Abnormal Uterine Bleeding.

Age	Frequency	Percent
25-34 years	28	16
35-44years	63	36
45-54years	47	26.9
55-64years	37	21.1
Total	175	100
Parity	Frequency	Percent
P1	40	22.9
P2	47	26.9
P3	57	32.6
P4	27	15.4
P5	4	2.3
Total	175	100
Dysmenorrhea	Frequency	Percent
No	78	44.6
Yes	97	55.4
Total	175	100
TVS Findings	Frequency	Percent
Adenomyosis	33	18.9
Endometrial Atrophy	25	14.3
Endometrial Hyperplasia	15	8.6
Endometrial Polyps	30	17.1
Fibroids	41	23.4
Normal Endometrium	31	17.7
Total	175	100
Biopsy Findings	Frequency	Percent
Endometrial Carcinoma	2	1.1
Endometrial Hyperplasia	101	57.7
Endometrial Polyps	64	36.6
Normal	8	4.6
Total	175	100

Table 2: Distribution based on various health conditions.

Out of 175 women, anemia was present in 56.6%, making it the most common comorbidity. Diabetes affected a significant majority, with 80% of participants diagnosed. Some other health conditions observed in the present study was reported in following **Table 2**.

Various health conditions		Frequency	Percent
Anemia	No	76	43.4
	Yes	99	56.6
TB	No	169	96.6
	Yes	6	3.4
Diabetes	No	35	20.0
	Yes	140	80.0
Thyroid	No	67	38.3
	Yes	108	61.7
Others	No	148	84.6
	UTI	27	15.4

We found that, the TVS findings show that 73.1% of participants have positive results, indicating the presence of abnormalities detected by the scan (Table 3).

Table 3: TVS findings

TVS findings	Frequency	Percent
Negative	47	26.9
Positive	128	73.1
Total	175	100.0

The following **Table 4**, shows that, histopathological patterns in women with abnormal uterine bleeding varied with clinical features. Prolonged bleeding (>10 days) and heavy or irregular flow were associated with a higher incidence of endometrial hyperplasia and carcinoma. Polyps were more frequent with normal flow and irregular cycles.

Table 4: Cross tabulation of duration and biopsy findings:

Duration	Endometrial Carcinoma	Endometrial Hyperplasia	Endometrial Polyps	Normal	Total
5 to 10days	0	82	61	7	150
	0.0%	54.7%	40.7%	4.7%	100.0%
>10 ays	2	19	3	1	25
	8.0%	76.0%	12.0%	4.0%	100.0%
Total	2	101	64	8	175
Flow	Endometrial Carcinoma	Endometrial Hyperplasia	Endometrial Polyps	Normal	
Heavy	2	47	28	3	80
	2.5%	58.8%	35.0%	3.8%	100.0%
Normal	0	54	36	5	95
	0.0%	56.8%	37.9%	5.3%	100.0%
Total	2	101	64	8	175
Regularity	Endometrial Carcinoma	Endometrial Hyperplasia	Endometrial Polyps	Normal	Total
Irregular	2	54	40	3	99
	2.0%	54.5%	40.4%	3.0%	100.0%
Regular	0	47	24	5	76
	0.0%	61.8%	31.6%	6.6%	100.0%
Total	2	101	64	8	175

Our study found significant correlations between clinical features and TVS findings in women with abnormal uterine bleeding. Among those with bleeding lasting more than 10 days, 100% showed positive TVS findings, compared to 68.7% in those with 5–10 days ($p = 0.001$). Women experiencing heavy menstrual flow had a higher rate of positive TVS (85%) versus those with normal flow (63.2%) ($p = 0.001$). Similarly, irregular cycles were strongly associated with positive TVS findings (87.9%) compared to regular cycles (53.9%) ($p < 0.001$). Lastly, all patients with endometrial thickness >10 mm had positive TVS results, indicating a significant association between increased endometrial thickness and abnormal TVS findings ($p < 0.001$), as reported in the following **Table 5**.

Table 5: Association between duration, type of flow, regularity and endometrial thickness with TVS findings.

Duration	TVS		Chi square	p value
	Negative	Positive		
5 to 10 days	47	103	10.71	0.001
	31.30%	68.70%		
>10 days	0 0.0%	25 100.0%		
Total	47	128		
Type of flow	TVS			
	Negative	Positive		
Heavy	12	68	10.547	0.001
	15.00%	85.00%		
Normal	35	60		
	36.80%	63.20%		
Total	47	128		
Regularity	TVS			
	Negative	Positive		
Irregular	12	87	25.199	p<0.001
	12.10%	87.90%		
Regular	35	41		
	46.10%	53.90%		
Total	47	128		
Endometrial thickness	TVS			
	Negative	Positive		
5 to 10mm	47	91	17.229	p<0.001
	34.10%	65.90%		
>10 mm	0	37		
	0.00%	100.00%		
Total	47	128		

3. DISCUSSION

This study examines the correlation between TVS findings and endometrial biopsy results in women presenting with AUB. The findings provide nuanced understanding into the diagnostic value of these modalities and their integration into clinical practice. In the present investigation, AUB was found to be most prevalent among women aged 35–44 years (36.0%) and 45–54 years (26.9%), consistent with the perimenopausal phase, where anovulatory cycles and structural anomalies such as fibroids and adenomyosis are common.[13,14] A notable 56.6% of patients were anemic, underlining the necessity for timely evaluation and intervention. The delay in seeking healthcare observed in this population emphasizes the need to improve awareness and accessibility to diagnostic services.

Multiparity, especially among para 3 women (32.6%), showed a strong association with the presence of fibroids, adenomyosis, and prolapse. This supports previous literature which showed a higher parity with uterine remodeling and a

major risk of AUB.[15,16] Considering obstetric history during evaluation is therefore essential for appropriate management. In terms of bleeding characteristics, most women reported durations of 5–10 days (85.8%), while 14.2% experienced prolonged bleeding. Additionally, 45.7% reported heavy menstrual flow and 56.6% had irregular cycles, both of which suggest underlying pathology. Irregular cycles, especially, indicate problems with ovulation, which often happen in perimenopausal women because of high levels of estrogen without balance, raising the risk of endometrial hyperplasia.[17]

TVS played a pivotal role in identifying underlying causes, detecting fibroids in 23.4%, adenomyosis in 18.9%, polyps in 17.1%, and endometrial atrophy in 14.3% of cases. Interestingly, 17.7% of participants showed normal endometrial morphology, further validating the sensitivity of TVS in detecting structural abnormalities.[18,19] TVS proved particularly useful in the early diagnosis of adenomyosis and submucosal fibroids, enabling timely initiation of therapy.[20] Measurement of endometrial thickness further refined diagnostic accuracy; a thickness greater than 10 mm was observed in 21.1% of women and was significantly associated with hyperplasia and carcinoma. Conversely, no malignancy was found in cases with endometrial thickness below 10 mm, supporting the >10 mm threshold for biopsy, as recommended by Smith-Bindman et al.[21]

Histopathological examination via endometrial biopsy confirmed hyperplasia in 57.7%, polyps in 36.6%, and carcinoma in 1.1% of cases, affirming its role as the diagnostic gold standard.[22] The correlation between TVS and biopsy findings was strong. Among patients with endometrial thickness exceeding 10 mm, 65.2% had hyperplasia and 8.0% were diagnosed with carcinoma, thereby reinforcing the value of TVS in clinical triaging.[23] [Alcazar JL,] Analysis of symptom-pathology associations revealed that heavy bleeding was commonly linked with hyperplasia (58.8%) and polyps (35.0%), while irregular cycles were predominantly associated with hyperplasia (61.8%). Cases involving prolonged bleeding of more than 10 days showed a notably higher incidence of carcinoma (8.0%), stressing the importance of early and thorough evaluation.[24,25]

In this study, statistical analysis revealed significant associations between prolonged bleeding and TVS findings ($p=0.001$), heavy menstrual flow and TVS findings ($p=0.001$), and endometrial thickness over 10 mm with positive findings on TVS ($p<0.001$), all of which validate the predictive capacity of TVS in clinical practice. Thereby, the substantial prevalence of endometrial hyperplasia in the studied population, routine evaluation with TVS and endometrial biopsy should be prioritized for at-risk women. As a non-invasive and widely accessible diagnostic tool, TVS can be effectively integrated into primary care settings, particularly benefiting resource-limited healthcare environments. However, this study has limitations, including a single tertiary care center study with a small sample size, limiting its generalizability. Additionally, a prospective design restricts extrapolation to large populations without a cross-sectional or multicenter design. To enhance diagnostic accuracy and patient outcomes, future multi-center longitudinal studies and the adoption of molecular diagnostic techniques are recommended in future studies.

4. CONCLUSION

The present study sheds light on, the significant roles of TVS and EB in the evaluation of AUB. TVS serves as an effective, non-invasive screening modality, whereas EB remains essential for establishing a definitive and accurate diagnosis, especially in high-risk patients. The combined use of these diagnostic tools within a structured clinical settings enhances the overall management of AUB by facilitating early detection and accurate treatment, thereby contributing to improved patient outcomes and quality of life

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