Original Research Article

Sensitivity and specificity of transvaginal ultrasonography in detecting endometrial pathology in women with postmenopausal bleeding

Sanjana Rahman[1]*, Taslim Ara Nila[2], Alif Laila[1], Fatema Akter[2], Umme Salma Shilpi[3], Nargis Sultana[1], Tanzin Hossain[3]

[1]Department of Obstetrics and Gynecology, Dhaka Medical College Hospital, Dhaka, Bangladesh
[2]Department of Obstetrics and Gynaecology, Shahid Syed Nazrul Islam Medical College Hospital, Kishoreganj, Bangladesh
[3]Department of Obstetrics and Gynaecology, Kurmitola 500 Bedded General Hospital, Dhaka, Bangladesh

*Correspondence:
Dr. Sanjana Rahman,
E-mail: sanjanalopa244@gmail.com

ABSTRACT

Background: Postmenopausal vaginal bleeding is a frequent reason for gynecological consultation. Transvaginal ultrasonography (TVS) is a key diagnostic tool for assessing endometrial pathology through the measurement of endometrial thickness in such patients. This study aimed to evaluate the sensitivity and specificity of TVS in detecting endometrial pathology in women with postmenopausal bleeding, using histopathological findings as the reference standard.
Methods: This cross-sectional study was carried out in department of obstetrics and gynaecology of DMCH, from June 2022 to May 2023. A total of 65 women with post-menopausal vaginal bleeding were included after taking informed written consent.
Results: The study included 65 women with postmenopausal bleeding, with a mean age of 55.5±7.6 years. Histopathological analysis revealed abnormal endometrial findings in 70.8% of cases: 47.8% had endometrial hyperplasia, 23.9% endometrial atrophy, 13.1% endometrial carcinoma and 15.2% endometrial polyp. On TVS, the mean endometrial thickness was 9.1±6.1 mm; 58.5% had a thickness>5 mm, while 41.5% had ≤5 mm. ROC curve analysis identified a cut-off value of ≥4.99 mm (AUC=0.880; 95% CI: 0.785–0.975; p<0.01) for detecting endometrial pathology, demonstrating 82.61% sensitivity, 73.68% specificity, 88.37% positive predictive value (PPV), 63.64% negative predictive value (NPV) and 80% overall accuracy. Another ROC analysis for detecting endometrial carcinoma revealed an optimal cut-off value of ≥13.5 mm (AUC=0.935; 95% CI: 0.875–0.995; p<0.01), with 100% sensitivity, 86.44% specificity, 42.86% PPV, 100% NPV and 87.69% accuracy.
Conclusions: Transvaginal ultrasonography has high sensitivity and specificity in detecting endometrial pathology in women with postmenopausal bleeding. However, further larger studies in different surgical units are warranted.

Keywords: Endometrial thickness, Endometrial pathology, Endometrial carcinoma, Postmenopausal bleeding, Transvaginal ultrasonography

INTRODUCTION

Abnormal uterine bleeding is an important cause of the ill-health in peri- and post-menopausal women. Postmenopausal bleeding (PMB) refers to vaginal bleeding that occurs after a woman has reached menopause. While endometrial pathology is a common cause in menopausal women, such bleeding can also originate from other sites, including the cervix, vagina, vulva, fallopian tubes or may be associated with ovarian conditions.[1] Vaginal bleeding is reported in about 4-11% of postmenopausal women.[2] Most of the patients with

post- menopausal bleeding experience vaginal bleeding secondary to atrophic changes of vagina or endometrium. However, depending upon risk factors and age, endometrial cancer is the most common gynaecological malignancy estimated to affect over 54,000 new women in 2015.[3] Despite the high incidence of EC, 70% of these malignancies are diagnosed at an early stage with localized disease confined to the uterus and have a favourable 5-years overall survival approaching 95%. This early detection is often attributed to the presence of disease-associated symptoms, such as abnormal uterine bleeding or vaginal discharge, which occur early in the disease process prompting evaluation.[4-6]

The prevalence of endometrial cancer and hyperplasia was 1.0% and 5.8% in women of reproductive age and 3.0% and 12.1% in postmenopausal women, respectively. Thus, a sound clinical approach is needed for diagnosis and exclusion of endometrial pathology.[7] When a woman presents with abnormal uterine bleeding, a thorough medical history is obtained, followed by appropriate diagnostic evaluations. These complaints may significantly affect quality of life of women and lead to increased surgical interventions and ultimately have significant impact on health care system. The clinical approach to post-menopausal bleeding requires prompt and efficient evaluation to exclude any endometrial pathology or diagnose carcinoma.[8] Several methods are present for finding the cause of endometrial pathology and one of them is pelvic ultrasonography and especially TVS (Transvaginal ultrasonography).

In cases of postmenopausal bleeding, multiple studies have identified transvaginal sonographic measurement of endometrial thickness (TVS-ET) as a primary screening tool to help determine a threshold value that can effectively exclude endometrial pathology.[9] Transvaginal ultrasonography uses higher frequency ultrasound at a greater proximity to the uterus and the endometrial-myometrial interface can be seen clearly than with the full bladder with trans-abdominal technique. Maximum antero-posterior thickness of endometrium in long axis of trans-vaginal view of uterus is measured as the endometrial thickness (ET).

Objective

The objective of this study was to identify the sensitivity and specificity of transvaginal ultrasonography in detecting endometrial pathology in women with postmenopausal bleeding.

METHODS

This cross-sectional study was conducted at the Department of Obstetrics and Gynaecology, Dhaka Medical College Hospital (DMCH), Dhaka, Bangladesh, from June 2022 to May 2023. A total of 65 postmenopausal women presenting with vaginal bleeding were included, selected based on specific inclusion criteria. Data were collected through transvaginal ultrasonography (TVS) and histopathological analysis to evaluate the correlation between endometrial thickness and pathological findings.

Inclusion criteria

Postmenopausal women presenting with vaginal bleeding. Willingness to participate in the study

Exclusion criteria

Women on menopausal hormone therapy (MHT). Diagnosed cases of endometrial carcinoma. Diagnosed cases of vulvar, vaginal or cervical cancer. Diagnosed cases of cervical polyp or myomatous polyp. Patients unwilling to provide informed consent.

After obtaining ethical approval from the Ethical Review Committee of Dhaka Medical College, data were collected from 65 postmenopausal women attending the outpatient department. Informed written consent was obtained after explaining the study's objectives and procedures. Detailed demographic and clinical information including menstrual, obstetric and gynecological history was gathered using a structured questionnaire and interview schedule. Each participant underwent general physical examination followed by per abdominal, per speculum and per vaginal examinations. TVS was performed by a trained sonologist at the department of nuclear medicine and allied sciences using a high-frequency vaginal transducer in lithotomy position to measure endometrial thickness at its maximum point in the sagittal plane.

Fractional curettage was subsequently performed under general anesthesia or deep sedation, with separate endocervical and endometrial samples collected for histopathological analysis at the department of pathology, DMC. Data were entered and analyzed using SPSS version 26. Descriptive statistics were used to summarize demographic variables. Based on TVS findings, patients were categorized into two groups: Group 1 (endometrial thickness≤5 mm) and Group 2 (>5 mm). A p-value of <0.05 was considered statistically significant.

RESULTS

Table 1 shows the distribution of the participants according to age. Majority (78.5%) of the patients were aged between 45 to 60 years and 21.5% were above 60 years. Mean age of the patients was 55.5±7.6 years.

Table 2 presents the distribution of the patients according to endometrial thickness on TVS. On TVS 58.5% of the patients had endometrial thickness >5 mm and 41.5% of the patients had endometrial thickness ≤5 mm. Mean thickness was 9.1±6.1 mm. According to histopathology, 70.8% had abnormal endometrium; among them 47.8% had endometrial hyperplasia, 23.9% had endometrial atrophy, 13.1% had endometrial carcinoma and 15.2% had

endometrial polyp (Table 3). According to Table 4 abnormal histopathological examination of endometrium showed significantly higher endometrial thickness on TVS.

A cut-off value of endometrial thickness≥4.99mm (AUC=0.880, 95% CI=0.785-0.975, p<0.001) in the prediction of endometrial pathology showed 82.61% sensitivity, 73.68% specificity, 88.37% PPV, 63.64% NPV and 80% accuracy (Figure 1).
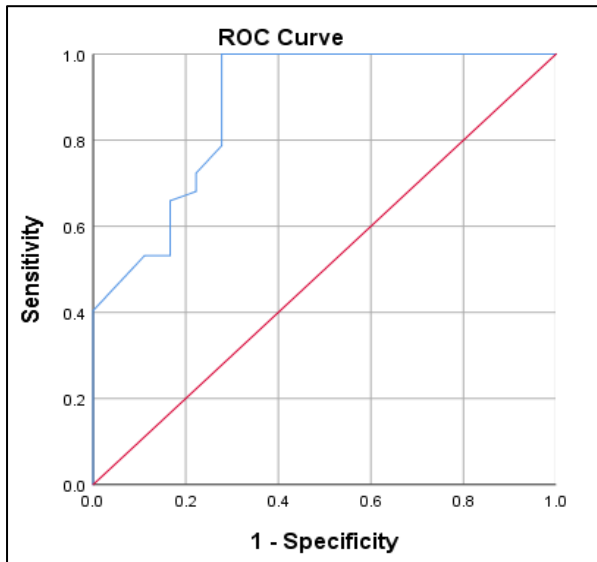

Figure 1: ROC curve analysis of endometrial thickness on TVS in the prediction of endometrial pathology (n=65).
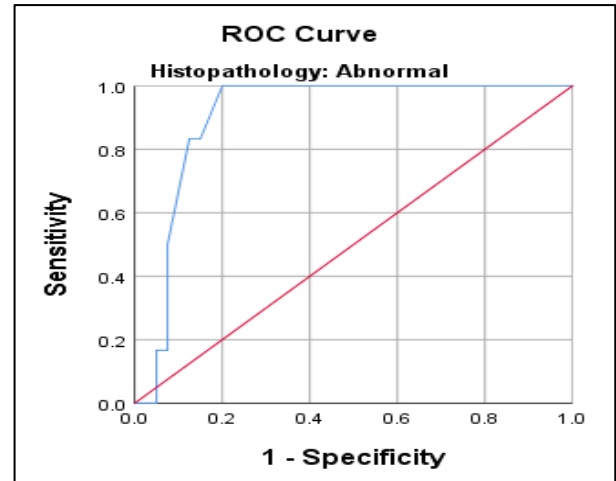

Figure 2: ROC curve analysis of endometrial thickness on TVS in the prediction of endometrial carcinoma among the patients (n=65).

Among 46 patients with endometrial pathology, a cut-off value of endometrial thickness ≥4.99 mm could truly detect 38 cases and among 19 patients with no endometrial pathology, <4.99 mm could truly detect 14 cases (Table 5). A cut-off value of endometrial thickness≥13.5 mm (AUC=0.935, 95% CI=0.875-0.995, p<0.001) in the prediction of endometrial carcinoma showed 100% sensitivity, 86.44% specificity, 42.86% PPV, 100% NPV and 87.69% accuracy (Figure 2). Among 6 patients with endometrial carcinoma, a cut-off value of endometrial thickness≥13.5 mm could truly detect all cases and among 59 cases with no endometrial carcinoma<13.5mm could truly detect 51 cases (Table 6).

Table 1: Distribution of the participants according to age (n=65).

Age group (in years)	Frequency (N)	(%)
45-60	51	78.5
>60	14	21.5
Mean±SD (years)	55.5±7.6	

Table 2: Distribution of the patients according to endometrial thickness on TVS (n=65).

Endometrial thickness	Frequency (N)	(%)
>5 mm	38	58.5
≤5 mm	27	41.5
Mean±SD (mm)	9.1±6.1	

Table 3: Distribution of the patients according to histopathological findings (n=65).

Histopathological findings	Frequency (N)	(%)
Abnormal	46	70.8
Endometrial hyperplasia	22	47.8
Endometrial atrophy	11	23.9
Endometrial carcinoma	6	13.1
Endometrial polyp	7	15.2
Normal	19	29.2

Table 4: Association of histopathological examination with endometrial thickness on TVS (n=65).

Endometrial thickness on TVS	Abnormal pathology (N=46) N (%)	No pathology (N=19) N (%)	P value*
>5 mm	33 (73.9)	5 (21.1)	0.001
≤5 mm	13 (26.1)	14 (78.9)	

*p value was determined by Chi-square test. Data was presented with frequency (%) and within parenthesis percentage over column in total.

Table 5: Accuracy test of endometrial thickness on TVS in the prediction of endometrial pathology (n=65).

	Abnormal pathology	No pathology	Total
≥4.99 mm	TP38	FP5	TP+FP43
<4.99 mm	FN8	TN14	FN+TN22
Total	TP+FN46	FP+TN19	65

Table 6: Accuracy test of endometrial thickness on TVS in the prediction of endometrial carcinoma among the patients (n=65).

	Endometrial carcinoma	No endometrial carcinoma	Total
≥13.5 mm	TP6	FP8	TP+FP14
<13.5 mm	FN0	TN51	FN+TN51
Total	TP+FN6	FP+TN59	65

DISCUSSION

Some women experience vaginal bleeding after menopause and postmenopausal bleeding (PMB) accounts for 5% of all gynaecologic outpatient visits.[10] Current study aimed to identify the sensitivity and specificity of Transvaginal Ultrasonography in detecting endometrial pathology in women with postmenopausal bleeding. A total of 65 women of menopausal age with post-menopausal bleeding was enrolled in the study.

In this study, Mean age of the patients was 55.5±7.6 years and majority (78.5%) of the patients were aged between 45 to 60 years. Another study also observed that age of subject was ranged from 41 years to 76 years with mean age was 55.49±8.82 years which was similar to current study.[10] In consistent with current Vasudeva et al, observed among 82 patients whereas mean age of the subjects was 54.85±5.25 years with maximum patients belonging between 56-65 year age group accounting for 63%.[11] Another study conducted in Haydarpasa training hospital revealed that mean age of the patients was 49.5±12.9 years among the patients with endometrial pathology which was slightly lower from current study.[12] Age distribution may slightly differ due to the enrolled patients during the study period.

In this study, according to histopathology 70.8% had abnormal endometrium which was slightly higher from the previous study by Shabir et al, found endometrial pathology present in 36/55 (65.5%).[10] In this study, most commonly found pathology was endometrial hyperplasia (47.8%) followed by 23.9% had endometrial atrophy, 13.1% had endometrial carcinoma and 15.2% had endometrial polyp. This was similar to the previous study by Shabir et al, also found most common endometrial pathology was endometrial hyperplasia in 30.9% followed by endometrial carcinoma in 20%, endometrial polyp in 14.55% of women but percentage of different types of pathologies was little different from current study.[10] Vasudeva et al, also identified comparable diseases in their investigation. Atrophic endometrium (54.9%) was the most prevalent endometrial pathology, followed by endometrial polyp (22%) and hyperplasia (13.4%), as well as endometrial cancer (3.7%), which was different from the current study.[11] Other previous study found endometrial carcinoma as one of the leading causes of endometrial pathology.[6,12,13] Due to the diverse patient types admitted throughout the research period, the frequency of the various Endometrial pathologies in the current investigation was not totally matched.

On TVS 58.5% of the patients had endometrial thickness >5 mm and 41.5% of the patients had endometrial thickness ≤5 mm. Mean thickness was 9.1±6.1 mm. A cut-off value of endometrial thickness ≥4.99 mm can be useful indicator in predicting endometrial pathology and endometrial thickness ≥13.5 mm can be useful indicator in predicting endometrial carcinoma. Patients with abnormal histopathological examination of endometrium showed significantly higher endometrial thickness on TVS. Previous study also revealed that mean endometrial thickness was significantly greater in patients with endometrial pathologies (16.8±9.5 mm vs 3.5±3.7 mm; p<0.001) and suggested that endometrial thickness is the most important parameter differentiating endometrial pathologies and proposed TVS as the test of first choice in such women.[14] Consistent with current study Sadoon et al, also demonstrated that a cut off value of 5mm or more

includes endometrial pathology with good certainty.[6] An earlier study that was comparable to the current study showed that transvaginal ultrasonography had excellent sensitivity and specificity for detecting endometrial pathology and that there is a strong correlation between endometrial thickness and endometrial pathology. It was totally in line with the current study when it was recommended that endometrial thickness more than 5.5 mm could be used as a risk signal for predicting endometrial pathology and that endometrial thickness greater than 13 mm could be used as a risk indicator for endometrial cancer.[10]

ROC curve analysis of endometrial thickness was done for the prediction of endometrial pathology as well as carcinoma. A cut-off value of endometrial thickness ≥4.99 mm (AUC=0.880, 95% CI=0.785-0.975, p<0.01) in the prediction of endometrial pathology showed 82.61% sensitivity, 73.68% specificity, 88.37% PPV, 63.64% NPV and 80% accuracy. Besides, A cut-off value of endometrial thickness ≥13.5 mm (AUC=0.935, 95% CI=0.875-0.995, p<0.01) in the prediction of endometrial carcinoma showed 100% sensitivity, 86.44% specificity, 42.86% PPV, 100% NPV and 87.69% accuracy. Previous study observed a cut off value of ET≤5.5 mm rules out EP with great certainty having sensitivity 86% and specificity 80% which was close to current study.[10]

In the study of Vasudeva et al, diagnostic accuracy of ET by TVS at a cut-off point of 5 mm was 94% with 89.3% sensitivity, 100% specificity, 100% PPV and 88% NPV which was slightly higher from current study.[11] However, previous another study observed that using a cut off of 6.3 mm for ET alone reached the same level of sensitivity of 97% for EC with a specificity of 60% and using 5.9 mm as the cut off attained 100% sensitivity with a specificity of 57%.[14]

In the study by Sousa et al, for the assessment of endometrial pathology as a whole, transvaginal sonography revealed 79.5% sensitivity, 88% specificity, 92.1% positive predictive value and 71% negative predictive value.[15] Depending on the preference of each individual clinic, ET measurements may be used with lower cut offs and nearly perfect sensitivity or with slightly higher cut offs and lower but acceptable sensitivity, which also result in lower false positive rates and appear to be optimal by ROC curve analysis.[14]

In comparison to other study, slightly different cut off values were suggested but all determined and proved that TVS is the first line investigation and can prevent invasive procedure in most. Transvaginal ultrasonography is a widely available, relatively cheap and practical method to evaluate uterine pathologies. It is non-invasive and causes minimal discomfort to the patient.[12] Due to its affordability, accessibility and non-invasive nature, Vasudeva et al, recommended TVS with ET measurement as the initial study in the assessment of women with suspected endometrial pathology who have PMB.[11]

Similarly, previous studies also suggested that ultrasonography can be used to rule out endometrial hyperplasia or cancer with a high degree of certainty when the finest studies are employed.[6,16,17]

All samples in this study were collected from a single institution, which may limit the generalizability of the findings. Additionally, the sampling was done using a purposive technique rather than randomization, which could introduce selection bias. Moreover, the study did not include a comparison group of healthy subjects, restricting the ability to contrast findings with normal baseline parameters.

CONCLUSION

The study findings showed that endometrial thickness ≥4.99 mm had 82.61% sensitivity and 73.68% specificity to correctly diagnose endometrial abnormality, while endometrial thickness ≥13.5 mm had 100% sensitivity and 86.44% specificity to correctly diagnose endometrial carcinoma.

Recommendations

Transvaginal sonography can be considered early screening method to detect endometrial pathology in post-menopausal women with vaginal bleeding. Further multi-center study with larger sample size is recommended.

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