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ORIGINAL ARTICLE

Endovaginal Sonographic Evaluation of Postmenopausal Uterine Bleeding.

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ABSTRACT

Aims and Objectives- To evaluate the role of endovaginal sonography (EVS) in postmenopausal women (PMW) with postmenopausal bleeding (PMB) and to correlate it with the histopathological diagnosis at curettage, so that unnecessary operations in postmenopausal women could be spared where sonography depicts normal findings.
Materials And Methods-The present study was conducted on postmenopausal women (PMW) with postmenopausal bleeding, who were referred to the department of Radio diagnosis by the department of Gynaecology of Adesh Institute Of Medical Sciences and Research, Bathinda. A total of 112 patients were observed from 2006 to 2008. A written informed consent was taken.
EVS was done to measure endometrial thickness in post menopausal women with postmenopausal bleeding (PMB).
Results-The mean endometrial thickness in PMW with PMB was 8.21±6.88mm and in those without PMB was 3.83±2.14mm.
With a cutoff value of 4mm endometrial thickness, EVS showed a sensitivity of 100%, specificity 73.33%, a positive predictive value of 76.47%, a negative predictive value 100% and an accuracy of 85.71%.
Conclusion: EVS is a useful method for screening for endometrial abnormalities and we recommend its use in women with postmenopausal bleeding.
Hence, unnecessary operations in postmenopausal women could be spared where the endometrium is ultrasonographically normal.

Key Words: Endometrial Thickness, Endovaginal Sonography (EVS), Postmenopausal Bleeding (PMB), Postmenopausal Women (PMW), Transvaginal Sonography (TVS).

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Introduction

Menopause is the termination of the reproductive phase of life in a woman. Menopause is a greek word and means 'men' (month) and pause (cessation) i.e. cessation of menstruation. Vaginal bleeding occurring any time after six months of amenorrhea in a woman of menopausal age should be considered as post menopausal bleeding and should be investigated.

Endovaginal ultrasonography has provided new anatomical and pathophysiological information about the female organs. Because of the close proximity to the organ of interest and the higher insonating frequency, the resolution is dramatically improved [7].

Transvaginal Sonography (TVS) is an efficient and acceptable non-invasive method for the early detection of endometrial pathology in postmenopausal women. The thickened endometrium during menopause is the most significant ultrasonographical criterion implicating its pathology [24].

Approximately 80% of all curettage procedures performed for postmenopausal bleeding result in benign diagnosis, and therefore, if a non-invasive modality such as TVS can be accurately used to determine endometrial thickness and the measurement below which pathology is less likely, sampling must be avoided. TVS is found to perform slightly less accurately than MRI. The role of TVS is well established in the search for endometrial hyperplasia and carcinoma [14]. The results of various studies have shown that the TVS measurement of endometrial thickness is currently used as a diagnostic tool in patients with postmenopausal bleeding. The studies consistently show that an ultrasonographically measured endometrial thickness of 4 or 5 mm or less almost completely excludes endometrial carcinoma [2],[5],[6],[8],[16],[18],[22],[25].

The advantage of TVS is that it can be performed with empty bladder and is convenient for the patient and at the same time, it is suitable for getting more correct gynecological diagnosis, especially in fatty women with a thick abdomen. TVS is superior to CT and approaches MRI in its ability to provide information about myometrial, cervical and perhaps, myometrial invasion of endometrial carcinoma. TVS is clinically established as the preferred technique for the evaluation of endometrial disorders, especially abnormal uterine bleeding [23].

Endometrial biopsy has been considered as a standard for the clinical diagnosis of endometrial disease among asymptomatic patients, but it is invasive, may be uncomfortable, and may not be able to be performed in some patients with cervical stenosis. Ultrasound evaluation is less invasive and more comfortable and can be performed in patients with cervical stenosis [13].

Materials And Methods

The present study was conducted on postmenopausal women with PMB who were referred to the department of Radio diagnosis by the department of Gynaecology of Adesh Institute of Medical Sciences and Research, Bathinda, from 2006 to 2008.

Menopause was defined as one year of amenorrhea in the age of 40-50 yrs. Patients with PMB, at least 6 months after cessation of menstruation, were considered in the study. No hormonal parameters were used to characterize the women as postmenopausal. PMW on hormone replacement therapy were not included in the study. The patient's other complaints, clinical examination and relevant investigations were recorded.

The study was approved by the ethical committee of A.I.M.S.R. Bathinda.

A written and informed consent was obtained. The study included 112 postmenopausal women with postmenopausal bleeding.

The patients were subjected to endovaginal sonography for evaluating endometrial thickness. TVS was performed on the Nemio (Toshiba, Tokyo, Japan) machine. The probe was a micro-convex device for conducting TVS. A permanent record was taken on a thermal paper roll on a Sony videographic printer.

Before TVS, the patient was asked to empty the urinary bladder. The examination was performed with the patient in the lithotomy position, with a pillow under the buttocks. The probe was placed inside a condom that contained coupling gel. Additional gel was placed on the covered probe.

The transducer was introduced into the posterior vaginal fornix and the uterus was scanned longitudinally and transversely. The thickness of the endometrium was measured at the thickest part in the longitudinal plane. It was measured from the highly reflective interface of the junction of the endometrium and the myometrium. This measurement represented two layers of the endometrium. In the presence of fluid in the endometrial canal, the two half thickness endometrial measurements were added together.

Correlation between the transvaginal sonographical findings of the endometrium was done with histopathological findings.

Statistics

The mean endometrial thickness and SD for each diagnostic category were calculated. Sensitivity, specificity, positive and negative predictive values and the accuracy of EVS in diagnosing endometrial abnormality at a certain cut off for this endometrial thickness, were calculated.

Observations

The present study included 112 postmenopausal women with PMB.

After taking the detailed history, all patients were subjected to thorough clinical examination. The history, clinical findings and biochemical investigations were recorded. All the patients were subjected to EVS and the findings were recorded and correlated with histopathological findings wherever applicable.

84 patients belonged to rural areas and 28 patients were from urban areas.

96 patients were indoor patients and 16 were outdoor patients.

The mean age of the patients was 57 ± 6.41 years. The maximum number of patients (80) were between 51-60 years of age.

The mean parity in the patients was 3.03 ±1.59 (range 0-7).
The mean age of menarche in group A was 15.1 ± 0.86 (range 13-17 years).

A majority of the patients (85%) had regular menstrual cycles in their reproductive period. Only 15% patients had irregular menstrual cycles.

The mean age of menopause was 48.71 ± 2.37years.

In most of the patients (84) the duration of postmenopausal bleeding was from 6 months to 1 year. The lowest duration of postmenopausal bleeding was 2 months and the highest duration was 3 years.

The mean weight of the postmenopausal women was 62.57 ± 7.17 kg (range 45-81 Kgs). The maximum number of patients (60) had weight between 56-65 Kgs.

On per vaginum examination, bleeding per vaginum was found in 88 patients at the time of examination.

The maximum number of patients (56) in group A had atrophic uterus on P/V examination. Normal sized uterus was found in 20 patients and multiparous uterus was found in 28 patients.

Enlarged uterus was palpated in 8 patients.

The mean+- SD endometrial thickness in group A was 8.21+-6.88 mm (range 1.8-27.7mm). The maximum number of patients (50%) had endometrial thickness between 1 to 5mm as shown in [Table/Fig 1].

(Table/Fig 1)Distribution of Cases According To Endometrial Thickness As Measured By EVS

Endometrial Thickness (In mm.)	No.	%age
1-5.0	56	50.00
5.1-10.0	20	17.86
10.1-15.0	20	17.86
15.1-20.0	4	3.57
20.1-25.0	8	7.14
25.1-30.0	4	3.57
Total	112	100
Range (In mm.)	1.8-27.7	
Mean ± SD (In mm.)	8.21±6.88	

Fractional curettage was done in 57.15% cases and dilatation and curettage was done in 42.85% cases.

EVS and Histopathological Findings

Based on histopathological studies, endometrial atrophy was found in 60 patients, benign endometrial polyps in 12 patients, simple endometrial hyperplasia in 20 patients; endometrial carcinoma is 16 patients and pyometra in 4 patients as shown in [Table/Fig 2].

(Table/Fig 2)EVS and Histopathological Findings In PMW With PMB

EVS Diagnosis	EVS Findings Endometrial thickness (mm.)			Histopathological Findings
	No.	Mean ± SD (In mm.)	Range (In mm.)	No.
Postmenopausal atrophic uterus	56	3.19± 1.00	1.8 – 4.8	60
Postmenopausal uterus + endometrial polyp	12	12.61± 2.26	10.2 – 14.6	12
Endometrial hyperplasia	28	11.92 ± 5.80	5.6 – 20.1	20
Endometrial Carcinoma	12	19.23 ± 10.06	8.1 – 27.7	16
Pyometra	4	6.3 ±0	6.0-6.6	4

Additional findings as fibroids uterus (20 patients), nabothian follicles in cervix (20 patients), irregular thickened cervix which proved to be squamous cell carcinoma of cervix invading the myometrium on histopathology [4] and fluid in cul-de-sac [4] were noted.

With a cut off value of 4mm endometrial thickness, EVS showed a sensitivity of 100%, specificity of 73.33%, a positive predictive value of 76.47%, a negative predictive value 100% and an accuracy of 85.71%.

Discussion

EVS is better able to visualize and depict subtle abnormalities within the endometrium and to clearly define the endometrial-myometrial border [17]. With high frequency vaginal transducers, the endometrium can easily be studied with regards to changes in the thickness. The thicker the endometrial lining on EVS, the higher the risk of endometrial disease [28].

In the present study, endometrial thickness was measured in postmenopausal women by transvaginal sonography, so that unnecessary interventions in postmenopausal women where the endometrium was ultrasonically normal could be spared. Correlation with endometrial histopathological findings was done.

The present study was conducted on 112 postmenopausal women with postmenopausal bleeding.

The present study showed that the median age for women with benign changes in the endometrium was found to be 56 years and the median age for women with malignant changes in the endometrium was 64 years, which is consistent with other studies [26]. It also showed that the median age for women with malignant histological changes was 66 years and that for women with benign histological changes was 55 years.

In the present study, four out of six cases of endometrial carcinoma were nulliparous and the other two were multiparous. The mean parity of malignant cases was 1.6 ± 0.5 and that of non-malignant cases was 3.2 ± 1.55. This is similar to the observation made in other studies [3], [23] that nulliparity or low parity is a risk factor which is associated with endometrial cancer. The difference in parity between the women with benign and malignant changes was not significant, as the number of patients with endometrial carcinoma was very less in the present study.

In our study, the mean age of menarche in women with endometrial cancer was 14.8 ± 0.57 years and in non-malignant cases, it was 15.28 ±0.84 years. The difference was not significant, which is similar to the findings of other studies [21]. The mean age of menopause in six women with endometrial cancer was 51 years, which showed that late age of menopause is a risk factor which is associated with endometrial carcinoma [3],[23].
The study of the age of postmenopausal women at the time of study, age of menopause, duration of menopause and parity was not particularly rewarding.

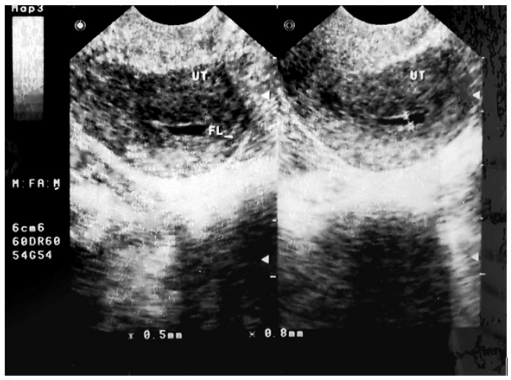
In the present study, 48% postmenopausal women gave preference to EVS, 44% to TAS and 8% gave no such preference. TVS was actually preferred by a majority of patients because a full bladder was not required [27].

In the present study, endometrial thickness was measured from the highly reflective interface of the junction of the endometrium and the myometrium in the sagittal section. This measurement represented two layers of endometrium [12], [26], [28]. In the present study, if there was fluid in the endometrial cavity then the two half thickness endometrial measurements were added together [15].

Our study showed that the mean ± SD endometrial thickness of 112 patients in group A was found to be 8.21 ± 6.88mm (range 1.8-27.7). 43% cases had endometrial thickness <4mm. This is similar to the findings of other studies [12], [21]. The present study had 50% cases with endometrial thickness <5mm, 35.42% cases had endometrial thickness between 5-15mm and14.28% cases had endometrial thickness between 15-30mm [12].

Histopathological study was done after fractional curettage in 64 patients and after dilatation and curettage in 48 cases. Endometrial atrophy was considered as a normal finding.

Endometrial atrophy was found in 53% patients [Table/Fig 3]. Out of these patients, 78.5% patients had endometrial thickness ≤ 4mm and 21% had endometrial thickness between 4-5mm. Two cases had endometrial thickness between 4-5mm and showed endometrial hyperplasia in the histopathological studies. Four patients with endometrial thickness between 6-8mm showed an atrophic endometrium at curettage. A possible explanation could be that the women had endometrial polyp which is often difficult to remove by blind curettage [12].



(Table/Fig 3)EVS Showing Thin Endometrium With Minimal Fluid (FL) In Endometrial Cavity (Histopathologically Proved To Be Endometrial Atrophy)

A high proportion of women with atrophic endometrium with atypical uterine bleeding which supports the suggestion that sclerotic vessel changes with consequent venous or arterial ruptures are the commonest causes of atypical postmenopausal bleeding [4].

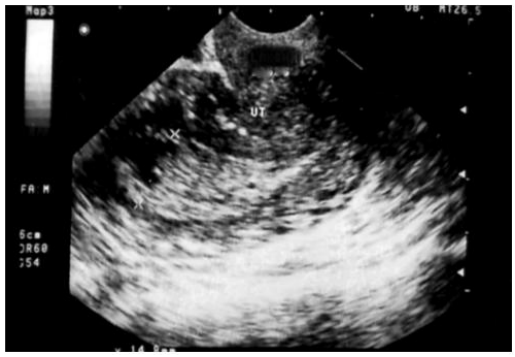
Endometrial polyps were detected in 10.7% cases. The range of endometrial thickness as measured by EVS was 10.2-14.6mm and the mean was 12.61 ± 2.26mm. Endometrial polyps were diagnosed ultrasonically in 6 patients by the presence of a well defined local thickening of the endometrium with increased reflectivity, surrounded by a symmetrical area of low amplitude echoes. The cranial part of the uterine axis is thinner

than the caudal part [20]. All 12 cases of endometrial polyps were confirmed by histopathological examination.

In the present study, 28 patients showed a well defined, thick and highly reflective endometrium surrounded by an asymmetrical poorly reflective zone with a mean endometrial thickness of 11.92 ± 5.8mm and a range of 5.6-20.1mm. This picture was highly suggestive of endometrial hyperplasia [Table/Fig 4]**.**

(Table/Fig 4)Well Defined Thickened Endometrium On EVS (Simple Endometrial Hyperplasia On Histopathology)

Histopathology revealed simple diffuse hyperplasia (cystic glandular hyperplasia) in 16 cases. No case of atypical hyperplasia was present. 8 cases of endometrial thickness between 6-8mm, turned out to be endometrial atrophy on histopathology and 4 cases with endometrial thickness 11.5mm, 12.4mm, 13.1mm and14.9 mm were found to be endometrial adenocarcinoma [Table/Fig 5].Four cases with endometrial thickness between 4-5mm on EVS were found to be endometrial hyperplasia by histopathological studies. The mean endometrial thickness in women with endometrial carcinoma was 19.23 ± 10.06mm (range 8.1-27.7). In our study, no endometrial carcinoma was found in endometrium ≤ 8mm [9].



(Table/Fig 5)Thick, Heterogeneous Endometrium On EVS (Histology Confirmed Endometrial Carcinoma)

In the present study, EVS correctly predicted carcinoma of the endometrium in 12 cases. The lesion appeared as an irregular, thickened, highly reflective area of endometrial lining, with loss of the surrounding symmetrical area of low amplitude echoes [20]. Four cases showed uterine cavity distended with thick fluid, and pyometra was suspected. Biopsy showed invasive squamous cell carcinoma of the cervix in these cases and uterine cavity distended with pus.

The overall sensitivity and specificity of EVS to exclude endometrial pathology was found to be 93.3% and 100%, respectively [19].

At a cut off limit of 4mm endometrial thickness (endometrium >4mm indicating pathology), the sensitivity of the present study was 100% and the specificity was 73.3%. The positive predictive value was 76%, the negative predictive value was 100% and the accuracy was 85.71%. At a cut off limit of 5mm endometrial thickness (endometrium >5mm indicating pathology), the sensitivity of the present study was 92.3% and the specificity was 86.6 %. The positive predictive value was 85.71%, the negative predictive value was 92.86 % and the accuracy was 89 %, as shown in [Table/Fig 6].Two cases of endometrial hyperplasia would have been missed if a cutoff of 5mm was used. No case of

endometrial carcinoma with a cut off of 5mm endometrial thickness was overlooked [1]. No pathology was overlooked when a cutoff limit of 4mm was used. So curettage could be avoided in cases with endometrial thickness ≤ 4mm. The difference between the thickness of the atrophic endometrium as measured by vaginal ultrasonography and the thickness of the endometrium with carcinoma indicate that EVS could be used as a very simple method to exclude endometrial carcinoma as a cause of postmenopausal bleeding.

(Table/Fig 6)Cut Off Limit For Endometrial Thickness
(More Indicating Pathology)

Cut off of endometrial thickness	Sensitivity	Specificity	Positive predictive value	Negative predictive value	Accuracy
4 mm	100%	73.3%	76%	100%	85.71%
5 mm	92.3%	86.6%	85.71%	92.86%	89%

The cutoff limit of 4mm used in the present study is consistent with the cutoff limit used by other studies [10], [11], [12], [28]. This indicated that when 4mm was used as a cutoff limit of the endometrial thickness measured vaginosonographically in a woman with PMB, endometrial abnormality could be excluded with reasonable certainty. EVS was also helpful in obese patients, in patients with a retroverted uterus and it bypassed obstacles such as bone, gas filled bowel and extensive pelvic adhesions.

The limitations encountered with EVS were, the limited maneuverability of the probe and the unorthodox position and angle of the transducer due to which correct orientation was difficult initially.

Conclusions

78% of the patients with endometrial atrophy had an endometrial thickness ≤4mm. No case with endometrial pathology had endometrial thickness ≤4mm.

We concluded that EVS is an excellent first step diagnostic method for excluding endometrial abnormalities in women with PMB. The changes in the thickness and texture of the endometrium as depicted by EVS correlated with subsequent pathological findings.

The accuracy of the present study at a cutoff value of 4mm endometrial thickness was 85.71%. Thus, in women with postmenopausal bleeding and an endometrial thickness ≤ 4mm, it is justified to refrain from curettage. The risk of endometrial pathology increases with an increase in the endometrial thickness, as measured by EVS.

The major limitation of EVS is the relatively small field of view. It is not possible to obtain a panoramic view of the pelvis. Our study showed that EVS is a useful method for screening for endometrial abnormalities and we recommend its use for women with postmenopausal bleeding.

Conflict Of Interest Statement

The authors declare that there is no financial or other conflict of interest.

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