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Research Article

Ultrasonographic evaluation of abnormal uterine bleeding in postmenopausal women

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ABSTRACT

Background: Objectives of current study were to diagnose causes of Abnormal Uterine Bleeding (AUB) in postmenopausal women (PMW) and to correlate it with curettage and histopathological findings, hysteroscopy and thereby minimizing unnecessary interventions in the form of operations and hysteroscopy where sonography depicts normal findings.
Methods: After obtaining ethical clearance present prospective observational study was conducted from November 2010 to November 2012, to evaluate the endometrium in 50 postmenopausal women (PMW) with bleeding per vagina referred to the department of Radio diagnosis by the department of gynaecology in Bangalore medical college and research institute. After applying inclusion and exclusion criterias the cases were evaluated with ultrasonography both transabdominal (TAS) and transvaginal scan (TVS where ever necessary). Histopathological and hysteroscopic correlation was done in all cases.
Results: 58% of the PMW with bleed were in the age group of 51-60 years. Most common cause of PMB was atrophic endometrium (44%), endometrial polyp (22%), followed by malignancy (14%), and hyperplastic endometrium (6%). At Endometrium thickness less than 4 mm there were nil chances of carcinoma.
Conclusions: In women with AUB in postmenopausal age ultrasonography (USG) can be considered as an initial imaging modality for diagnosing endometrial diseases. The sensitivity and specificity of USG for Atrophic endometrium is 100% & 84% respectively with accuracy of 100%, endometrial polyp the specificity is 100% with accuracy of 88%. For malignancy USG showed 100% specificity & accuracy of 100%. Hence USG is highly accurate for evaluating endometrial pathologies. Being noninvasive, less costly & good patient compliance USG should be considered as an initial imaging modality over invasive investigations like D&C, hysteroscopy in evaluating endometrial disorders.

Keywords: Postmenopausal bleed, Postmenopausal women, Abnormal uterine bleed, Ultrasonography, Transvaginal scan

INTRODUCTION

Post-Menopausal Bleeding (PMB) is defined as uterine bleeding occurring more than 12 months after the last menstrual period.[1] In PMW it is essential to exclude endometrial carcinoma although the incidence is only 6.96 per 1000 women with postmenopausal bleeding.[2]

PMB is symptom of sinister significance. An analysis of the causes of PMB shows that apart from endometrial malignancy which constitutes less than 10%, there are several other causes like endometrial polyps, fibroids, endometrial hyperplasia and atrophic endometrium.[3]

Determining the cause of PMB is essential in planning appropriate therapy. In these women, transvaginal sonography (TVS) is a sensitive means for diagnosing the causes of such bleeding, yet endometrial biopsy (EMB) is still preferred as the first diagnostic test.[4]

A thickened endometrium is the reliable predictor of endometrial diseases,[5] although this sign is sensitive indicator non specificity of this has led most clinicians to use tissue specific techniques such as blind endometrial biopsy or dilatation and curettage as initial screening methods for diagnosis of endometrial diseases. Unfortunately both these techniques are blind and inexact.[5]

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.[6]

The advantage of USG especially 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.[7]

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.[8]

METHODS

A prospective observational study was conducted from November 2010 to November 2012, to evaluate the endometrium in 50 postmenopausal women with bleeding per vagina referred to department of radiology in Bangalore medical college and research institute. All patients were examined by the concerned gynaecologist before referring to our department and a provisional diagnosis was given. Subjected were then referred for ultrasonological examination. The history, clinical findings and biochemical investigations were recorded. After applying inclusion and exclusion criteria the cases were evaluated with ultrasonography. Patient were scanned trans abdominally by curvilinear probes of frequency C5-2 initially with full bladder and respective images were stored in system. For patients who were not fit for trans abdominal scan (like obesity, urinary incontinence and pathology not clearly seen by TAS), TVS was done by probe of frequency C7-8.

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.

Presence of pathological lesions were studied according to the location morphological features, invasion into adjacent myometrium and its vascularity. Ultrasonographic diagnosis was correlated with histopathological findings in all positive cases. Hysteroscopic correlation was done where ever it was necessary like in case with suspicion of polyp, hyperplasia, atrophied endometrium.

Exclusion criteria

Patients on medications for treatment of hirsutism, patients on digitalis, phenytoin, antidepressants, hormones (HRT-tamoxifen), corticosteroids, anticoagulants.

Patients with bleeding disorders and thyroid related problems.

Statistical methods

Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5% level of significance.

Chi-square/Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups. Diagnostic statistics viz sensitivity, specificity, PPV, NPV and accuracy have been computed to find the correlation of USG diagnosis with hysteroscopy and histology findings.

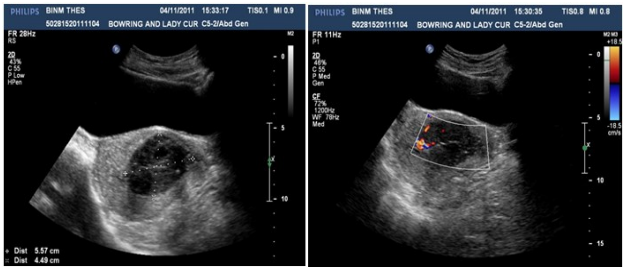

Figure 1: TAS showing A. Thick endometrium with hypoechogenic endocavitatory lesion extending into myometrium. B. Doppler showed significant vascularity - suggestive of endometrial carcinoma.

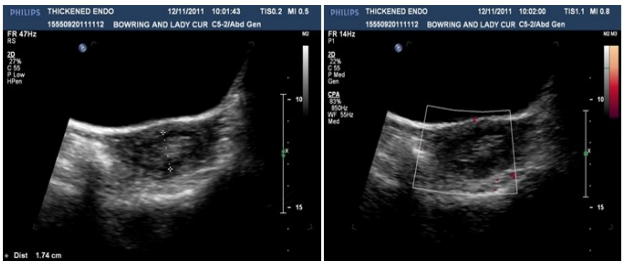

Figure 2: TAS showing (A) A heterogeneous polypoidal lesion in the endometrial cavity with surrounding hypoechoic endometrial collection, proved as benign polyp on histopathology (B) On colour Doppler there is no significant colour flow in thickened endometrium.

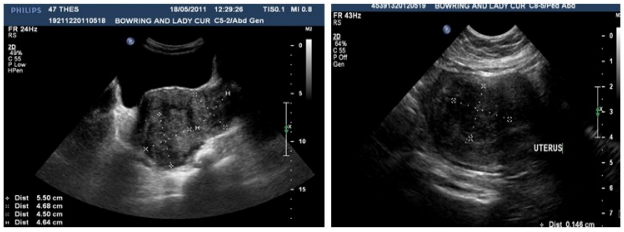

Figure 3: TAS showing heterogeneous predominant hypoechoic lesion with whorled appearance in intramural (A) & in submucosal location (B) - suggestive of fibroids.

RESULTS

In the present series, out of 50 patients in postmenopausal group most of them were in between 51-60 years (58%).

Most of the women in this group (52%) were with BMI between 25-30 kg/m^2 and 14 (28%) with >30 kg/m^2, which explains the association of comorbid conditions with PMB.

Among the 14 with BMI of >30 kg/m^2 in postmenopausal group, 6 had endometrial carcinoma, 5 showed endometrial polyp, rest simple cystic hyperplasia.

Maximum Endometrial Thickness (ET) of women with endometrial carcinoma was 30 mm with BMI of 36.5 kg/m^2 with comorbid condition of hypertension and DM.[9]

Table 1 shows most of the PMW with bleed had ET 1-5 mm (<4 mm) with mean ± SD of 8.84 ± 8.04.

Table 1: Distribution of ET in postmenopausal group with PMB.

ET (mm)	No.	Percentage
1-5	24	48
5.1-10	10	20
10.1-15	4	8
15.1-20	8	16
25-30	4	8
Total	50	100
Mean ± SD (mm)	8.84 ± 8.04 (similar to the study done by Kaur et al.)[1]	

From the Table 2 it is seen that none of the patients with ET <4 mm had incidence of endometrial malignancy which is the more worrisome entity in women with PMB.

Endometrial atrophy was diagnosed sonologically (TAS) in 24 (48%) patients. Out of these patients, 19 (80%) were histologically proved to be atrophic endometrium, 2 (8.3%) as endocervical polyp and 3 (12.5%) and endometrial polyp.

Table 2: Distribution of endometrial diseases with respect to ET (mm) on USG in PMW with bleed (histologically confirmed).

Conditions	ET (mm)				
	<4	4.1-10	10.1-15	15.1-20	25-30
Atrophic	17 (34%)	2 (4%)	-	-	-
Endometrial polyp	3 (6%)	3 (6%)	1 (2%)	4 (8%)	-
Endocervical polyp	2 (4%)	-	-	-	-
Endometrial carcinoma	-	2 (4%)	-	1 (2%)	4 (8%)
Hyperplasia	-	2 (4%)	-	4 (8%)	-
Fibroids	-	3 (6%)	-	-	-

DISCUSSION

The present study was conducted on 50 postmenopausal women with postmenopausal bleeding. Most of the PMW with bleed had ET 1-5 mm (< 4 mm) with mean ± SD of 8.84 ± 8.04 which matched with study done by Kaur et al.[11]

Two of the cases with ET - 4.5 & 5 mm were atrophic endometrium on histopathology. These findings matched with the study done by Kaur et al.[11] Two atrophic endometrium case with ET 4mm diagnosed on TAS came as endocervical polyp on histopathology. This was similar to study done by Hunter et al.[12]

In the present study, 7 cases had ET between 18-30 mm came as endometrial carcinoma on histopathology. Among these, 5 cases were nulliparous and the other two were multiparous. This is similar to the observation made in other studies,[11,13,14] that nulliparity or low parity is a risk factor which is associated with endometrial cancer.

In present study USG diagnosed polyps in 11 cases among which 5 were proved on HPE remaining 6 cases was normal on HPE however these were also diagnosed as polyps on hysteroscopy. These findings were similar to the study done by Kaur et al.[11] Thus biopsy missed 6 cases of polyps due to its blind nature.[5]

With dilatation and curettage focal lesions may also be missed and only 60% of surface endometrium may actually be sampled.[5] Blind sharp curettage covers as much as 60% of the cavity but may miss polyps as they recoil from the passing curette.[15]

There were 3 cases of submucosal fibroid diagnosed ultrasonologically out of which 1 was fibroid and 2 polyp histologically. This shows that TVS cannot differentiate focal thickening as polyp or fibroid as accurately as hysteroscopy and histology. This limitation of the study was similar to that seen in study done by Hunter et al.[12]

USG showed sensitivity of 50% and specificity of 95% with accuracy of 92% in diagnosing fibroid.

Sensitivity of 41% and specificity of 84% with accuracy of 74% in diagnosing polyp.

USG diagnosed endometrial malignancy with 100 % sensitivity and specificity with histology as gold standard.

There was significant concordance between USG and histological diagnosis of atrophic endometrium (100 % sensitive and 84 %specificity with accuracy of 100%). This was similar to the study done by Hunter et al.[12] (out of 41 cases of PMB, 16 USG diagnosed cases of atrophic endometrium 15 had histologically atrophic endometrium).

Endometrial atrophy was diagnosed ultrasonologically (TAS) in 24 (48%) patients. Out of these patients, 19 (80%) were histologically proved to be atrophic endometrium, 2 (8.3%) as endocervical polyp and 3 (12.5%) and endometrial polyp. This matched with the study done by Karlsson et al., Kaur et al., Osmer et al. (43% had ET < 4 mm) 17 (89%) of atrophic endometrium cases had ET <4 mm (ranging 1.5-4 mm).

Sensitivity of diagnosing endometrial cancer with a biopsy via endometrial suction curette increases when the pathology affects more than 50% of the surface area of the endometrial cavity.[7] Biopsy frequently misses focal lesions such as endometrial polyps and submucosal fibroids. This goes in accordance with the conclusion of the study by EPSTEIN Elisabeth et al.

Endometrial biopsy (EMB) alone is not sufficient for screening women for PMB. TVS appears to be more sensitive than EMB for the detection of abnormalities, particularly those outside the endometrium. For these reasons, TVS should be the initial screening test when examining women with PMB.[4]

From the Table 2 it is seen that none of the patients with ET <4 mm had incidence of endometrial malignancy which is the more worrisome entity in women with PMB.

Also at ET <4 mm 80% of patients showed atrophic changes with very less number of cases showed endometrial & endocervical polyps. The cutoff limit of 4mm used in the present study is consistent with the cutoff limit used by other studies.[11,16-18] This indicated that when 4 mm was used as a cutoff limit of the endometrial thickness measured sonographically in a woman with PMB, endometrial abnormality could be excluded with reasonable certainty.

From Table 3 it is conclusive that ET below 4 mm, chances of endometrial carcinoma was very less. Similarly in the present study when ET <4 mm is taken as standard there was no cases of endometrial malignancy diagnosed both ultrasonologically and histologically.

In the present study most common cause of PMB was atrophic endometrium (44%, with ET range of 1.5-4 mm.) followed by endometrial polyp (22%), endometrial carcinoma (14%), simple cystic hyperplasia (6%).

At a cut off limit of 4 mm endometrial thickness (endometrium >4 mm indicating pathology), the sensitivity of the present study was 100% and the specificity was 84.3%. The positive predictive value was 77%, the negative predictive value was 100% and the accuracy was 88.00%.

This matched with the study done by Kaur et al.[11] (sensitivity 100%, specificity 73.3%, PPV of 76% & NPV 100%), Granberg et al.,[17] Karlsson et al.,[16] Gull et al.,[19,20] Alcazara et al.,[21] Conoscenti et al.[22] (sensitivity of 100%, specificity of 60%, NPV of 100%.) and Goldstein et al.[18]

Table 3: Showing ET (mm) and cancer findings in postmenopausal women with bleeding.

References	Year	No. of women	Et (mm)	No. of cases of malignancy	NPV
Mascarette	1993	131	<4 mm	4	99.6%
Karlsson	1995	1168	<4 mm	0	100%
Ferrazzi	1996	930	<4 mm <5 mm	2 4	99.8% 99.6%
Gull	2000	163	<4 mm	1	99.4%
Epstein	2001	97	<5 mm	0	100%
Gull	2003	394	<4 mm	0	100%
Goldstein	2009	917	<4 mm	1	99.4%
Present study	2012	50	<4 mm	0	100%

So present study shows that when ET <4 mm there could be no need for further investigations needed thus reducing economic burden to the patient

Thus USG showed good accuracy in diagnosing malignancy & atrophy with fairly acceptable accuracy in diagnosing polyp and fibroids.

To conclude, TVS can be safely used as an initial investigation in the management of abnormal uterine bleeding as it is a noninvasive procedure for the detection of endometrial pathology. USG should be considered as initial imaging modality in diagnosing AUB in PMW with bleed over invasive procedures like D&C and hysteroscopy which requires hospitalization and general anaesthesia. Present study showed USG has good accuracy and positive predictive value in diagnosing endometrial malignancy with thickness less than 4mm and good accuracy in diagnosing atrophic endometrium. Because better field of view, TVS can be considered as initial imaging modality in diagnosing submucosal pathologies like polyp and fibroids over D&C which is a blind procedure can miss the lesions.

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