ORIGINAL ARTICLE

The role of Ultrasound in Evaluation of Postmenopausal Bleeding

Hala M. Maghraby, Yasser M. Fekry, Aya F. A. Ragab *

Department of Radiodiagnosis, Faculty of Medicine for Girls, Al-Azhar University, Cairo, Egypt

Abstract

Background: Menopause is defined as the permanent cessation of menstruation. It is diagnosed retrospectively once menstruation has been absent for 12 consecutive months.

Aim: To assess the role of high-resolution ultrasound in evaluating postmenopausal bleeding, as it is the preferred method for investigating the various causes of this condition. Additionally, it examines the effectiveness of color Doppler and transvaginal ultrasonography in diagnosing postmenopausal hemorrhage.

Patients and methods: This study had been conducted in Diagnostic Radiology Department, Al-Zahraa University hospital on 30 female patients, presented by postmenopausal bleeding along six months' duration starting from January 2024 to September 2024.

Results: A significant rise was discovered in recurrent bleeding in cases who received HRT compared to those who did not p-value<0.05. An insignificant variance was discovered in the amount of bleeding, ultrasonographic findings, or endometrial thickness among patients with heavy, light, or spotted bleeding p>0.05. Endometrial thickness was higher in patients with heavy bleeding, followed by light bleeding and spotted bleeding. Endometrial atrophy was higher in patients with spotted bleeding (69.2%), while endometrial carcinoma was higher in patients with heavy bleeding (60%).

Conclusion: Postmenopausal vaginal bleeding in women is linked to endometrial atrophy, DM, recurrent bleeding, spotting, and heavy bleeding. Patients receiving HRT have a higher DM percentage, while those without receiving HRT are multiparous, have longer menopause, and have recurrent bleeding.

Keywords: Ultrasound; PMB; HRT

1. Introduction

Menopause is defined as the permanent cessation of menstruation. It is diagnosed retrospectively once menstruation has been absent for 12 consecutive months.[1]

Abnormal uterine bleeding can be disturbing and troubling at any age; however, postmenopausal bleeding is of particular importance due to its prevalence as the most common clinical indicator of endometrial carcinoma (EC).[2]

The diagnostic accuracy of TVUS is significantly different in specific subpopulations, including pre- and postmenopausal cases. In fact, the cyclic changing of the endometrium throughout a female's reproductive years makes it challenging to determine a specific endometrial thickness (ET) cutoff in cases of suspected EC. The condition for postmenopausal females is distinct in that the endometrium isn't impacted by hormones in these cases. Several studies were conducted to identify the optimal ET cutoff for the evaluation of cases that require more invasive studies, such as hysteroscopy and endometrial sampling.[3]

A reasonable first step in the evaluation of a case with postmenopausal bleeding is the measurement of endometrial thickness using transvaginal ultrasound. In addition, TVUS has its limits. Particularly, it may be challenging to fully evaluate the endometrial lining in a case with a history of uterine fibroids, adenomyosis, obesity, or previous operations. In those cases, the next assessment step could involve endometrial sampling, office hysteroscopy, or saline-infusion sonograms.[4]

This research aimed to assess the role of high-resolution ultrasound in evaluating postmenopausal bleeding, as it is the preferred method for investigating the various causes of this condition. Additionally, it examines the effectiveness of color Doppler and transvaginal ultrasonography in diagnosing postmenopausal bleeding.

2. Patients and methods

This research had been conducted in Diagnostic Radiology Department, Al-Zahraa University hospital on 30 female patients, presented by postmenopausal bleeding along six months' duration starting from January 2024 to September 2024.

Inclusion criteria: patients complaining of postmenopausal vaginal bleeding.

Ethical consideration: Informed consent will be taken from all cases before inclusion in the study and before performing the transvaginal ultrasound examination. The study fulfilled the research ethics committee of the faculty of medicine, Al Azhar University for Girls.

Methods

All patients have been subjected to the following:

History taking involves: Personal history, Present history, Past history of previous operations, and menstrual history.

Previous US examination

Ultrasound technique

Transabdominal Ultrasound (TAUS): (Using Philips ClearView 650 US device). Sonologists often recommend TAUS as a screening procedure before other ultrasound techniques like TVUS or HSG. However, TAUS requires a full bladder, which can be uncomfortable and time-consuming, especially in postmenopausal women. In patients with a normal-sized uterus, TAUS is unnecessary. A partially full bladder interferes with TVUS and HSG, which are best performed with the bladder completely empty. In enlarged and anteverted uteruses, a full bladder may not be necessary for visualization. Endometrial thickness is measured in anteroposterior dimensions, and further investigations are not performed if it is less than 5mm. Transvaginal Ultrasound (TVUS): ** A transvaginal ultrasound is a diagnostic procedure performed after a patient has emptied their bladder, providing a detailed evaluation of the endometrial cavity and ovaries. The patient lies in a lithotomy position, with a 15-20 cm thick foam cushion placed beneath the pelvis to facilitate hand movement. The exam begins with scanning the cervix, then locates and assesses the uterus, ensuring the cervix is included. The ovaries and fallopian tubes are examined, with the cul-de-sac being a key area to screen. Other relevant structures are also evaluated.

Statistical Analysis

The data were collected, revised, coded, and entered into the Statistical Package for Social Science (IBM SPSS) version 27. If parametric, the quantitative data were described as the mean, standard deviations, and ranges. If non-parametric, the median and inter-quartile range (IQR) were used. Additionally, qualitative parameters were described as percentages and numbers. The Kolmogorov-Smirnov test may be utilized to determine whether the parameter is normally distributed in one sample. The tests utilized were the independent t-test, Mann-Whitney test, Kruskall-Walli test, Chi-square test, and/or Fisher's exact test. The margin of error accepted was five percent, and the confidence interval was established at 95%. Therefore, the p-value was determined to be significant as follows: Non-significant (NS) is indicated by a P-value greater than 0.05, significant (S) by a P-value less than 0.05, and highly significant (HS) by a P-value less than 0.01.

3. Results

30 women with mean age 60.6 ± 7.71 (73.3% were between 50 - 65 years), age of menarche was 12.57 ± 1.76, median of endometrial thickness was 4.85 mm (3.2 – 16.3). Median of parity was 4 (3 – 5) and mean weight was 80.83 ±10.11 Kg. Median of menopause duration was 7 (2.5 – 14) years. (Table 1)

Table 1. Demographic data and characteristics of the examined cases :

		NO. = 30
AGE (Y)	Mean ± SD	60.6 ± 7.71
	Range	50 – 77
AGE GROUPS	50 - 65 years	22 (73.3%)
	> 65 years	8 (26.7%)
AGE OF MENARCHE	Mean ± SD	12.57 ± 1.76
	Range	10 – 16
ENDOMETRIAL THICKNESS (MM)	Median (IQR)	4.85 (3.2 – 16.3)
	Range	1.5 – 47
PARITY	Median (IQR)	4 (3 – 5)
	Range	0 – 7
WEIGHT (KG)	Mean ± SD	80.83 ± 10.11
	Range	64 – 104
MENOPAUSE DURATION (YEARS)	Mean ± SD	7 (2.5 – 14)
	Range	1 – 25

66.7% of patients had recurrent bleeding while 33.3% had single bleeding. Bleeding was spotting, heavy, and light in 43.3%, 40.0%, and 16.7% of women. (Table 2)

Table 2. Frequency and amount of bleeding among the studied patients:

		NO. = 30
FREQUENCY OF BLEEDING (EPISODE)	Single	10 (33.3%)
	Recurrent	20 (66.7%)
AMOUNT OF BLEEDING	Heavy	5 (16.7%)
	Light	12 (40.0%)
	Spotting	13 (43.3%)

Regarding Ultra-sonographic table, most of the patients had endometrial atrophy (53.3%), followed by endometrial carcinoma (16.7%),

endometrial hyperplasia (13.3%), and uterine fibroid (10.0%). Endometrial polyp and cervical polyp were only detected in 3.3% of patients in each. (Table 3)

Table 3. Ultrasonographic findings of the studied patients:

FINDING		NO. = 30
	Endometrial atrophy	16 (53.3%)
	Endometrial carcinoma	5 (16.7%)
	Endometrial hyperplasia	4 (13.3%)
	Uterine fibroid	3 (10.0%)
	Endometrial polyp	1 (3.3%)
	Cervical polyp	1 (3.3%)

A statistically significant rise was discovered in the percentage of cases with recurrent bleeding in patients received HRT didn't receive HRT (100%). While no statistically significant difference between patients received hormone replacement therapy and did not receive hormone replacement therapy regarding amount of bleeding, ultrasonographic findings, and endometrial thickness. (Table 4)

Table 4. Relation between receiving HRT and bleeding frequency and amount of the studied patients

		HRT		TEST VALUE	P-VALUE	SIG.
		No No. = 24	Yes No. = 6			
FREQUENCY OF BLEEDING (EPISODE)	Single	10 (41.7%)	0 (0.0%)	3.750*	0.053	NS
	Recurrent	14 (58.3%)	6 (100.0%)			
AMOUNT OF BLEEDING	Heavy	3 (12.5%)	2 (33.3%)	2.668*	0.263	NS
	Light	9 (37.5%)	3 (50.0%)			
	Spotting	12 (50.0%)	1 (16.7%)			

P-value < 0.05: Significant; P-value > 0.05: Non-significant; P-value < 0.01: Highly significant
≠: Mann-Whitney test,*: Chi-square test

A statistically insignificant variance was discovered among patients with single bleeding and patients with recurrent bleeding regarding amount of bleeding p-value>0.05. (Table 5)

Table 5. Relation among frequency and amount of bleeding among the studied patients

		FREQUENCY OF BLEEDING (EPISODE)		TEST VALUE	P-VALUE	SIG.
		Single No. = 10	Recurrent No. = 20			
AMOUNT OF BLEEDING	Heavy	0 (0.0%)	5 (25.0%)	5.337*	0.069	NS
	Light	3 (30.0%)	9 (45.0%)			
	Spotting	7 (70.0%)	6 (30.0%)			

A statistically insignificant variance was discovered in ultrasonographic findings, and endometrial thickness between patients with heavy, light, and spotted bleeding. Endometrial thickness was statistically significant greater in patients with heavy bleeding (28 (19–45)),

followed by patients with light bleeding (4.7 (3.6–10.45)) and spotted bleeding (3.6 (2.2–8.8)). Endometrial atrophy was statistically higher in patients with spotted bleeding (69.2%) while endometrial carcinoma was statistically higher in patients with heavy bleeding (60%). (Table 6)

Table 6. Relation between amount of bleeding and ultrasonographic findings among the studied patients:

		AMOUNT OF BLEEDING			TEST VALUE	P-VALUE	SIG.
		Heavy No. = 5	Light No. = 12	Spotting No. = 13			
FINDING	Endometrial atrophy	0 (0.0%)	7 (58.3%)	9 (69.2%)	20.879*	0.022	S
	Endometrial carcinoma	3 (60.0%)	1 (8.3%)	1 (7.7%)			
	Endometrial hyperplasia	0 (0.0%)	3 (25.0%)	1 (7.7%)			
	Uterine fibroid	1 (20.0%)	0 (0.0%)	2 (15.4%)			
	Endometrial polyp	1 (20.0%)	0 (0.0%)	0 (0.0%)			
	Cervical polyp	0 (0.0%)	1 (8.3%)	0 (0.0%)			
ENDOMETRIAL THICKNESS (MM)	Median (IQR)	28 (19–45)	4.7 (3.6–10.45)	3.6 (2.2–8.8)	9.581≠	0.008	HS
	Range	7.4–47	2.9–30	1.5–23			

CASE PRESENTATION

Case (1)

History and clinical picture: The case is a 65-year-old female with G3P3003 that has been presenting to her obstetrics and gynecology physician with a history of recurrent episodes of vaginal bleeding (spotting) over the past three months. The patient's last menstrual period was at age 53 and menarche was at age 13. She has no family history of cancer. No history of gynecologic problem or sexually transmitted infections. Patient weight 89 kg. Medical history is diabetic and hypertensive. She denies nausea, diarrhea, vomiting, pelvic pain, constipation, and any other symptoms. Not on hormone replacement therapy (HRT). Ultrasound results: ultrasound was scheduled. The case was diagnosed with atrophic endometrium.
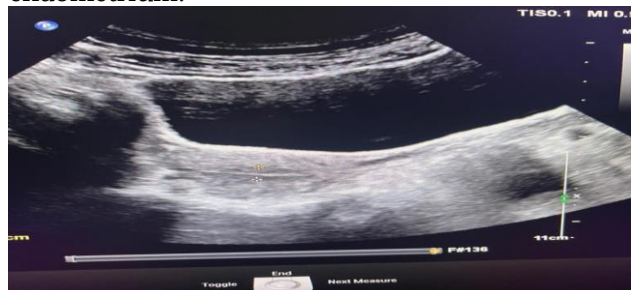

Figure 1. Transabdominal ultrasound revealed thin atrophic endometrium. The endometrial thickness (calipers) measures about 3.6 mm.

Case (2)

History and clinical picture: The case is a 62-year-old G7P6106, presents to her obstetrics and gynecologist physician with recurrent episodes of heavy vaginal bleeding. The patient's last menstrual period was at age 54 and menarche was at age 11. She has negative family history of

cancer. No history of gynecologic problem or sexually transmitted infections. Patient weight 71 kg. Medical history: The patient is diabetic with thyroid disease (multi-nodular goiter), no other significant medical history. She denies family history of significant illness. Ultrasound results: Ultrasound imaging was scheduled and shows heterogeneous uterus with multiple intramural and sub-mucous fibroids.

Figure 2. Transabdominal ultrasound image, sagittal and axial images of the uterus showing multiple intramural and submucos fibroids measuring about 3.7 x 3.3 cm for submucos, 5.2 x 4 cm and 2.9 x 2.8 cm for intramural fibroids.

4. Discussion

Postmenopausal bleeding is of particular concern due to its status as the sole commonly observed clinical indicator of endometrial carcinoma, despite the fact that abnormal uterine bleeding is disruptive and concerning at any stage of a woman's life.[5] The frequency of postmenopausal bleeding (PMB) may be above ten percent, and it is characterized as uterine bleeding that occurs for a minimum of one year following menopause.[6]

We included 30 women with mean age 60.6 ±7.71 (73.3% were between 50- 65 years), age of menarche was 12.57 ±1.76, median of endometrial thickness was 4.85 mm (3.2 – 16.3). Median of parity was 4 (3 – 5) and mean weight was 80.8±10.11 Kg. Median of menopause duration was 7 (2.5 – 14) years.

This age discovery was in line with Kim et al.,[7] who evaluated the role of three-dimensional power Doppler ultrasound to detect endometrial lesions in women with postmenopausal endometrial bleeding and found that mean of age was 59.27 ±5.25 years in patients with PMB and benign tumor and 61.04 ±7.28 years in patients with PMB and malignant tumor.

Begum and Samal,[8] differ from our study results, they investigated the clinical data obtained from the history and endometrial pathology through endometrial sampling in cases with postmenopausal bleeding. They observed that the mean age at the time of presentation was 57.17 ±7.11 years, the mean menopausal age was 49.18 ±3.69 years, and the mean thickness of the endometrium was 11.13 ±6.37 millimeter.

In our study, 66.7% of patients had recurrent bleeding, while 33.3% had single bleeding. Bleeding was spotting, heavy, and light in 43.3%, 40.0%, and 16.7% of women.

In line with us, a cross-sectional study of Asgari et al.,[9] aimed to determine the compatibility of ultrasound and hysteroscopy findings and histopathological results in women with abnormal uterine bleeding and noted that the most common form of bleeding was spotting, which was seen in 27.7% of patients.

Regarding Ultrasonographic findings, most of the patients had endometrial atrophy (53.3%), followed by endometrial carcinoma (16.7%), endometrial hyperplasia (13.3%), and uterine fibroids (10.0%). Endometrial polyps and cervical polyps were only detected in 3.3% of patients in each.

Also, a previous study by Sert et al.,[10] showed that the most frequent histopathologic diagnoses of the women with postmenopausal bleeding were established as endometrial atrophy, endometrial polyp, inadequate material, cancer, proliferative endometrium, endometrial hyperplasia, and other disorders, respectively.

A statistically significant rise was discovered in the median duration of menopause in patients with age > 65 years [16.5 (14.5 – 20)] than in patients with age 50-65 years [5 (2 – 10)] with p-value = 0.001. A statistically significant rise was discovered in the percentage of cases with recurrent bleeding in patients aged 50-65 years (77.3%) than in patients aged> 65 years (37.5%). A statistically significant increase was discovered in the percentage of patients with recurrent bleeding who received HRT (100%). There was no statistically significant difference between patients who received HRT and those who did not receive HRT regarding the amount of bleeding, ultrasonographic findings, and endometrial thickness.

Similar to previous results, Kathleen et al.,[11] stated that most AUB cases were observed in postmenopausal females between the ages of fifty and fifty-two (43.3%).

Then we compared between patients regarding frequency of bleeding (single (n=10) vs recurrent (n=20)), we found statistically insignificant variance among cases with single bleeding and patients with recurrent bleeding regarding age of menarche, parity, weight, and menopause duration. A statistically significant increase was discovered in the age of cases of single bleeding. In the recurrent bleeding group, patients aged between 50 and 65 years showed a statistically significant percentage (85%) compared to patients with an age of> 65 years.

Then we compared between patients regarding amount of bleeding (heavy (n=5), light (n=12), and spotting (n=13)) and found no statistically

significant difference regarding age, age group, age of menarche, parity, weight, and menopause duration. As well as no statistically significant difference in hypertension, DM, family history of cancer, HRT, and other systemic diseases.

A statistically significant variance was discovered in ultrasonographic findings, and endometrial thickness among patients with heavy, light, and spotted bleeding.

Endometrial thickness was statistically significantly higher in patients with heavy bleeding (28 (19–45)), followed by patients with light bleeding (4.7 (3.6–10.45)) and spotted bleeding (3.6 (2.2–8.8)). Endometrial atrophy was statistically higher in patients with spotted bleeding (69.2%), while endometrial carcinoma was statistically higher in patients with heavy bleeding (60%).

In agreement with the previous finding, Al-Turiahi et al.,[12] assessed PMB and investigated their causes, correlation with variable socio-demographic status. They found that the amount of PMB (Mild (n=64), Moderate (n=71), and Severe (n=22)) was statistically significantly different among the diagnoses and findings of the patients, except for atrophic endometritis and endocervical polyp. Endometrial cancer was statistically higher in cases with severe hemorrhage.

Research by AbdelMaboud and Elsaid,[13] confirmed our hypothesis and study aim. They evaluated the role of transvaginal ultrasonography and color Doppler in postmenopausal bleeding and determined that transvaginal color Doppler is a noninvasive technique that has a significant role in the diagnostic methods for PMB assessment. The differentiation of benign from malignant endometrial alterations may be facilitated by transvaginal color Doppler.

4. Conclusion

Women complaining of postmenopausal vaginal bleeding are more likely to have endometrial atrophy, DM, recurrent bleeding, spotting, and heavy bleeding. Patients with postmenopausal vaginal bleeding who received HRT had a high percentage of DM, while patients who did not receive HRT were more likely to be multiparous, had longer menopause duration, and recurrent bleeding. The pattern of bleeding had an effect on ultrasonographic findings and endometrial thickness.

Disclosure

The authors have no financial interest to declare in relation to the content of this article.

Authorship

All authors have a substantial contribution to the article

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