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Research Article

Evaluating Postmenopausal Bleeding: A Tunisian Experience on Ultrasound, Hysteroscopy, and Histopathology Correlation

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Received: December 04, 2025; **Published:** January 03, 2026

Abstract

Introduction: Postmenopausal bleeding (PMB) is a frequent clinical concern and a major warning sign for endometrial carcinoma. Accurate evaluation combining imaging and endoscopic methods is essential for early diagnosis and optimal management.

Objective: To assess the correlation and diagnostic performance of transvaginal ultrasound (TVUS), hysteroscopy, and histopathology in evaluating PMB.

Methods: A retrospective study was conducted over five years (2021-2025) including 240 women presenting with PMB. All patients underwent TVUS, followed by hysteroscopy and targeted endometrial biopsy. Diagnostic concordance, sensitivity, and specificity of each method were analyzed using histopathology as the gold standard.

Results: The mean age was 61.0 ± 8.2 years. Hypertension (56.7%), diabetes (35%), and obesity (33.3%) were the most frequent comorbidities. Histopathological analysis identified endometrial polyps in 43.3%, atrophic endometrium in 25%, hyperplasia in 13.3%, and malignant or pre-malignant lesions in 18.3% of cases. TVUS showed high diagnostic accuracy for endometrial carcinoma (sensitivity = 81.8%, specificity = 93.9%) but low sensitivity for polyps (23.1%). Hysteroscopy demonstrated superior diagnostic performance with sensitivity and specificity of 100% and 98% for cancer, and 96.2% and 100% for polyps, respectively.

Conclusion: The integration of TVUS, hysteroscopy, and histopathology provides a comprehensive and reliable diagnostic approach to PMB. TVUS serves as an effective non-invasive screening tool, while hysteroscopy remains the gold standard for detecting focal lesions. Histopathology confirms the final diagnosis, ensuring early and accurate detection of endometrial pathology.

Keywords: *Postmenopausal Bleeding; Abnormal Uterine Bleeding; Transvaginal Ultrasound; Hysteroscopy; Endometrial Cancer; Histopathology*

Introduction

Postmenopausal bleeding (PMB) is a frequent and concerning clinical symptom that often prompts gynecological consultation. Characterized by irregular frequency, duration, or volume of bleeding, it can significantly affect a woman's daily life and productivity. PMB accounts for nearly 70% of postmenopausal gynecologic consultations and is considered a major warning sign for endometrial carcinoma. While in over 60% of cases no organic cause is found, endometrial cancer is identified in approximately 10 to 15% of PMB cases.

Since its introduction in the 1980s, transvaginal ultrasound (TVUS) has become a widely accessible and non-invasive technique and is now considered the first-line investigation tool for evaluating endometrial pathology in women with PMB. When coupled with color Doppler imaging, it is regarded as the gold standard for the initial assessment of PMB. In cases where abnormalities are identified or suspected, hysteroscopy remains the most reliable method for direct visualization of the endometrial cavity. It enables accurate lesion mapping and allows targeted biopsies for histopathological analysis.

Objective of the Study

The primary objective of this study was to evaluate the correlation between transvaginal ultrasound findings, hysteroscopic observations, and histopathological results in the assessment of PMB. The study also aimed to determine the diagnostic performance of each modality in identifying the underlying etiology.

Materials and Methods

This retrospective study was conducted over a five-year period, from January 1, 2021, to December 31, 2025. Among them, 240 patients were included in the final analysis based on specific inclusion criteria. Exclusion criteria included women with known cervical pathology.

Results

The average age of participants was 61.03 years, ranging from 45 to 86 years. Most women had a history of multiple pregnancies, with an average gravidity of 4 and an average parity of 3. Nulliparity was observed in 16.7% of patients. The mean age of menopause was 50 years, with an average menopausal duration of 10 years. Notably, none of the patients had received hormone replacement therapy.

Regarding comorbidities, hypertension was the most frequent, affecting 56.7% of patients, followed by diabetes (35%), obesity (33.3%), and dyslipidemia (16.7%). A small proportion (6.7%) had a personal history of breast cancer.

During clinical evaluation, the speculum examination revealed the presence of an expelled polyp in 6.7% of cases, while active intrauterine bleeding was noted in 18.3%. Hemoglobin analysis revealed that 31.7% of the patients presented with anemia due to chronic or heavy uterine bleeding.

Transvaginal ultrasound was performed for all patients. An endometrial thickness greater than 4 mm was observed in 71.7% of cases, while 28.3% had a thickness of 4 mm or less. Additionally, ultrasound identified suspicious endometrial patterns in 20% of patients, intracavitary images in 10%, enlarged uterus in 6.7%, and one case of suspected ovarian pathology.

Hysteroscopy was then conducted, revealing that endometrial polyps were the most common finding, present in 43.4% of patients. A suspicious endometrial appearance was identified in 20% of cases, and atrophic endometrium alone or in association with polyps was observed in over half the cohort.

Histopathological analysis of biopsy samples confirmed the presence of endometrial polyps in 43.3% of cases. Normal or atrophic endometrium was found in 25% of cases, while 13.3% showed proliferative or hyperplastic changes. Notably, 18.3% of patients were diagnosed with malignant or pre-malignant endometrial lesions.

The analysis of correlations between diagnostic modalities revealed a high concordance between transvaginal ultrasound and hysteroscopic findings in cases of thin endometrium, with an agreement rate of 88.23%. Similarly, endometrial patterns deemed suspicious on ultrasound were confirmed in 100% of cases by hysteroscopy.

When comparing ultrasound with histopathology, a high level of agreement was observed in diagnosing atrophic endometrium and endometrial cancer. The ultrasound correctly identified 81.8% of malignant cases, with a specificity of 93.9%. However, its sensitivity for detecting endometrial polyps was low (23.1%), despite a perfect specificity of 100% (Table 1).

Lesion Type	Agreement (%)	Sensitivity (%)	Specificity (%)	PPV	NPV	p-value
Atrophy	88.23	73.3	86.7	11	39	<0.05
Hyperplasia	18.6	50.0	25.0	4	13	0.14
Polyp	-	23.1	100.0	6	34	0.003
Cancer	91.67	81.8	93.9	9	46	<0.05

Table 1: *Diagnostic performance of ultrasound findings compared with histopathology.*

Hysteroscopy demonstrated superior diagnostic performance (Table 2). The identification of atrophic endometrium by hysteroscopy showed a concordance of 93.3% with histopathology. For polyps, sensitivity was 96.2% and specificity 100%. Hysteroscopic suspicion of malignancy was confirmed in 91.7% of cases, with a sensitivity of 100% and a specificity of 98%.

Lesion Type	Agreement	Sensitivity	Specificity	PPV	NPV	P-value
Atrophy	100%	93.3%	97.8%	14	44	<0.05
Hyperplasia	-	75%	98.1%	6	51	<0.05
Polyp	-	96.2%	100%	25	34	<0.05
Cancer	91.67%	100%	98%	11	48	<0.05

Table 2: *Diagnostic performance of hysteroscopic findings compared to histopathological results.*

Discussion

This retrospective study of 240 women presenting with postmenopausal bleeding (PMB) provides valuable insights into the etiologies of this condition and the diagnostic performance of transvaginal ultrasound (TVUS) and hysteroscopy in a clinical setting. Our findings align with the established understanding that postmenopausal bleeding is a critical symptom that warrants a systematic and multi-modal diagnostic approach to rule out malignancy and identify benign causes.

The demographic profile of our cohort, with a mean age of 61 years and a high prevalence of comorbidities such as hypertension (56.7%), diabetes (35%), and obesity (33.3%), is consistent with known risk factors for endometrial pathology. The high prevalence of these metabolic conditions is significant, as obesity and type 2 diabetes are well-established, strong risk factors for the development of endometrial cancer, driven by mechanisms such as hyperinsulinemia and chronic inflammation [1].

The fact that 18.3% of our patients were diagnosed with malignant or pre-malignant lesions is consistent with, albeit on the higher end of, the commonly cited 10-15% prevalence of endometrial cancer in PMB, likely reflecting a selected high-risk population referred for tertiary investigation [2].

The role of transvaginal ultrasound (TVUS) as a triage tool: Performance and context

Our chosen 4 mm cut-off aligns with major international guidelines, including those from the American College of Obstetricians and Gynecologists (ACOG) and the International Endometrial Tumor Analysis (IETA) group, which recommend thresholds between 4 - 5 mm for initial risk stratification [3,4]. The diagnostic performance of TVUS in our study for detecting malignancy is compared with historical and recent literature in the table 3.

Study (Year)	Endometrial cutoff (mm)	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
Our study (2025)	> 4 mm	81.8	93.9	81.8	88.5
Rahman., *et al*. (2025) [5]	≥ 4.99 mm	82.6	73.7	88.4	63.6
Gupta and Ramanathan (2023) [6]	> 4 mm	85.9	34.9	70.2	58.4
Yela., *et al*. (2009) [7]	> 4 mm	95.6	7.4	53.3	60
Wong., et al. (2016) [8]	> 5 mm	93.5	74.0	19.7	99.2
G., *et al.* (1995) [9]	> 4 mm	69.3	82.7	74.1	72.1

Table 3: *Diagnostic performance of transvaginal ultrasound (TVUS) for detecting endometrial pathology in postmenopausal bleeding: comparison with literature.*

Our data shows a sensitivity of 81.8% and a notably high specificity of 93.9%. This high specificity means that when our TVUS suggested a normal endometrium, it was correct in over 93% of cases, which is crucial for avoiding unnecessary invasive procedures. This performance is consistent with recent studies like Rahman., *et al.* (2025) [5] and Shabir., *et al.* (2020) [10], which also report high sensitivity and good specificity using similar cut-offs. For instance, Gupta and Ramanathan (2023) and Yela., *et al.* (2009) reported specificities below 35%, leading to a high number of false positives and unnecessary further investigations [6,7].

The high concordance (88.23%) between TVUS and hysteroscopy for a thin endometrium further reinforces its role as a reliable triage tool. This is strongly supported by a 2018 consensus from the International Endometrial Tumor Analysis (IETA) group, which reaffirms that an ET ≤ 4 mm in a postmenopausal woman with bleeding carries a very low risk of endometrial cancer [3].

However, our study also highlights the inherent limitations of TVUS, particularly its poor sensitivity (23.1%) for detecting focal lesions like polyps, despite perfect specificity (100%). TVUS is excellent for measuring global endometrial volume but is less adept at characterizing focal pathology. This is a well-documented limitation. A systematic review and meta-analysis by van Hanegem., *et al*. directly addressed this issue and concluded that office hysteroscopy is superior to TVUS for the diagnosis of focal intracavitary lesions (such as polyps and submucosal fibroids) in women with abnormal uterine bleeding, demonstrating higher sensitivity and diagnostic accuracy [11].

The diagnostic superiority of hysteroscopy and its evolving role

Our data demonstrate the exceptional diagnostic performance of hysteroscopy, confirming its role as the visual "gold standard" for evaluating the endometrial cavity. The high concordance with histopathology for atrophic endometrium (93.3%) and the outstanding sensitivity and specificity for polyps (96.2%/100%) and malignancy (100%/98%) are noteworthy.

These figures are strongly supported by recent literature. The 2019 AAGL practice report on the management of PMB states that hysteroscopy is the most accurate method for diagnosing intracavitary pathology and allows for directed biopsy, improving the diagnosis of focal lesions that could be missed by blind sampling [12].

Furthermore, the advent of office hysteroscopy without anesthesia has enhanced its feasibility and patient acceptability as a secondary diagnostic tool. The near-perfect sensitivity for malignancy in our study underscores its value; a normal hysteroscopic examination reliably excludes a significant intracavitary lesion.

The etiological profile identified in our cohort is instructive. The predominance of endometrial polyps (43.3% on histology) as the most common finding is a classic result, followed by atrophic endometrium (25%). More importantly, the prevalence of malignant or pre-malignant lesions was 18.3%, a figure that underscores the "red flag" nature of postmenopausal bleeding and fully justifies a systematic diagnostic protocol.

Histopathology remains the ultimate arbiter for a definitive diagnosis. Our study shows an excellent correlation between hysteroscopic suspicion of malignancy and the final histological diagnosis (91.7% confirmed). Modern research continues to refine the hysteroscopic criteria for predicting histology. A recent study by Vitale., *et al.* (2021) developed and validated a hysteroscopic risk scoring system that effectively stratifies patients into low, intermediate, and high risk for endometrial cancer based on specific visual characteristics, further enhancing the predictive value of the procedure [13].

However, as hysteroscopy can sometimes overestimate the severity of hyperplasia, histopathological confirmation remains mandatory before definitive surgical management.

Conclusion

In conclusion, this study confirms the powerful synergy of TVUS, hysteroscopy, and histopathology. TVUS serves as an invaluable, non-invasive triage tool with high specificity for ruling out disease. Hysteroscopy proves to be a highly accurate technique for direct intracavitary evaluation, especially for focal lesions. Finally, histopathology remains the definitive diagnostic standard. Integrating these three modalities in a sequential approach ensures an optimal, safe, and effective evaluation of postmenopausal bleeding, facilitating the early diagnosis of serious pathology while avoiding unnecessary invasive procedures for women at low risk.

Disclosure

The authors have nothing to report.

Informed Consent

No written consent has been obtained from the patients as there is no patient identifiable data included.

Conflicts of Interest

The authors declare no conflicts of interest.

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Volume 15 Issue 1 January 2026