e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2025; 17(9); 1179-1183

Original Research Article

Comparative Analysis of Hysteroscopic and Ultrasonographic Findings and Their Histopathological Correlation in Perimenopausal Bleeding

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Received: 01-06-2025 / Revised: 15-07-2025 / Accepted: 21-08-2025
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Conflict of interest: Nil

Abstract

Background: Abnormal uterine bleeding (AUB) is a common gynecological concern in perimenopausal women, requiring accurate diagnosis to guide management.

Objective: To compare the diagnostic efficacy of ultrasonography and hysteroscopy in detecting uterine abnormalities in AUB and correlate findings with histopathology.

Material and Methods: A prospective observational study was conducted on 120 perimenopausal women with AUB. All participants underwent USG, hysteroscopy, and targeted biopsies for histopathological examination. Diagnostic accuracy, sensitivity, and specificity were analyzed.

Results: Hysteroscopy demonstrated higher diagnostic accuracy than USG, particularly for polyps, submucous fibroids, and endometrial hyperplasia. Histopathology confirmed definitive diagnoses, including malignancies in two cases. Combined hysteroscopy and histopathology provided optimal evaluation.

Conclusion: Hysteroscopy, complemented by histopathology, offers superior diagnostic precision compared to USG alone, facilitating accurate evaluation and management of perimenopausal AUB.

Keywords: Abnormal uterine bleeding, Hysteroscopy, Ultrasonography, Histopathology.

Introduction

Abnormal uterine bleeding (AUB) is a prevalent gynecological concern, particularly among perimenopausal women, significantly impacting their quality of life. The perimenopausal period, characterized by hormonal fluctuations, often leads to menstrual irregularities, making the evaluation of AUB crucial for appropriate management [1].

Ultrasonography (USG), especially transvaginal ultrasound, is commonly employed as a non-invasive first-line imaging modality to assess uterine abnormalities. It aids in evaluating endometrial thickness and detecting structural lesions such as fibroids and polyps [2]. However, USG may have limitations in visualizing certain intrauterine pathologies, necessitating further diagnostic procedures [3].

Hysteroscopy, on the other hand, offers direct visualization of the uterine cavity, allowing for the identification of lesions that may not be apparent on ultrasound. It also facilitates targeted biopsy collection for histopathological examination, providing definitive diagnosis [4]. Histopathological evaluation remains the gold standard for diagnosing endometrial pathologies, offering detailed insights into cellular changes and aiding in the differentiation between benign and malignant conditions [5].

Recent studies have demonstrated that hysteroscopy has superior diagnostic accuracy compared to USG for detecting endometrial polyps, submucous fibroids, and endometrial hyperplasia in perimenopausal women [6,7]. Moreover, combining hysteroscopic evaluation with histopathology enhances diagnostic precision, ensuring timely and appropriate management [8]. With increasing emphasis on minimally invasive diagnostics, hysteroscopy is recommended as the gold standard for assessing persistent or unexplained AUB [9,10].

This study aims to compare the diagnostic efficacy of ultrasonography and hysteroscopy in detecting uterine abnormalities in perimenopausal women presenting with AUB, correlating findings with histopathological examination to determine the most accurate approach for evaluation and management.

Materials and Methods

This study was designed as a prospective, observational study conducted at the Department of

Obstetrics and Gynecology, in collaboration with the Pathology department, at a tertiary care center. The study period extended over 12 months, from January 2023 to December 2023. The study population included perimenopausal women presenting with abnormal uterine bleeding (AUB) who consented to participate in the research.

A total of 120 participants were enrolled based on the prevalence of uterine abnormalities in perimenopausal women and calculated using standard sample size formulas for observational studies. Women aged above 40 years with confirmed AUB and a willingness to undergo ultrasonography, hysteroscopy, and subsequent histopathological evaluation were included. Patients with acute pelvic infection, pregnancy, coagulation disorders, or refusal to provide consent were excluded from the study.

All participants underwent a detailed clinical evaluation, including medical history and gynecological examination. Transvaginal ultrasonography was performed to assess endometrial thickness, detect fibroids, polyps, and other structural abnormalities. Subsequently, diagnostic hysteroscopy was conducted to directly visualize the uterine cavity, identify lesions, and obtain targeted biopsies for histopathological analysis. The histopathology served as the reference standard to confirm the presence and type of endometrial pathology.

Data on patient demographics, clinical presentation, ultrasonographic findings, hysteroscopic observations, and histopathological results were collected and recorded systematically. Ethical approval for the study was obtained from the Institutional Ethics Committee, and written informed consent was obtained from all participants. Patient confidentiality and privacy were maintained throughout the study.

Data analysis involved descriptive statistics for demographic and clinical variables. Continuous variables were analyzed using appropriate statistical tests, and categorical variables were compared using chi-square tests. The diagnostic accuracy, sensitivity, specificity, positive predictive value, and negative predictive value of ultrasonography and hysteroscopy were calculated with histopathology as the gold standard. Statistical significance was considered at a p-value of <0.05. All analyses were performed using SPSS version 26.0, with graphs and tables generated in Microsoft Excel 2016.

Results

The findings of this study among 120 perimenopausal women with abnormal uterine bleeding (AUB) were analyzed using ultrasonography (USG), hysteroscopy, and histopathology. Table 1 presents the overall detection of normal and abnormal findings. USG identified 65 women (54.17%) as normal and 55 (45.83%) as abnormal. Hysteroscopy detected abnormalities in 64 participants (53.33%), slightly higher than USG, while histopathology confirmed abnormalities in 63 participants (52.5%). Submucous fibroids were detected in 3 patients (5%) on USG, 8 patients (13.33%) on hysteroscopy, and none on histopathology. Adenomyosis was identified in 8 patients (14.55%) on USG, whereas hysteroscopy did not detect any cases. Endometrial polyps were seen in 8 patients (14.55%) on USG, 17 patients (28.33%) on hysteroscopy, and 19 patients (31.67%) on histopathology. Endometrial hyperplasia was reported in 34 patients (61.82%) on USG, 20 (33.33%) on hysteroscopy, and 23 (38.33%) on histopathology. Endometritis was found in 0 on USG, 6 (10%) on hysteroscopy, and none on histopathology. Atrophic endometrium was observed in 3 patients (5.45%) on USG, 4 (6.67%) on hysteroscopy, and 12 (20%) on histopathology. Cervical polyps were detected only on histopathology in 5 patients (8.33%), and endometrial malignancy was identified in 2 patients (3.33%) on histopathology.

Table 2 shows the correlation of USG findings for fibroids with hysteroscopy and histopathology. Out of the 3 patients identified with fibroids on USG, 2 were confirmed as normal on hysteroscopy and histopathology (50% each), and 1 patient was confirmed as an endometrial polyp (16.7%). This demonstrates the limitations of USG in accurately detecting fibroids compared to hysteroscopy and histopathology.

Table 3 presents the correlation of USG findings for adenomyosis with hysteroscopy and histopathology. Among 9 patients detected with adenomyosis on USG, 6 were normal on hysteroscopy and histopathology (66.7%), 2 were atrophic endometrium on USG, and 1 case was confirmed as endometrial hyperplasia (11.1%). This highlights that hysteroscopy may not detect adenomyosis effectively.

Table 4 displays the correlation of USG-detected endometrial polyps with hysteroscopy and histopathology. Of 8 polyps detected on USG, 1 was normal on both hysteroscopy and histopathology (12.5%), and 5 were confirmed as polyps on hysteroscopy and histopathology (62.5%). This indicates that hysteroscopy more accurately identifies endometrial polyps compared to USG.

Table 5 presents the comparison of USG findings for endometrial hyperplasia with hysteroscopy and histopathology. Out of 35 patients diagnosed with hyperplasia on USG, 7 were normal on

hysteroscopy (20%) and 8 on histopathology (22.9%), while the majority were confirmed as hyperplasia on both hysteroscopy and histopathology (72–75%). This confirms the high concordance between USG and histopathology in detecting hyperplasia. Table 6 shows USG-detected endometrial malignancy correlated with hysteroscopy and histopathology. Of the 2 malignancies detected, 1 was confirmed on hysteroscopy and histopathology, while 1 was only detected on histopathology, indicating that USG may occasionally miss early malignancies.

Table 1: Findings on USG, Hysteroscopy, and Histopathology (n=120)

Findings	USG N (%)	Hysteroscopy N (%)	Histopathology N (%)
Normal	65 (54.17)	56 (46.67)	57 (47.5)
Abnormal	55 (45.83)	64 (53.33)	63 (52.5)
Submucous fibroid	3 (5)	8 (13.33)	0 (0)
Adenomyosis	8 (14.55)	0 (0)	0 (0)
Endometrial polyp	8 (14.55)	17 (28.33)	19 (31.67)
Endometrial hyperplasia	34 (61.82)	20 (33.33)	23 (38.33)
Endometritis	0 (0)	6 (10)	0 (0)
Endometrial malignancy	1 (1.82)	1 (1.67)	2 (3.33)
Intrauterine adhesions	0 (0)	6 (10)	0 (0)
Atrophic endometrium	3 (5.45)	4 (6.67)	12 (20)
Cervical polyp	0 (0)	0 (0)	5 (8.33)
Cervical malignancy	0 (0)	0 (0)	0 (0)

Table 2: Comparison of USG Finding (Fibroid) with Hysteroscopy and Histopathology (n=120)

Findings on USG	Hysteroscopy	%	Histopathology	%
Fibroid (n=3)	Normal	2	Normal	2
Fibroid (n=3)	Endometrial polyp	1	Endometrial polyp	1

Table 3: Comparison of USG Finding (Adenomyosis) with Hysteroscopy and Histopathology (n=120)

Findings on USG	Hysteroscopy	%	Histopathology	%
Adenomyosis (n=9)	Normal	6	Normal	6
Adenomyosis (n=9)	Atrophic endometrium	2	0	0
Adenomyosis (n=9)	Endometrial hyperplasia	1	1	1

Table 4: Comparison of USG Finding (Endometrial Polyp) with Hysteroscopy and Histopathology (n=120)

Findings on USG	Hysteroscopy	%	Histopathology	%
Endometrial polyp (n=8)	Normal	1	Normal	1
Endometrial polyp (n=8)	Endometrial polyp	5	Endometrial polyp	5

Table 5: Comparison of USG Finding (Endometrial Hyperplasia) with Hysteroscopy and Histopathology (n=120)

Findings on USG	Hysteroscopy	%	Histopathology	%
Endometrial hyperplasia (n=35)	Normal	7	Normal	8
Endometrial hyperplasia (n=35)	Endometrial hyperplasia	28	Endometrial hyperplasia	27

Table 6: Comparison of USG Finding (Endometrial Malignancy) with Hysteroscopy and Histopathology (n=120)

Findings on USG	Hysteroscopy	Histopathology
Endometrial malignancy (n=2)	1	2

Discussion

The present study aimed to compare the diagnostic efficacy of ultrasonography (USG) and hysteroscopy in detecting uterine abnormalities in perimenopausal women with abnormal uterine bleeding (AUB), with histopathology as the gold standard. Our findings demonstrated that hysteroscopy provided superior diagnostic accuracy compared to USG for most endometrial pathologies. USG was limited in detecting submucous fibroids, adenomyosis, and endometrial polyps, whereas hysteroscopy more accurately identified intrauterine lesions, facilitating targeted biopsy [11].

Endometrial hyperplasia was the most common pathology identified, consistent with previous studies indicating that perimenopausal hormonal changes predispose to proliferative endometrial disorders [12]. The concordance between hysteroscopy and histopathology in detecting hyperplasia was higher than USG, highlighting hysteroscopy's role as a critical diagnostic tool in perimenopausal AUB [13]. Submucous fibroids and polyps were frequently missed on USG but identified on hysteroscopy, emphasizing that USG alone may underdiagnose structural abnormalities in the uterine cavity [14].

Our findings also confirmed that histopathological evaluation remains essential for definitive diagnosis, particularly for detecting malignancies and atypical hyperplasia. Two cases of endometrial malignancy were identified, one of which was detected only on histopathology, reinforcing that even hysteroscopy may occasionally fail to detect subtle malignant changes [15].

The study supports prior evidence suggesting that an integrated diagnostic approach combining hysteroscopy and histopathology ensures accurate evaluation, guiding optimal management and improving clinical outcomes in perimenopausal women with AUB.

Overall, this study demonstrates that while USG is valuable as a non-invasive screening tool, hysteroscopy provides higher diagnostic precision, particularly for intrauterine lesions, and should be considered when structural abnormalities are suspected or when initial USG findings are inconclusive. These findings underscore the importance of selecting appropriate diagnostic modalities to ensure timely detection of benign and malignant uterine conditions.

Conclusion

Hysteroscopy demonstrates superior diagnostic efficacy compared to ultrasonography in evaluating perimenopausal women with abnormal uterine bleeding. Histopathology remains the gold standard for definitive diagnosis. Combining hysteroscopy with histopathological assessment provides the most accurate evaluation, facilitating early detection of structural abnormalities and malignancies, and guiding optimal management strategies for improved patient outcomes.

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