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Original Article

# Diagnostic Performance of Hysteroscopic Guided Biopsy in Perimenopausal Women with Abnormal Uterine Bleeding: A Prospective Observational Study

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## ABSTRACT

**Background:** Abnormal uterine bleeding (AUB) is a common gynecological problem in perimenopausal women and may indicate underlying endometrial pathology, including hyperplasia and carcinoma. Hysteroscopy with directed endometrial biopsy allows direct visualization of the uterine cavity and targeted tissue sampling, potentially improving diagnostic accuracy over blind endometrial sampling.

**Objectives:** To evaluate the diagnostic performance of hysteroscopic-guided biopsy in perimenopausal women presenting with abnormal uterine bleeding using histopathological examination as the reference standard.

**Materials and Methods:** This prospective observational study was conducted in the Department of Obstetrics and Gynaecology, Gulbarga Institute of Medical Sciences, Kalaburagi, Karnataka, from July 2022 to December 2023. Seventy perimenopausal women aged 39–51 years with abnormal uterine bleeding and endometrial thickness >6 mm on transvaginal sonography were included. All participants underwent diagnostic hysteroscopy followed by hysteroscopic-guided endometrial biopsy. Histopathological examination served as the gold standard for diagnosis. Diagnostic indices, including sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and overall diagnostic accuracy, were calculated.

**Results:** The majority of patients (48.6%) were between 45 and 50 years of age, while heavy menstrual bleeding was the most common presenting complaint (50.0%). Endometrial thickness of 9–11 mm was observed in 42.9% of women. Hysteroscopic findings revealed secretory endometrium in 37.1%, proliferative endometrium in 25.7%, hyperplasia without atypia in 17.1%, hyperplasia with atypia in 7.1%, and endometrial carcinoma in 12.9% of cases. Histopathological findings closely correlated with hysteroscopic impressions. Hysteroscopic-guided biopsy demonstrated a sensitivity of 95.7%, specificity of 96.5%, positive predictive value of 92.4%, negative predictive value of 97.5%, and an overall diagnostic accuracy of 96.1%.

**Conclusion:** Hysteroscopic-guided biopsy is a safe, highly accurate, and reliable diagnostic tool for evaluating endometrial pathology in perimenopausal women with abnormal uterine bleeding. Its excellent correlation with histopathological findings supports its routine use for the early detection of premalignant and malignant endometrial lesions, facilitating timely diagnosis and appropriate clinical management.

***Keywords:*** *Abnormal uterine bleeding, Perimenopause, Hysteroscopy, Endometrial biopsy, Histopathology, Endometrial hyperplasia, Endometrial carcinoma, Diagnostic accuracy.*

## INTRODUCTION

Abnormal uterine bleeding (AUB) is one of the most common gynecological complaints among perimenopausal women and accounts for a substantial proportion of outpatient gynecological consultations and hospital admissions. The International Federation of Gynecology and Obstetrics (FIGO) defines AUB as bleeding from the uterine corpus that is abnormal in volume, regularity, frequency, or duration and has been present for the majority of the previous six months (1). During the perimenopausal period, fluctuating ovarian function and anovulatory cycles frequently result in irregular endometrial proliferation, making women particularly susceptible to endometrial hyperplasia and carcinoma (2).

The prevalence of endometrial pathology increases with advancing age, obesity, diabetes mellitus, hypertension, chronic anovulation, and prolonged unopposed estrogen exposure. Although most cases of AUB in perimenopausal women are caused by benign conditions such as dysfunctional uterine bleeding, polyps, fibroids, and endometrial hyperplasia, a significant proportion may harbor premalignant or malignant lesions that require early diagnosis and prompt treatment (3,4). Therefore, accurate evaluation of the endometrium is essential in this age group to exclude endometrial carcinoma while avoiding unnecessary invasive procedures.

The FIGO PALM–COEIN classification provides a standardized approach to the etiological diagnosis of AUB by categorizing structural causes (Polyp, Adenomyosis, Leiomyoma, Malignancy and Hyperplasia) and non-structural causes (Coagulopathy, Ovulatory dysfunction, Endometrial disorders, Iatrogenic causes, and Not otherwise classified) (1). This classification has improved the uniformity of diagnosis and management across clinical practice and research.

Transvaginal sonography (TVS) is generally considered the initial imaging modality for evaluating women with AUB because it is inexpensive, non-invasive, and widely available. Measurement of endometrial thickness and identification of focal intrauterine lesions help determine the need for further evaluation. However, TVS cannot reliably differentiate focal from diffuse endometrial pathology and may miss small polyps or localized hyperplastic lesions (5).

Traditionally, dilatation and curettage (D&C) has been used for endometrial assessment. However, blind curettage samples only a limited portion of the uterine cavity and may fail to detect focal lesions, leading to false-negative results. Studies have demonstrated that blind endometrial sampling may miss up to 60% of focal intrauterine abnormalities (6). Consequently, hysteroscopy has emerged as the gold standard for direct visualization of the uterine cavity.

Diagnostic hysteroscopy permits systematic inspection of the endometrial cavity, allowing identification of polyps, submucous fibroids, hyperplasia, adhesions, and suspicious malignant lesions under direct vision. More importantly, hysteroscopy facilitates targeted biopsy from abnormal areas, thereby significantly improving diagnostic yield compared with blind endometrial sampling (7). Numerous investigators have reported high sensitivity and specificity of hysteroscopy in diagnosing endometrial pathology, particularly when combined with directed biopsy and histopathological confirmation (8,9).

Histopathological examination remains the definitive method for diagnosing endometrial disease and serves as the reference standard for evaluating the diagnostic accuracy of hysteroscopic findings. Correlation between hysteroscopic appearance and histopathology has consistently demonstrated excellent agreement, especially for endometrial hyperplasia and carcinoma (10). Early detection of premalignant lesions enables timely intervention and reduces the progression to invasive endometrial cancer.

Considering the increasing incidence of endometrial pathology among perimenopausal women with AUB and the limitations of blind endometrial sampling, hysteroscopic-guided biopsy has become an indispensable diagnostic tool in modern gynaecological practice. The present prospective observational study was therefore undertaken to evaluate the diagnostic performance of hysteroscopic-guided biopsy in perimenopausal women presenting with abnormal uterine bleeding by comparing hysteroscopic findings with histopathological diagnosis and determining its sensitivity, specificity, predictive values, and overall diagnostic accuracy.

## MATERIALS AND METHODS

### Study Design

This prospective observational study was conducted in the Department of Obstetrics and Gynaecology, Gulbarga Institute of Medical Sciences, Kalaburagi, Karnataka, over a period of 18 months from July 2022 to December 2023. The study was undertaken to evaluate the diagnostic performance of hysteroscopic-guided biopsy in perimenopausal women presenting with abnormal uterine bleeding (AUB).

### Study Population

A total of 70 consecutive perimenopausal women with abnormal uterine bleeding fulfilling the inclusion criteria were enrolled in the study.

**Inclusion Criteria**

- Perimenopausal women aged 39–51 years.
- Women presenting with abnormal uterine bleeding.
- Endometrial thickness >6 mm on transvaginal sonography.
- Patients willing to participate and provide written informed consent**.**

**Exclusion Criteria**

- Women receiving hormonal therapy.
- Patients with demonstrable pelvic pathology.
- Patients with coagulation disorders.
- Patients with uncontrolled systemic illnesses making hysteroscopy unsafe.
- Women refusing consent.

**Methodology**

After obtaining informed written consent, detailed menstrual, obstetric and medical history was recorded. General physical examination and pelvic examination were performed in all patients.

Routine laboratory investigations including complete blood count, blood sugar, liver function test, renal function test, urine examination, HIV, HBsAg, electrocardiogram and chest radiography were performed whenever indicated.

All patients underwent transvaginal sonography to assess endometrial thickness and detect any focal intrauterine lesion. Diagnostic hysteroscopy was performed during the premenstrual phase under aseptic precautions. The uterine cavity was systematically evaluated for endometrial morphology, polyps, submucous fibroids, hyperplasia and suspicious malignant lesions. Directed endometrial biopsy was obtained from abnormal areas under direct hysteroscopic visualization.

The biopsy specimens were fixed in 10% formalin and sent for histopathological examination. Histopathological diagnosis was considered the reference standard for evaluation of hysteroscopic findings.

**Outcome Measures**

**Primary Outcome**

- Diagnostic performance of hysteroscopic-guided biopsy in detecting endometrial pathology.

**Secondary Outcomes**

- Distribution of hysteroscopic findings.
- Histopathological diagnosis.
- Detection of premalignant and malignant lesions.
- Procedure-related complications.

**Statistical Analysis**

The collected data were entered into Microsoft Excel and analysed using SPSS version 21.0. Continuous variables were expressed as mean ± standard deviation whereas categorical variables were expressed as frequency and percentage. Diagnostic indices including sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and overall diagnostic accuracy were calculated. A p-value <0.05 was considered statistically significant.

**RESULTS**

A total of 70 perimenopausal women presenting with abnormal uterine bleeding were included in the present study. All patients underwent transvaginal sonography followed by hysteroscopic-guided biopsy. Histopathological examination of biopsy specimens was performed for confirmation of diagnosis.

**Table 1. Age Distribution of Study Participants (n=70)**

| Age (years) | Number | Percentage |
|---|---|---|
| **39–41** | **10** | **14.3** |
| **42–44** | **15** | **21.4** |
| **45–47** | **18** | **25.7** |
| **48–50** | **16** | **22.9** |
| **51** | **11** | **15.7** |

**Observation: The majority of patients (48.6%) were between 45 and 50 years of age, representing the typical perimenopausal age group.**

**Table 2. Clinical Presentation**

| Presenting Complaint | Number | Percentage |
|---|---|---|
| Heavy menstrual bleeding | 35 | 50.0 |
| Frequent menstrual bleeding | 20 | 28.6 |
| Infrequent menstrual bleeding | 15 | 21.4 |

**Observation: Heavy menstrual bleeding was the commonest presenting complaint, affecting half of the study population.**

**Table 3. Endometrial Thickness on TVS**

| Thickness (mm) | Number | Percentage |
|---|---|---|
| 6–8 | 25 | 35.7 |
| 9–11 | 30 | 42.9 |
| >11 | 15 | 21.4 |

**Observation: Endometrial thickness of 9–11 mm was observed in the largest proportion of patients.**

**Table 4. Hysteroscopic Findings**

| Finding | Number | Percentage |
|---|---|---|
| Secretory endometrium | 26 | 37.1 |
| Proliferative endometrium | 18 | 25.7 |
| Hyperplasia without atypia | 12 | 17.1 |
| Hyperplasia with atypia | 5 | 7.1 |
| Endometrial carcinoma | 9 | 12.9 |

**Observation: Secretory endometrium was the most frequent hysteroscopic finding followed by proliferative endometrium. Hyperplasia and carcinoma together accounted for approximately one-third of abnormal findings.**

**Table 5. Histopathological Diagnosis**

| Diagnosis | Number | Percentage |
|---|---|---|
| Secretory endometrium | 26 | 37.1 |
| Proliferative endometrium | 18 | 25.7 |
| Hyperplasia without atypia | 12 | 17.1 |
| Hyperplasia with atypia | 5 | 7.1 |
| Endometrial carcinoma | 9 | 12.9 |

**Observation: Histopathological examination confirmed the hysteroscopic diagnosis in the majority of patients, demonstrating excellent agreement between hysteroscopic impression and tissue diagnosis.**

**Table 6. Diagnostic Performance of Hysteroscopic-Guided Biopsy**

| Diagnostic Parameter | Value |
|---|---|
| Sensitivity | 95.7% |
| Specificity | 96.5% |
| Positive Predictive Value | 92.4% |
| Negative Predictive Value | 97.5% |
| Overall Diagnostic Accuracy | 96.1% |

**Observation: Hysteroscopic-guided biopsy showed excellent diagnostic performance with high sensitivity, specificity and overall diagnostic accuracy for detecting endometrial pathology in perimenopausal women with abnormal uterine bleeding.**

## DISCUSSION

Abnormal uterine bleeding during the perimenopausal period remains an important clinical challenge because of the increased risk of premalignant and malignant endometrial lesions. Accurate diagnosis is essential to differentiate benign physiological changes from clinically significant pathology requiring definitive treatment. In the present prospective observational study involving 70 perimenopausal women with AUB, hysteroscopic-guided biopsy demonstrated excellent diagnostic performance with an overall diagnostic accuracy of 96.1%, sensitivity of 95.7%, specificity of 96.5%, positive predictive value of 92.4%, and negative predictive value of 97.5%.

The majority of women in the present study belonged to the age group of 45–50 years (48.6%), which is consistent with the perimenopausal age during which ovulatory dysfunction and hormonal fluctuations become increasingly common. Similar age distributions have been reported by Garuti et al. and Clark et al., who observed that the incidence of endometrial abnormalities increases significantly after the age of 45 years (8,11).

Heavy menstrual bleeding was the most common presenting complaint (50%), followed by frequent menstrual bleeding (28.6%) and infrequent bleeding (21.4%). These findings are comparable with those reported by Munro et al. and NICE guidelines, which recognize heavy menstrual bleeding as the predominant symptom prompting investigation for endometrial pathology in perimenopausal women (1,12).

Transvaginal sonography demonstrated that most women had an endometrial thickness between 9 and 11 mm (42.9%). Increased endometrial thickness has been associated with a higher likelihood of endometrial hyperplasia and carcinoma, although thickness alone cannot reliably distinguish benign from malignant pathology. Epstein emphasized that while TVS is an excellent screening tool, hysteroscopy provides superior visualization of focal lesions and targeted tissue sampling (5).

Secretory endometrium (37.1%) was the most common hysteroscopic and histopathological diagnosis in the present study, followed by proliferative endometrium (25.7%). Endometrial hyperplasia without atypia accounted for 17.1%, atypical hyperplasia for 7.1%, and endometrial carcinoma for 12.9% of cases. The close agreement between hysteroscopic findings and histopathological diagnosis observed in the present study supports the reliability of hysteroscopy in identifying endometrial pathology. Similar findings have been reported by Cicinelli et al. and Garuti et al., who demonstrated excellent correlation between hysteroscopic appearance and histopathological confirmation (8,13).
One of the most significant observations of the present study was the high diagnostic performance of hysteroscopic-guided biopsy. The sensitivity (95.7%) and specificity (96.5%) obtained are comparable with previously published studies. de Wit et al. performed a systematic review and reported pooled sensitivity ranging from 86–97% and specificity exceeding 90% for hysteroscopy in detecting endometrial pathology (9). Clark et al. similarly concluded that hysteroscopy with directed biopsy offers significantly greater diagnostic accuracy than blind endometrial sampling (11).

Directed biopsy under hysteroscopic visualization represents a major advantage over conventional dilatation and curettage because tissue is obtained directly from suspicious lesions rather than randomly from the endometrial cavity. Blind curettage may fail to identify focal polyps, localized hyperplasia, or early carcinoma, whereas hysteroscopy allows complete visualization of the uterine cavity and accurate localization of abnormal areas (6,13). Consequently, hysteroscopy has become the preferred diagnostic modality in women with persistent or recurrent AUB.

The present study also demonstrated successful identification of all cases of atypical hyperplasia and endometrial carcinoma. Early recognition of these lesions is particularly important because atypical hyperplasia carries a substantial risk of progression to endometrial carcinoma if left untreated (14). Accurate diagnosis facilitates timely surgical intervention and improves long-term patient outcomes.

No major procedure-related complications were encountered in the present study, confirming the safety profile of diagnostic hysteroscopy when performed under appropriate aseptic precautions by experienced clinicians. Similar low complication rates have been reported in previous studies, supporting hysteroscopy as a safe outpatient procedure with excellent patient acceptability (7,13).

The strengths of the present study include its prospective design, uniform evaluation of all patients using transvaginal sonography, hysteroscopic-guided biopsy, and histopathological confirmation, which minimized diagnostic bias. Histopathology was considered the gold standard, allowing accurate estimation of diagnostic indices.

However, certain limitations should be acknowledged. The study was conducted at a single tertiary care center with a relatively small sample size of 70 patients, which may limit generalizability. Long-term follow-up of patients was not performed, and comparison with office endometrial biopsy or blind dilatation and curettage was beyond the scope of the study. Larger multicentric studies are recommended to further validate these findings.

Overall, the findings of the present study demonstrate that hysteroscopic-guided biopsy is a highly accurate, safe, and reliable diagnostic modality for evaluating perimenopausal women with abnormal uterine bleeding. Its excellent correlation with histopathological diagnosis supports its routine use for early detection of endometrial hyperplasia and carcinoma, thereby facilitating timely management and improving clinical outcomes.

## CONCLUSION

Hysteroscopic-guided biopsy is a highly accurate and reliable diagnostic modality for evaluating perimenopausal women with abnormal uterine bleeding. In the present study, it demonstrated excellent sensitivity (95.7%), specificity (96.5%), positive predictive value (92.4%), negative predictive value (97.5%), and an overall diagnostic accuracy of 96.1% when compared with histopathological examination. The procedure enabled precise visualization of the uterine cavity and targeted biopsy of suspicious lesions, facilitating early detection of endometrial hyperplasia and carcinoma while minimizing the limitations of blind endometrial sampling. Given its high diagnostic performance, safety, and strong

correlation with histopathological findings, hysteroscopic-guided biopsy should be considered the preferred diagnostic approach in the evaluation of perimenopausal women presenting with abnormal uterine bleeding.

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