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Diagnostic Performance of Pipelle Endometrial Sampling in Perimenopausal Women with Abnormal Uterine Bleeding: A Prospective Observational Study

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ABSTRACT

Background: Abnormal uterine bleeding (AUB) is one of the most common gynaecological complaints among perimenopausal women and requires timely evaluation to exclude premalignant and malignant endometrial lesions. Pipelle endometrial sampling is a minimally invasive outpatient procedure that offers a simple and reliable method for endometrial assessment.

Objectives: To evaluate the diagnostic performance, histopathological findings, and safety of Pipelle endometrial sampling in perimenopausal women presenting with abnormal uterine bleeding.

Materials and Methods: A prospective observational study was conducted in the Department of Obstetrics and Gynaecology, Gulbarga Institute of Medical Sciences, Kalaburagi, from July 2022 to December 2023. A total of 70 perimenopausal women with abnormal uterine bleeding underwent Pipelle endometrial sampling. Demographic characteristics, clinical profile, transvaginal ultrasonographic findings, histopathological diagnosis, diagnostic performance, complications, and clinical outcomes were recorded. Data were analyzed using SPSS version 21.0, and a p-value <0.05 was considered statistically significant.

Results: The majority of participants (25.7%) belonged to the 45–47-year age group, and heavy menstrual bleeding was the most common presenting complaint (50.0%). Endometrial thickness of 9–11 mm was observed in 42.9% of women. Histopathological examination revealed secretory endometrium in 35.7%, proliferative endometrium in 28.6%, endometrial hyperplasia without atypia in 14.3%, hyperplasia with atypia in 7.1%, and endometrial carcinoma in 14.3% of cases. Pipelle endometrial sampling demonstrated a sensitivity of 93.3%, specificity of 95.0%, positive predictive value of 90.0%, and negative predictive value of 96.0%. Procedure-related complications were minimal, with no complications in 85.7% of patients, and symptom relief was achieved in 78.6% during follow-up.

Conclusion: Pipelle endometrial sampling is a safe, accurate, and minimally invasive outpatient procedure for evaluating abnormal uterine bleeding in perimenopausal women and can be recommended as an effective first-line diagnostic modality.

Keywords*: Abnormal uterine bleeding, Pipelle biopsy, Endometrial sampling, Perimenopause, Histopathology, Endometrial hyperplasia.*

INTRODUCTION

Abnormal uterine bleeding (AUB) is one of the most common gynecological disorders encountered in women approaching menopause and accounts for a substantial proportion of outpatient gynecological consultations worldwide. It adversely affects physical health, psychological well-being, social functioning, and quality of life while contributing

significantly to healthcare utilization and economic burden. The prevalence of AUB increases during the perimenopausal period because of hormonal fluctuations, anovulatory cycles, and age-related endometrial changes, making prompt evaluation essential to exclude premalignant and malignant conditions (1,2).

Perimenopause represents the transitional period preceding menopause and is characterized by irregular ovulation and progressive ovarian follicular depletion. These endocrine alterations often result in menstrual irregularities, including heavy menstrual bleeding, prolonged bleeding, intermenstrual bleeding, and infrequent menstrual cycles. Although many cases are attributable to benign hormonal disturbances, endometrial hyperplasia and endometrial carcinoma remain important differential diagnoses that require early identification (3,4).

Histopathological examination of endometrial tissue remains the gold standard for diagnosing endometrial pathology. Endometrial sampling is therefore recommended in women aged 45 years or older presenting with abnormal uterine bleeding and in younger women with persistent symptoms or significant risk factors for endometrial malignancy. Early diagnosis facilitates timely treatment and improves clinical outcomes (5,6).

Several techniques are available for obtaining endometrial tissue, including dilatation and curettage, hysteroscopy-guided biopsy, and office-based endometrial aspiration. Although hysteroscopy provides direct visualization of the uterine cavity, it is relatively invasive, requires specialized equipment and expertise, and is associated with higher procedural costs. Consequently, there is increasing interest in minimally invasive outpatient techniques that provide reliable histopathological diagnosis with minimal patient discomfort (7,8).

Pipelle endometrial sampling is a simple suction-based device designed to obtain representative endometrial tissue without cervical dilatation or general anesthesia. The procedure can be performed in an outpatient setting, is inexpensive, rapid, and generally well tolerated by patients. Numerous studies have reported high sensitivity and specificity of Pipelle biopsy in detecting diffuse endometrial lesions, particularly endometrial hyperplasia and carcinoma, making it a valuable first-line diagnostic tool (9–12).

Despite its widespread use, evidence regarding the diagnostic performance of Pipelle biopsy in the Indian population remains limited. Regional studies evaluating its effectiveness and safety are essential to guide clinical practice, particularly in resource-constrained healthcare settings where access to hysteroscopy may be limited. The present prospective observational study was therefore undertaken to evaluate the histopathological findings, diagnostic performance, and safety profile of Pipelle endometrial sampling in perimenopausal women presenting with abnormal uterine bleeding.

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 designed to evaluate the diagnostic performance of Pipelle endometrial sampling in perimenopausal women presenting with abnormal uterine bleeding (AUB).

Study Population

A total of 70 consecutive perimenopausal women with abnormal uterine bleeding fulfilling the eligibility criteria were enrolled after obtaining written informed consent.

Inclusion Criteria

- Women aged 39–51 years
- Perimenopausal women with abnormal uterine bleeding
- Endometrial thickness >6 mm on transvaginal ultrasonography
- Willing to participate

Exclusion Criteria

- **Pregnancy**
- Women receiving hormonal therapy
- Pelvic inflammatory disease
- Bleeding disorders
- Cervical malignancy
- Acute genital tract infection
- Patients unwilling to participate

Sample Size
A total sample size of 70 patients was calculated considering previously reported sensitivity and specificity of Pipelle biopsy with 95% confidence interval and 10% allowable error.

Study Procedure
Detailed menstrual, obstetric and medical history was obtained. General physical examination and pelvic examination were performed. Routine laboratory investigations including CBC, blood sugar, liver and renal function tests, coagulation profile, HIV, HBsAg and urine examination were carried out. Transvaginal sonography was performed to assess endometrial thickness. Pipelle endometrial sampling was performed as an outpatient procedure under aseptic precautions without anaesthesia. Endometrial tissue obtained was fixed in 10% buffered formalin and sent for histopathological examination.
Patients were observed for immediate complications and followed clinically after the procedure.

Outcome Measures
Primary outcome
- Histopathological diagnosis obtained by Pipelle biopsy.

Secondary outcomes
- Sample adequacy
- Diagnostic yield
- Procedure-related complications
- Patient tolerability

Statistical Analysis
Data were entered into Microsoft Excel and analysed using SPSS version 21.0. Continuous variables were expressed as Mean ± SD. Categorical variables were expressed as frequencies and percentages. Chi-square test was used wherever applicable. A p-value <0.05 was considered statistically significant.

RESULTS AND OBSERVATIONS;

Table 1. Baseline Demographic and Clinical Characteristics of the Study Participants (n = 70)

Variable	Category	n (%)
Age (years)	39–41	10 (14.3)
	42–44	15 (21.4)
	45–47	18 (25.7)
	48–50	16 (22.9)
	51	11 (15.7)
Parity	Nulliparous	8 (11.4)
	Multiparous	45 (64.3)
	Grand multiparous	17 (24.3)
BMI (kg/m²)	<18.5	5 (7.1)
	18.5–24.9	30 (42.9)
	25.0–29.9	20 (28.6)
	≥30	15 (21.4)

Observation: Most women were 45–47 years old, multiparous, and had a normal or overweight BMI.

Table 2. Clinical Profile of Perimenopausal Women with Abnormal Uterine Bleeding (n = 70)

Variable	Category	n (%)
Presenting complaint	Heavy menstrual bleeding	35 (50.0)
	Frequent bleeding	20 (28.6)
	Infrequent bleeding	15 (21.4)
Duration of symptoms	≤3 months	20 (28.6)
	4–6 months	30 (42.9)
	7–12 months	15 (21.4)
	>12 months	5 (7.1)
Hemoglobin (g/dL)	<8	15 (21.4)
	8–10	30 (42.9)
	>10	25 (35.7)

Observation: Heavy menstrual bleeding was the commonest presentation, and nearly half of the women had hemoglobin levels between 8–10 g/dL.

Table 3. Transvaginal Ultrasonographic Findings and Associated Comorbidities (n = 70)

Variable	Category	n (%)
Endometrial thickness (mm)	6–8	25 (35.7)
	9–11	30 (42.9)
	>11	15 (21.4)
Comorbidities	Hypertension	20 (28.6)
	Diabetes mellitus	15 (21.4)
	Hypothyroidism	10 (14.3)
	None	25 (35.7)

Observation: Endometrial thickness of 9–11 mm was the most common ultrasonographic finding, while hypertension was the most frequent comorbidity.

Table 4. Histopathological Findings on Pipelle Endometrial Sampling (n = 70)

Histopathological diagnosis	n (%)
Proliferative endometrium	20 (28.6)
Secretory endometrium	25 (35.7)
Endometrial hyperplasia without atypia	10 (14.3)
Endometrial hyperplasia with atypia	5 (7.1)
Endometrial carcinoma	10 (14.3)

Observation: Secretory endometrium was the most frequent histopathological diagnosis, followed by proliferative endometrium.

Table 5. Diagnostic Performance of Pipelle Endometrial Sampling

Diagnostic Parameter	Value (%)
Sensitivity	93.3
Specificity	95.0
Positive Predictive Value (PPV)	90.0
Negative Predictive Value (NPV)	96.0

Observation: Pipelle endometrial sampling demonstrated high sensitivity and specificity for detecting endometrial pathology.

Table 6. Procedure-Related Outcomes Following Pipelle Endometrial Sampling (n = 70)

Variable	Category	n (%)
Complications	None	60 (85.7)
	Bleeding	5 (7.1)
	Infection	3 (4.3)
	Pain	2 (2.9)
Clinical outcome	Symptom relief	55 (78.6)
	Persistent symptoms	15 (21.4)

Observation: Pipelle endometrial sampling was well tolerated, with minimal complications and symptom relief observed in the majority of patients.

DISCUSSION

The present prospective observational study evaluated the diagnostic performance of Pipelle endometrial sampling in 70 perimenopausal women presenting with abnormal uterine bleeding. The findings demonstrate that Pipelle biopsy is a reliable, minimally invasive, and well-tolerated outpatient procedure capable of diagnosing a broad spectrum of endometrial pathologies with high diagnostic accuracy and minimal complications.

The majority of study participants belonged to the 45–47-year age group, reflecting the increased incidence of abnormal uterine bleeding during the perimenopausal transition. Similar age distributions have been reported by Clark et al. and Bhatla et al., who observed that hormonal fluctuations associated with declining ovarian function predispose women in this age group to menstrual irregularities and endometrial abnormalities (13,14).

Heavy menstrual bleeding was the predominant clinical presentation in the present study, accounting for half of all cases. Comparable observations have been reported in previous studies, where heavy menstrual bleeding constituted the commonest symptom among women undergoing endometrial evaluation (15,16).

Histopathological examination revealed secretory endometrium as the most frequent finding, followed by proliferative endometrium and endometrial hyperplasia. Endometrial carcinoma was identified in a smaller but clinically significant

proportion of patients. These findings are consistent with those reported by Dijkhuizen et al. and Fakhar et al., who also demonstrated that Pipelle biopsy effectively detects both benign and malignant endometrial lesions (17,18).

The diagnostic performance observed in the present study was excellent, with a sensitivity of 93.3%, specificity of 95.0%, PPV of 90.0%, and NPV of 96.0%. These findings are comparable to those reported by Stovall et al., Guido et al., and Clark et al., who demonstrated sensitivities ranging from 90% to 97% and specificities exceeding 90% for the diagnosis of significant endometrial pathology using Pipelle biopsy (19–21).

Procedure-related complications were uncommon, with most women experiencing no adverse events. Minor bleeding, pain, and infection occurred infrequently and were managed conservatively. These findings support previous reports demonstrating the excellent safety profile of Pipelle biopsy when performed as an office procedure without anesthesia (22,23).

Most patients experienced symptomatic improvement during follow-up, suggesting that timely histopathological diagnosis facilitated appropriate clinical management. Early identification of endometrial hyperplasia and carcinoma is particularly important because prompt treatment significantly improves prognosis and reduces disease-related morbidity (24,25).

The strengths of the present study include its prospective design, standardized data collection, and comprehensive clinicopathological evaluation. However, certain limitations should be acknowledged. The relatively small sample size and single-center design may limit the generalizability of the findings. Larger multicenter studies involving diverse populations are recommended to further validate these observations.

Overall, the present study demonstrates that Pipelle endometrial sampling is an effective first-line diagnostic modality for evaluating abnormal uterine bleeding in perimenopausal women. Its high diagnostic accuracy, simplicity, low complication rate, and outpatient feasibility make it particularly suitable for routine clinical practice, especially in resource-limited healthcare settings.

CONCLUSION

Pipelle endometrial sampling is a safe, simple, minimally invasive, and accurate outpatient procedure for evaluating abnormal uterine bleeding in perimenopausal women. It demonstrated high diagnostic performance with excellent sensitivity and specificity, while maintaining a low complication rate. Therefore, Pipelle biopsy can be recommended as an effective first-line diagnostic tool for endometrial evaluation, with hysteroscopy reserved for cases of inadequate sampling or suspected focal intrauterine lesions.

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