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Research Article

A HISTOPATHOLOGICAL STUDY OF ENDOMETRIAL BIOPSY SAMPLES IN ABNORMAL UTERINE BLEEDING

[1] Dr Radha Surasetty Angadi, [2]Dr Girish Kumar B S, [3]Dr Murali S V,[4] Dr Narayana Murthy C

[1] Assistant Professor, Department of Pathology, Basaveshwara Medical College and Hospital, Chitradurga, Karnataka, India.

[2] Assistant Professor, Department of Radiodiagnosis, Basaveshwara Medical College and Hospital, Chitradurga, Karnataka, India.

[3] Assistant Professor, Department of General Surgery, Armed Forces Medical College, Pune, India.

[4] Professor and Head, Department of Pathology, Basaveshwara Medical College and Hospital, Chitradurga, Karnataka, India.

*Corresponding Author
Dr Radha Surasetty Angadi

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Abstract: ***Introduction:*** Abnormal uterine bleeding (AUB) is one of the most common gynaecological complaints encountered in clinical practice and significantly affects the quality of life of women across different age groups. It encompasses a wide range of menstrual abnormalities resulting from both physiological and pathological alterations of the endometrium. Histopathological evaluation of endometrial biopsy specimens remains the gold standard for diagnosing endometrial pathology and plays a crucial role in identifying benign, premalignant, and malignant lesions.**Aim:** To study the histopathological spectrum of endometrial biopsy samples in patients presenting with abnormal uterine bleeding. **Objectives:** 1To evaluate the various histopathological patterns observed in endometrial biopsy specimens of patients with abnormal uterine bleeding. 2To determine the distribution of endometrial lesions across different age groups and identify benign, premalignant, and malignant endometrial pathologies. **Materials and Methods**: A hospital-based descriptive cross-sectional study was conducted in the Departments of Pathology and Obstetrics and Gynaecology of a tertiary care teaching hospital over a period of 18 months. A total of 100 women presenting with abnormal uterine bleeding who underwent endometrial biopsy were included in the study. Histopathological examination was performed on formalin-fixed, paraffin-embedded tissue sections stained with Hematoxylin and Eosin stain. The histopathological findings were categorized and analyzed using descriptive and inferential statistical methods. Associations between age, menopausal status, clinical presentation, and histopathological diagnosis were assessed using the Chi-square test and Fisher's exact test, with a p-value of <0.05 considered statistically significant. **Results**: The mean age of the study population was 41.8 ± 10.9 years, with the majority of patients belonging to the 41–50 years age group (35%). Heavy menstrual bleeding was the most common presenting complaint (45%). Proliferative endometrium was the most frequently observed histopathological finding (24%), followed by secretory endometrium (16%), disordered proliferative endometrium (14%), and endometrial hyperplasia without atypia (13%). Premalignant and malignant lesions were identified in 10% of cases. Statistically significant associations were observed between age group and histopathological findings ($p < 0.001$), clinical bleeding pattern and endometrial pathology ($p < 0.001$), and menopausal status and premalignant or malignant lesions ($p < 0.001$). Postmenopausal women demonstrated significantly higher odds of harbouring premalignant or malignant endometrial pathology. **Conclusion**: Histopathological evaluation of endometrial biopsy specimens is an essential diagnostic modality in women presenting with abnormal uterine bleeding. The study emphasizes that while functional endometrial changes predominate among younger women, the likelihood of premalignant and malignant lesions increases significantly with advancing age and postmenopausal status. Routine endometrial biopsy facilitates early diagnosis, appropriate clinical management, and improved patient outcomes.

Keywords: Abnormal uterine bleeding; Endometrial biopsy; Histopathology; Endometrial hyperplasia; Endometrial carcinoma; Postmenopausal bleeding.

INTRODUCTION

Abnormal uterine bleeding (AUB) is one of the most common gynecological complaints encountered in women of reproductive, perimenopausal, and postmenopausal age groups, accounting for a significant proportion of outpatient gynecology consultations worldwide. It is defined as any variation from the normal menstrual cycle in terms of frequency, regularity, duration, or volume of menstrual blood loss and can considerably affect a woman's physical, psychological, social, and reproductive health. The International Federation of Gynecology and Obstetrics (FIGO) introduced the PALM-COEIN classification system to standardize the causes of AUB into structural and non-structural etiologies, thereby facilitating better diagnosis and management. [1]

Globally, the prevalence of abnormal uterine bleeding has been reported to range between 10% and 35% among women of reproductive age, with higher prevalence rates observed among perimenopausal women owing to hormonal fluctuations and increased incidence of endometrial pathology. [2] The burden of AUB is particularly significant in low- and middle-income countries, where delayed presentation and limited access

to diagnostic facilities contribute to increased morbidity. In developing nations, abnormal uterine bleeding often leads to anemia, impaired daily functioning, and reduced health-related quality of life. Therefore, early and accurate diagnosis is crucial to prevent disease progression and unnecessary surgical interventions.

Endometrial biopsy remains one of the most reliable, minimally invasive, and cost-effective diagnostic tools for evaluating women presenting with abnormal uterine bleeding. Histopathological examination of endometrial biopsy specimens provides valuable information regarding physiological changes of the endometrium and helps identify pathological conditions such as endometrial hyperplasia, chronic endometritis, polyps, hormonal imbalance, and endometrial carcinoma. [3] It is considered the gold standard for assessing endometrial pathology, particularly in women over 40 years of age and those with risk factors for endometrial malignancy. The procedure aids clinicians in differentiating benign lesions from premalignant and malignant conditions, thereby guiding appropriate treatment strategies.

The spectrum of histopathological findings in endometrial biopsy specimens varies with age, hormonal status, and underlying disease processes. Proliferative and secretory endometrium are commonly encountered physiological patterns, whereas disordered proliferative endometrium, endometrial hyperplasia, and malignancies are more frequently observed among perimenopausal and postmenopausal women. [4] Early identification of premalignant lesions is of paramount importance because timely intervention can significantly reduce the incidence of endometrial carcinoma and improve patient outcomes. Histopathological evaluation not only establishes the diagnosis but also serves as a prognostic indicator in certain pathological conditions.

In India, abnormal uterine bleeding constitutes nearly one-third of gynecological consultations in tertiary care centers. Several Indian studies have demonstrated that endometrial hyperplasia and dysfunctional uterine bleeding are among the most common histopathological findings in women presenting with AUB, particularly in the perimenopausal age group.[5] With increasing life expectancy, rising prevalence of obesity, diabetes mellitus, and polycystic ovarian syndrome, the incidence of endometrial pathology is expected to increase substantially among Indian women. Consequently, histopathological assessment of endometrial biopsy samples has gained considerable clinical significance in routine gynecological practice.

The risk of endometrial carcinoma increases significantly with advancing age and prolonged unopposed estrogen exposure. Worldwide, endometrial cancer is the sixth most common malignancy among women and represents the most frequently diagnosed gynecological cancer in developed countries.[6] Although the incidence in India is comparatively lower than that in Western nations, recent epidemiological trends indicate a gradual rise in endometrial malignancies, necessitating greater emphasis on early diagnosis and screening of high-risk individuals. Endometrial biopsy plays a pivotal role in detecting atypical hyperplasia and early-stage carcinoma, both of which have excellent prognostic outcomes when diagnosed promptly.

Histopathological examination of endometrial biopsy samples thus serves as an indispensable diagnostic modality in the evaluation of abnormal uterine bleeding. Understanding the clinicopathological spectrum of endometrial lesions helps clinicians formulate individualized management plans and avoid unnecessary hysterectomies. Moreover, studies assessing histopathological patterns in different populations contribute significantly to evidence-based clinical practice and improve women's reproductive healthcare outcomes. [7] Therefore, the present study was undertaken to evaluate the histopathological spectrum of endometrial biopsy samples in patients presenting with abnormal uterine bleeding and to correlate these findings with the underlying pathological processes.

AIM

To study the histopathological spectrum of endometrial biopsy samples in patients presenting with abnormal uterine bleeding.

OBJECTIVES

1. To evaluate the various histopathological patterns observed in endometrial biopsy specimens of patients with abnormal uterine bleeding.
2. To determine the distribution of endometrial lesions across different age groups and identify benign, premalignant, and malignant endometrial pathologies.

MATERIALS AND METHODS

Study Design: Hospital-based descriptive cross-sectional study.

Study Setting: The study was conducted in the Department of Pathology in collaboration with the Department of Obstetrics and Gynaecology at a tertiary care teaching hospital.

Study Population: Women presenting with abnormal uterine bleeding who underwent endometrial biopsy during the study period were included in the study.

Sample Size: A total of 100 endometrial biopsy specimens from patients diagnosed with abnormal uterine bleeding were included in the study.

Sample Size Calculation

The sample size was calculated using the formula:

$n = Z^2 \times p \times q / d^2$

Where:

- n = Required sample size
- Z = 1.96 (for 95% confidence interval)

- p = Prevalence of abnormal uterine bleeding among gynecological patients (taken as 50% for maximum sample size estimation)
- q = 1 – p = 50%
- d = Absolute precision (10%)

Substituting the values:

$n = (1.96)^2 \times 0.5 \times 0.5 / (0.1)^2$

$n = 96.04$

The calculated sample size was approximately 96 and was rounded off to 100 subjects for convenience and to improve the study's statistical validity.

Inclusion Criteria

1. Women of all age groups presenting with abnormal uterine bleeding.
2. Patients who underwent endometrial biopsy or endometrial curettage for diagnostic evaluation.
3. Adequately preserved endometrial biopsy specimens received in the Department of Pathology.
4. Patients willing to provide informed consent for participation in the study.

Exclusion Criteria

1. Patients with pregnancy-related causes of bleeding.
2. Inadequate or poorly preserved endometrial biopsy specimens.
3. Patients with known bleeding disorders or those receiving anticoagulant therapy.
4. Patients who did not provide informed consent.

Methodology

After obtaining approval from the Institutional Ethics Committee and written informed consent from all participants, eligible patients presenting with abnormal uterine bleeding were enrolled in the study. Detailed clinical history, including age, menstrual history, parity, and relevant clinical findings, was recorded.

Endometrial biopsy specimens obtained through endometrial sampling or dilatation and curettage were fixed in 10% buffered formalin and processed using standard histopathological techniques. Tissue sections of 4–5 µm thickness were prepared and stained with Hematoxylin and Eosin (H&E) stain. The histopathological findings were evaluated under light microscopy and categorized into proliferative endometrium, secretory endometrium, disordered proliferative endometrium, endometrial hyperplasia, endometritis, endometrial polyp, atrophic endometrium, and malignant lesions wherever applicable.

The histopathological patterns were analyzed with respect to age distribution and clinical presentation of abnormal uterine bleeding.

Statistical Analysis

The collected data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) version 26.0. Descriptive statistics were expressed as frequencies, percentages, mean, and standard deviation. The Chi-square test was used to determine the association between age groups and histopathological findings. A p-value of <0.05 was considered statistically significant.

RESULTS

Table 1. Demographic and clinical characteristics of the study participants (n = 100)

Variable	Frequency (n)	Percentage (%)
Age group (years)		
≤30	18	18.0
31–40	27	27.0
41–50	35	35.0
>50	20	20.0
Mean age	**41.8 ± 10.9 years**	—
Menopausal status		
Premenopausal	72	72.0
Perimenopausal	18	18.0
Postmenopausal	10	10.0
Parity		
Nulliparous	9	9.0
Parity 1–2	47	47.0
Parity ≥3	44	44.0
Clinical pattern of bleeding		
Heavy menstrual bleeding	45	45.0
Irregular menstrual bleeding	28	28.0
Intermenstrual bleeding	12	12.0
Postmenopausal bleeding	15	15.0

Interpretation: The mean age of the study participants was 41.8 ± 10.9 years. The largest proportion of women belonged to the 41–50-year age group, accounting for 35%. Most participants were premenopausal women. Heavy menstrual bleeding was the most common clinical presentation, observed in 45% of cases, followed by irregular menstrual bleeding in 28%.

Table 2. Histopathological patterns observed in endometrial biopsy specimens (n = 100)

Histopathological finding	Frequency (n)	Percentage (%)
Proliferative endometrium	24	24.0
Secretory endometrium	16	16.0
Disordered proliferative endometrium	14	14.0
Endometrial hyperplasia without atypia	13	13.0
Endometrial polyp	9	9.0
Chronic endometritis	7	7.0
Atrophic endometrium	7	7.0
Atypical hyperplasia/endometrial intraepithelial neoplasia	5	5.0
Endometrial carcinoma	5	5.0
Total	**100**	**100.0**

Interpretation: Proliferative endometrium was the most frequently observed histopathological pattern, accounting for 24% of specimens. Secretory endometrium and disordered proliferative endometrium were found in 16% and 14% of cases, respectively. Endometrial hyperplasia without atypia was identified in 13% of cases. Premalignant lesions and endometrial carcinoma were each detected in 5% of biopsy specimens.

Table 3. Association between age group and category of histopathological finding (n = 100)

Age group	Functional endometrial patterns n (%)	Benign organic lesions n (%)	Premalignant/malignant lesions n (%)	Total
≤30 years	15 (83.3)	3 (16.7)	0 (0.0)	18
31–40 years	19 (70.4)	8 (29.6)	0 (0.0)	27
41–50 years	17 (48.6)	15 (42.9)	3 (8.6)	35
>50 years	3 (15.0)	10 (50.0)	7 (35.0)	20
Total	**54 (54.0)**	**36 (36.0)**	**10 (10.0)**	**100**

$\chi^2 = 30.82$; df = 6; $p < 0.001$

Functional patterns included proliferative, secretory and disordered proliferative endometrium. Benign organic lesions included hyperplasia without atypia, polyp, endometritis and atrophic endometrium.

Interpretation: A statistically significant association was observed between age group and histopathological category. Functional endometrial patterns predominated among women aged 40 years or younger. In contrast, benign organic, premalignant and malignant lesions became progressively more frequent with increasing age. Premalignant or malignant pathology was identified in 35% of women older than 50 years compared with none among women aged 40 years or younger.

Table 4. Association between clinical bleeding pattern and histopathological category (n = 100)

Clinical presentation	Functional patterns n (%)	Benign organic lesions n (%)	Premalignant/malignant lesions n (%)	Total
Heavy menstrual bleeding	30 (66.7)	14 (31.1)	1 (2.2)	45
Irregular menstrual bleeding	18 (64.3)	9 (32.1)	1 (3.6)	28
Intermenstrual bleeding	5 (41.7)	6 (50.0)	1 (8.3)	12
Postmenopausal bleeding	1 (6.7)	7 (46.7)	7 (46.7)	15
Total	**54 (54.0)**	**36 (36.0)**	**10 (10.0)**	**100**

$\chi^2 = 34.07$; df = 6; $p < 0.001$

Interpretation: The clinical pattern of abnormal uterine bleeding showed a statistically significant association with the histopathological category. Functional endometrial patterns were predominant among women presenting with heavy or

irregular menstrual bleeding. Nearly half of the women with postmenopausal bleeding had premalignant or malignant endometrial lesions, indicating that postmenopausal bleeding was an important warning symptom requiring mandatory histopathological evaluation.

Table 5. Association between menopausal status and premalignant or malignant endometrial lesions (n = 100)

Menopausal status	Premalignant/malignant lesion present n (%)	Premalignant/malignant lesion absent n (%)	Total
Premenopausal	1 (1.4)	71 (98.6)	72
Perimenopausal	3 (16.7)	15 (83.3)	18
Postmenopausal	6 (60.0)	4 (40.0)	10
Total	**10 (10.0)**	**90 (90.0)**	**100**

p < 0.001

Interpretation: Premalignant or malignant endometrial lesions were present in 60% of postmenopausal women, compared with 16.7% of perimenopausal women and 1.4% of premenopausal women. Postmenopausal women had approximately 32 times higher odds of having premalignant or malignant pathology than non-postmenopausal women. The association between menopausal status and significant endometrial pathology was statistically significant.

Overall interpretation

The study demonstrated that functional endometrial patterns were the most common findings among women with abnormal uterine bleeding. However, the frequency of benign organic, premalignant and malignant lesions increased significantly with advancing age. Postmenopausal bleeding and postmenopausal status were strongly associated with atypical hyperplasia and endometrial carcinoma. These findings supported the importance of endometrial biopsy, particularly in women older than 40 years and in all women presenting with postmenopausal bleeding.

DISCUSSION

The present study evaluated the histopathological spectrum of endometrial biopsy samples in 100 women presenting with abnormal uterine bleeding (AUB). The majority of patients belonged to the 41–50 years age group (35%), with a mean age of 41.8 ± 10.9 years. This finding highlights the increased prevalence of AUB among perimenopausal women, attributable to hormonal fluctuations, anovulatory cycles, and progressive endometrial changes associated with advancing age. Similar observations were reported by Doraiswami et al., who found that 40% of women presenting with AUB were in the 41–50 years age group, emphasizing the predominance of perimenopausal women in histopathological studies of endometrial biopsies.[8] Likewise, Abdullah et al. reported a mean age of 43.7 years among women with AUB, corroborating the age distribution observed in the present study.[9] The increased incidence of AUB during the perimenopausal period warrants meticulous histopathological evaluation because this age group is at a higher risk of developing premalignant and malignant endometrial lesions.

Heavy menstrual bleeding was the most common clinical presentation in the present study (45%), followed by irregular menstrual bleeding (28%). This finding is in agreement with studies conducted by Sajitha et al., who observed menorrhagia in approximately 52% of women with abnormal uterine bleeding.[10] Heavy menstrual bleeding remains the predominant presenting complaint because physiological and pathological alterations in endometrial architecture frequently manifest as excessive menstrual blood loss. Early histopathological assessment of such cases aids in identifying underlying pathology and formulating appropriate therapeutic interventions.

The histopathological evaluation demonstrated that proliferative endometrium constituted the most common finding (24%), followed by secretory endometrium (16%) and disordered proliferative endometrium (14%). Similar findings have been reported in several Indian and international studies. Doraiswami et al. reported proliferative endometrium in 32.4% of endometrial biopsies, while Sajitha et al. documented proliferative endometrium in nearly 30% of women with AUB.[8,10] Functional endometrial patterns are commonly encountered in reproductive-age women because hormonal imbalances and anovulatory cycles significantly influence endometrial morphology. These physiological patterns must be differentiated from pathological lesions to prevent overtreatment and unnecessary surgical procedures.

Endometrial hyperplasia without atypia was identified in 13% of cases in the present study. Endometrial hyperplasia represents a clinically significant premalignant lesion, particularly in women with prolonged unopposed estrogen exposure. Muzaffar et al. reported endometrial hyperplasia in 11.7% of women with AUB, whereas Jairajpuri and Jetley observed hyperplasia in approximately 14% of endometrial specimens.[11,12] These findings are comparable with the present study and underscore the importance of endometrial biopsy in detecting hyperplastic lesions before progression to atypical hyperplasia or carcinoma. Timely diagnosis facilitates conservative management and significantly improves patient outcomes.

The present study further demonstrated a statistically significant association between advancing age and histopathological findings ($p < 0.001$). Functional endometrial patterns predominated in younger women, whereas benign organic lesions and premalignant or malignant pathologies increased with age. Premalignant or malignant lesions were identified in 35% of women aged more than 50 years. Similar trends were reported by Yusuf et al., who found that the prevalence of atypical hyperplasia and endometrial carcinoma increased substantially among postmenopausal women presenting with AUB.[13] Age-related endometrial alterations and cumulative hormonal influences contribute significantly to the development of endometrial pathology in older women.

A significant association was also observed between the pattern of abnormal uterine bleeding and underlying histopathological diagnosis ($p < 0.001$). Nearly half of the women presenting with postmenopausal bleeding demonstrated premalignant or malignant lesions on histopathological examination. This observation aligns with the findings of Astrup and Olivarius, who reported that approximately 10% of women with postmenopausal bleeding are diagnosed with endometrial carcinoma, while a substantial proportion harbor premalignant lesions.[14] Postmenopausal bleeding should therefore always be regarded as a symptom warranting immediate diagnostic evaluation through endometrial sampling.

The present study revealed that premalignant or malignant lesions were present in 60% of postmenopausal women compared to only 1.4% among premenopausal women. Postmenopausal women exhibited significantly higher odds of developing clinically important endometrial pathology. Similar findings have been documented by Opolskiene et al., who emphasized that endometrial malignancies are predominantly diagnosed in postmenopausal women presenting with abnormal uterine bleeding.[15] These findings reinforce existing clinical recommendations advocating mandatory endometrial evaluation in all postmenopausal women with bleeding symptoms.

Endometrial carcinoma was diagnosed in 5% of biopsy specimens in the present study. Comparable rates ranging from 3% to 7% have been reported in tertiary care studies evaluating women with AUB.[16] The increasing prevalence of obesity, diabetes mellitus, hypertension, and metabolic syndrome has contributed substantially to the rising incidence of endometrial carcinoma globally as well as in India. Histopathological examination remains the cornerstone for early diagnosis and staging of endometrial malignancies, thereby enabling timely and effective treatment.

The findings of the present study highlight the indispensable role of endometrial biopsy as a minimally invasive, cost-effective, and highly informative diagnostic modality in the evaluation of abnormal uterine bleeding. Functional endometrial changes are common among reproductive-age women, whereas the incidence of premalignant and malignant lesions increases considerably among perimenopausal and postmenopausal women. Similar conclusions have been reported by Sarwar and Ul Haque, who emphasized that histopathological assessment of endometrial biopsy specimens provides invaluable information for clinical decision-making and significantly reduces diagnostic delays.[17,18] Therefore, routine histopathological evaluation of endometrial biopsy samples remains essential for the early detection of significant endometrial pathology and optimal patient management.

CONCLUSION

The present study demonstrated that abnormal uterine bleeding is a common gynecological presentation, particularly among women in the perimenopausal age group. Histopathological examination of endometrial biopsy specimens revealed a wide spectrum of endometrial changes, ranging from normal physiological patterns to premalignant and malignant lesions. Functional endometrial patterns were the most frequently encountered findings, whereas the incidence of endometrial hyperplasia and malignancy increased significantly with advancing age and postmenopausal status. A statistically significant association was observed between age, menopausal status, clinical bleeding pattern, and underlying endometrial pathology. The study highlights the indispensable role of endometrial biopsy as a simple, minimally invasive, and reliable diagnostic tool for the evaluation of abnormal uterine bleeding. Early histopathological diagnosis facilitates appropriate clinical management and aids in the timely detection of significant endometrial lesions, thereby improving patient outcomes and reducing unnecessary surgical interventions.

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