International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Impact Factor 2024: 7.101

Histopathological Study of Endometrium in Abnormal Uterine Bleeding

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Abstract: ***Background**: Abnormal uterine bleeding (AUB) encompasses deviations in menstrual timing, duration, or volume and is a common gynecologic concern, especially among perimenopausal women. The International Federation of Gynecology and Obstetrics (FIGO) classifies AUB into structural (PALM) and non-structural (COEIN) causes. Histopathological analysis plays a vital role in differentiating benign, premalignant, and malignant lesions. **Objective**: To evaluate the histopathological spectrum of endometrial changes in AUB and correlate findings with clinical presentations. **Methods**: A cross-sectional hospital-based study was conducted at Kanti Devi Medical College, Mathura, including 417 endometrial samples from patients presenting with AUB. Exclusion criteria included gestational causes and poorly preserved samples. Samples were processed using standard histological techniques and stained with hematoxylin and eosin. Data were analyzed using IBM SPSS version 21, with significance set at $p < 0.05$. **Results**: The most common histological pattern was disordered non-secretory endometrium (42.07%), followed by secretory (34.51%) and proliferative (12.59%) endometrium. Organic lesions included endometrial polyps (36.17%) and chronic endometritis (34.04%). Neoplastic findings showed a predominance of benign lesions, but 13.33% were malignant. Postmenopausal bleeding was often associated with atrophic endometrium and endometrial carcinoma. Functional causes dominated overall, but organic lesions, particularly in women over 50, were significant. **Conclusion**: Histopathological evaluation remains the gold standard for diagnosing AUB, especially in postmenopausal women with endometrial thickness >4 mm. Combining transvaginal ultrasound findings with histopathology enhances diagnostic accuracy. Comorbidities such as diabetes, obesity, and hypertension elevate endometrial cancer risk, underscoring the importance of early screening and preventive strategies.*

Keywords: Abnormal uterine bleeding, histopathology, endometrial thickness, transvaginal ultrasound, endometrial carcinoma, endometrial polyp, chronic endometritis, postmenopausal bleeding, FIGO classification, hormonal imbalance

1.Introduction

Abnormal uterine bleeding (AUB) refers to any deviation from normal menstrual patterns in terms of timing, duration, or volume. One common subtype, heavy menstrual bleeding (HMB), affects 14%–25% of women of reproductive age.[1] The International Federation of Gynecology and Obstetrics (FIGO) introduced the PALM-COEIN classification to guide diagnosis and management by categorizing AUB into structural causes (polyps, adenomyosis, leiomyomas, malignancy/hyperplasia) and non-structural causes (coagulopathies, ovulatory dysfunction, endometrial, iatrogenic, and idiopathic). These conditions significantly impact physical, emotional, and social well-being. AUB is classified as HMB or intermenstrual bleeding (IMB), with perimenopausal women being particularly susceptible due to hormonal fluctuations.[2]

Histopathological analysis plays a pivotal role in diagnosing endometrial abnormalities in AUB. It helps differentiate benign, premalignant, and malignant lesions—such as simple hyperplasia, atypical hyperplasia, and endometrial carcinoma—thus informing treatment plans. This is especially crucial in resource-limited settings like India, where delayed diagnoses contribute to higher morbidity.[3]

AUB management is tailored based on clinical, imaging, and histological findings. Medical treatments include NSAIDs, tranexamic acid, and hormonal therapies. Surgical options like ablation or hysterectomy are used in resistant or malignant cases. LNG-IUS is effective but limited by fibroids. This study aims to correlate histopathology with clinical findings.[4]

2.Materials and Methods

This hospital-based cross-sectional study was conducted using a simple random sampling technique to ensure unbiased selection of participants. A total of 417 of histopathological cases were included in the study.

Inclusion Criteria: Specimens of endometrial biopsies and hysterectomy from patients of all age groups who were diagnosed with abnormal uterine bleeding (AUB).

Exclusion Criteria: Endometrial samples from AUB cases attributed to gestational causes were excluded from the study.

Procedure: Relevant clinical data were recorded, and specimens from endometrial biopsies, curettage, or hysterectomy were processed using standard histological techniques per Bancroft's protocol. This included fixation in 10% formalin, dehydration, clearing with xylene, paraffin infiltration, embedding, and sectioning via microtomy. Sections were stained using the hematoxylin and eosin (H&E) method for microscopic examination and diagnosis.

Data Analysis: Data were analyzed using IBM SPSS Statistics (version 21). Categorical variables were expressed as frequencies and percentages. The chi-square test was used to assess associations, with Fisher's exact test

applied when needed. A p-value of less than 0.05 was considered statistically significant.

3.Results and Observations

Based on histopathological analysis of 417 AUB cases, the youngest patient in my study was of age 19 year and oldest patient age was 80 years. The age-wise distribution of histopathological parameters due to functional causes (N=397) indicates that disordered endometrium is the most common finding (42.07%), predominantly affecting the 41–50 years age group (50.30%). The secretory phase pattern is observed in 34.51% of cases, mainly in the 31–40 years (46.72%) and 41–50 years (45.26%) age groups. The proliferative phase accounts for 12.59%, with the highest occurrence in the 31–40 years group (58.00%). Atrophic endometrium is noted in 9.32%, increasing with age and peaking in those >60 years (40.54%). Among organic causes (N=47), chronic non-specific endometritis (34.04%) is most prevalent in the 41–50 years group (56.25%), while endometrial polyps in 17 patients (36.17%) was the most common finding among organic causes are primarily observed in the 31–40 (41.18%). Endometrial hyperplasia without atypia (14.89%) is more frequent in the 51–60 years group (42.86%), and atypical hyperplasia (4.26%) is equally distributed between the 31–40 and 41–50 years groups. Endometrial carcinoma (8.51%) is more common in the 51–60 years group (50.00%), whereas the Arias-Stella reaction is rare (0.25%) and observed only in patients >60 years. (TABLE No.: 1).

Table 1: Distribution of patients according to Histopathological Parameter

Agewise distribution of AUB due to functional and organic causes									
	Histopathological pattern	Age group						Total	%
		<20	21-30	31-40	41-50	51-60	>60		
Functional causes	Proliferative phase endometrium	0	2	29	16	3	0	50	12.59
	Secretory phase endometrium	0	7	64	62	4	0	137	34.51
	Disordered proliferative endometrium (Fig.1)	1	4	63	84	14	0	167	42.07
	Menstrual endometrium	0	0	0	4	2	0	6	1.51
	Atrophic endometrium (Fig.1)	0	0	1	11	10	15	37	9.32
	Total	1	13	157	177	33	15	397	100
Organic cause	Chronic nonspecific endometritis	0	0	5	9	2	0	16	34.04
	Granulomatous endometritis	0	0	0	0	0	0	0	0
	Arias-Stella reaction (Fig.1)	0	0	0	0	0	1	1	2.13
	Endometrial polyp	0	0	7	5	5	0	17	36.17
	Endometrial hyperplasia without atypia	0	0	2	1	3	1	7	14.89
	Atypical endometrial hyperplasia	0	0	1	1	0	0	2	4.26
	Endometrial carcinoma (Fig.1)	0	0	1	1	2	0	4	8.51
	Total	0	0	16	18	12	1	47	100

The age distribution across different bleeding patterns revealed distinct trends. Menorrhagia was most prevalent among women aged 31–40 years (5.85%) and 41–50 years (3.04%), with minimal representation in other age groups. Metrorrhagia showed a similar trend, peaking in the 41–50 years age group (49.12%) and followed closely by the 31–40 years group (42.11%), indicating a strong midlife predominance. (Table No. 2)

Table 2: Correlation of Bleeding Pattern with Age.

Age Distribution (in years)	Bleeding Pattern							
	Menorrhagia		Metrorrhagia		Hypomenorrhea		Post-Menopausal Bleeding	
	No. of Patients	Percentage	No. of Patients	Percentage	No. of Patients	Percentage	No. of Patients	Percentage
≤20	1	0.06	0	0.00	0	0.00	0	0.00
21-30	7	0.41	4	3.51	2	4.65	0	0.00
31-40	100	5.85	48	42.11	14	32.56	0	0.00
41-50	52	3.04	56	49.12	27	62.79	49	42.24
51-60	1	0.06	0	0.00	0	0.00	39	33.62
>60	0	0.00	0	0.00	0	0.00	17	14.66
Total	161	9.42	108	94.74	43	100.00	105	90.52

Hypomenorrhea was predominantly observed in women aged 41–50 years (62.79%), with fewer cases in the 31–40 years group (32.56%), and minimal cases in younger age brackets. Postmenopausal bleeding was most commonly reported among women aged 41–50 years (42.24%) and 51–60 years (33.62%), with a notable 14.66% in those older than 60 years.

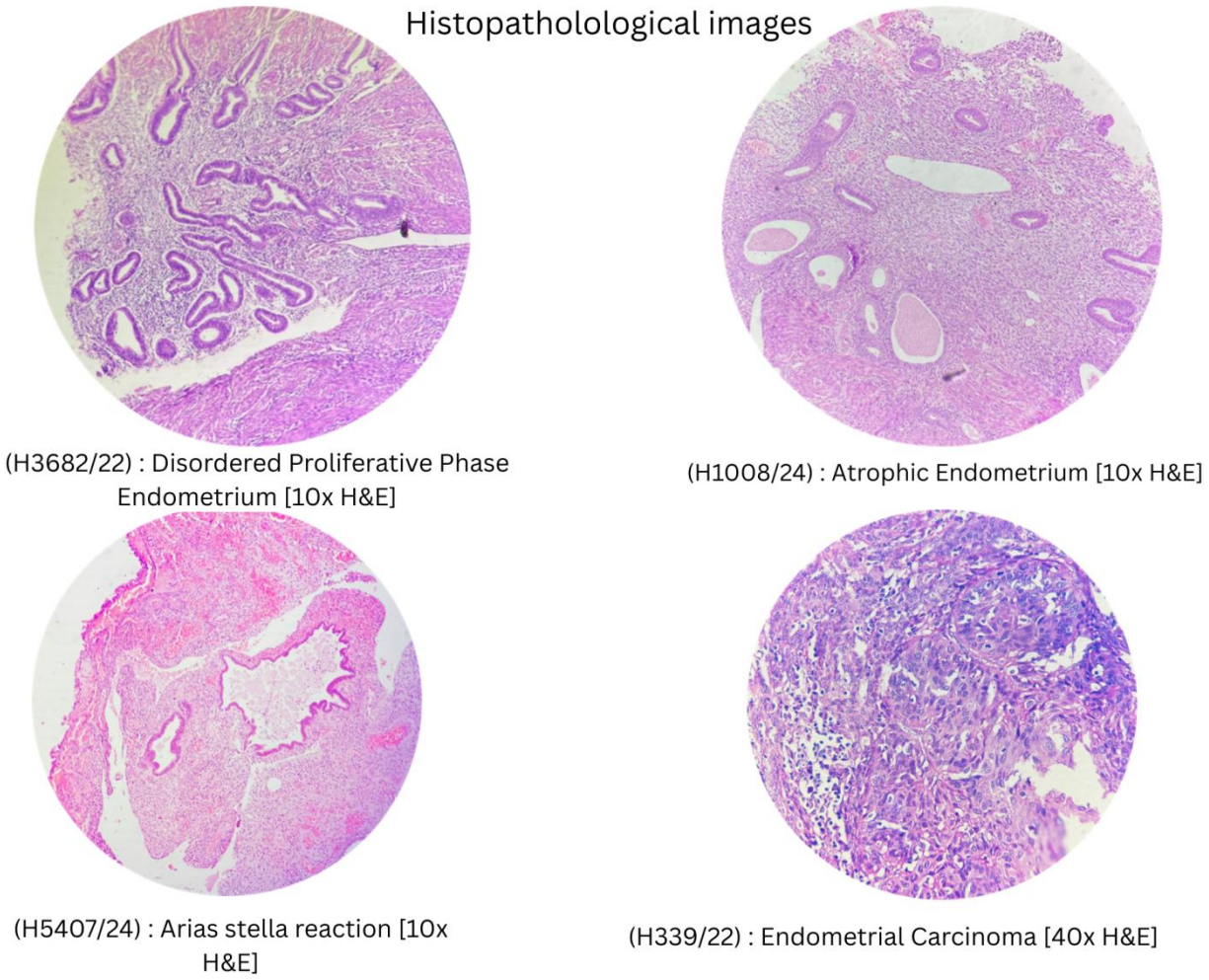

Figure 1

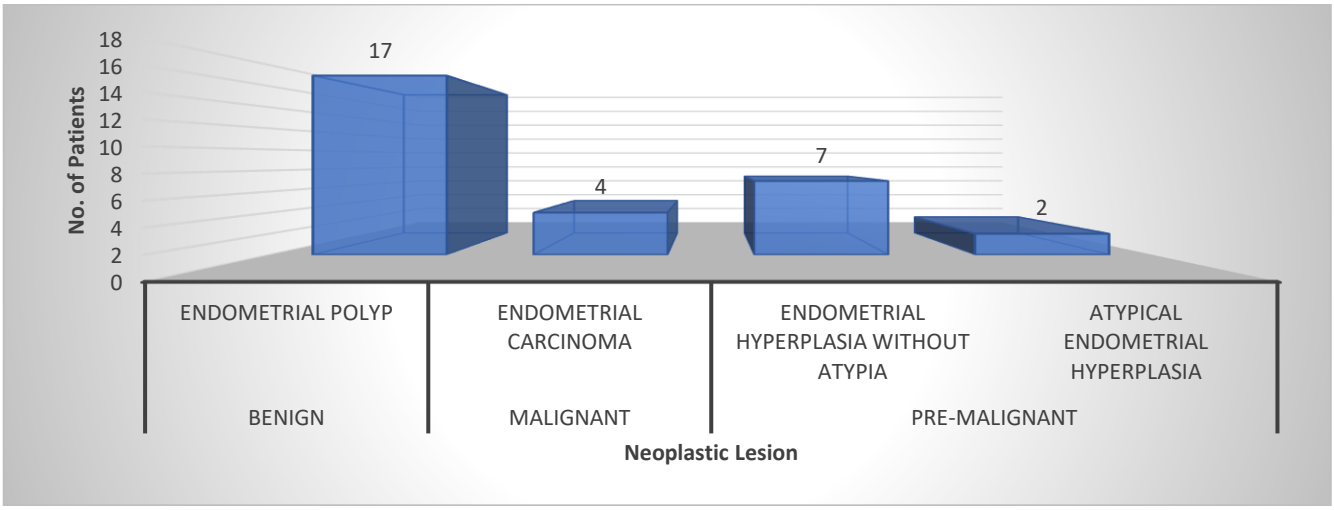

Figure 2: Distribution Of Neoplastic Endometrial Lesions Based on Histopathology

Among the 30 neoplastic lesions identified histopathological, benign lesions were most common, with endometrial polyps accounting for 17 cases (56.67%). Pre-malignant conditions included endometrial hyperplasia without atypia in 7 patients (23.33%) and atypical endometrial hyperplasia in 2 patients (6.67%). Malignant lesions were observed in 4 patients (13.33%), all diagnosed with endometrial carcinoma. These findings suggest that benign neoplastic changes predominate.

Among the various bleeding patterns analyzed, disordered proliferative endometrium emerged as a predominant functional cause across all categories, particularly in metrorrhagia (37.72%) and postmenopausal bleeding (32.76%). Among organic causes, chronic non-specific endometritis was most frequently associated with metrorrhagia (6.14%), while endometrial polyps were more commonly seen in postmenopausal bleeding (7.76%).

4.Discussion

Histopathological evaluation is essential in diagnosing abnormal uterine bleeding (AUB), revealing common patterns like proliferative and secretory endometrium linked to hormonal imbalance. Structural lesions, hyperplasia, and malignancies increase with age. Endometrial sampling aids in detecting premalignant and malignant conditions, ensuring timely management of AUB. This study focuses on histopathological assessment of AUB.[5]

The study found disordered non-secretory endometrium in 42.07% of cases, with secretory endometrium being the most common physiological pattern (34.51%). In a study by ***Thulasi P et al*, [6]** reported endometrial hyperplasia as the leading histopathological finding (40%), with proliferative and secretory endometrium considered normal patterns, identified in 33.33% and 20% of patients, respectively. In a study by ***Saravade V R et al*, [7]** observed simple hyperplasia in 34% of cases, while proliferative and secretory endometrial phases were noted in 30% and 26%, respectively. In a study by ***Singh N et al*.[8]** found proliferative out-of-phase endometrium to be the most common finding (59.1%), followed by normal endometrium in 28.8% of patients. In this study analysis of organic causes, endometrial polyps (36.17%) and chronic non-specific endometritis (34.04%) were the most common findings. These results highlight the prevalence of benign and inflammatory lesions in organic abnormal uterine pathology. In a study by ***Hassan A R et al.*, [10]** found that while a majority (38%) had normal endometrium suggesting hormonal etiologies structural lesions like polyps (28%) and hyperplasia (20%) were also frequently encountered. In a study by ***Bharatnur S et al.*, [11]** also addressed endometrial hyperplasia, noting that among 92 patients with non-atypical hyperplasia.

In this study, 30 confirmed neoplastic lesions, 56.67% were benign (endometrial polyps), 23.33% were pre-malignant (endometrial hyperplasia without atypia), and 13.33% were malignant (endometrial carcinoma). These results highlight the predominance of benign lesions and the need for early screening for pre-malignant and malignant changes. In a study by ***Sandeepa S et al.*, [9]** observed that among organic lesions, pregnancy-related causes were the most frequent (24.1%), followed by endometrial hyperplasia (17.4%). Carcinomas accounted for a smaller proportion (1.1%), while endometrial polyps, atrophic endometrium, and leiomyomas were each reported in only 0.4% of cases, indicating that benign and pre-malignant lesions far outnumber malignant ones. In a study by ***Dini P et al.*, [12]** also reported endometrial polyps in 13.2% of patients and chronic endometritis in 10.3%. Likewise, endometrial hyperplasia without atypia was identified in 8.8% of cases, while atypical hyperplasia remained rare, observed in only 1.5%, supporting the trend that while benign and pre-malignant lesions are frequently encountered, truly malignant pathology is relatively uncommon yet clinically significant.

Among 413 cases most were physiological variants, with secretory endometrium in 33.17%, proliferative in 12.11%, and atrophic in 8.96%. Disordered proliferative endometrium, suggestive of hormonal imbalance, was the most common abnormality (40.44%). In a study by ***Fathima S et al.*, [13]** reported that functional causes predominated, with 38 cases of proliferative and 10 of secretory endometrium, especially among women aged 41–50. Disordered proliferative endometrium was noted in 16% of cases, appearing across all age groups but most

commonly in the same age bracket, echoing the hormonal etiology observed in our findings.

Menorrhagia was most common in women aged 31–40 years (5.85%) and 41–50 years (3.04%), with few cases in other age groups. Metrorrhagia followed a similar trend, peaking in the 41–50 years group (49.12%) and notable in the 31–40 years group (42.11%). Hypomenorrhea was predominantly observed in women aged 41–50 years (62.79%), with fewer cases in the 31–40 years group (32.56%). Postmenopausal bleeding was most prevalent in the 41–50 years (42.24%) and 51–60 years (33.62%) groups, with 14.66% of cases in those over 60 years. These patterns highlight the need for age-specific diagnostic and treatment approaches. In a study by ***Singh A Et Al.***[14] reported menorrhagia as the most common bleeding pattern (42%) among 300 AUB cases, predominantly affecting women aged 41–50 years. In a study by ***Shukla M et al.***[15]also found the highest incidence of AUB in the 41–50 age group in their study of 120 patients, followed by the 31–40 and 51–60 age groups.

5.Conclusion

Combining endometrial thickness (ET) measurement with morphological assessment on transvaginal ultrasound improves diagnostic accuracy in evaluating postmenopausal bleeding (PMB), enabling better differentiation between benign and malignant conditions. This integrated approach is more effective than using ET alone and should be part of routine sonographic evaluation. Early screening and timely diagnosis are crucial for effective PMB management. Histopathological examination remains the gold standard, particularly in cases with ET >4 mm. Additionally, diabetes mellitus, obesity, and hypertension significantly increase the risk of endometrial cancer. Addressing these through lifestyle changes—such as glycemic control, physical activity, and managing metabolic disorders—can help reduce associated morbidity and mortality, improving long-term outcomes in postmenopausal women.

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