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Original Research Article

Abnormal uterine bleeding in perimenopausal women: correlating PALM-COEIN classification with histopathological findings

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ABSTRACT

Background: The most prevalent menstruation issue during perimenopause is abnormal uterine bleeding (AUB). A categorization system (PALM-COEIN) for the etiology of AUB in non-gravid women has been created by the International Federation of Gynecology and Obstetrics working group on menstrual disorders. Aims and objectives were to analyse the structural (PALM) and functional (COEIN) components of the PALM-COEIN system of AUB in perimenopausal women and correlate it histopathologically.

Methods: This prospective analytical study was conducted over 18 months at LLRM Medical College, Meerut, involving 172 perimenopausal women aged 40-49 years presenting with AUB. Ultrasonography was done and etiology of AUB was ruled out by PALM-COEIN classification and then was correlated with histopathology findings.

Results: Heavy and prolonged bleeding was the most common complaint (26.1%). Ultrasonographic (USG) findings revealed adenomyosis in 26.7% of cases, followed by fibroids (22.0%) and thickened endometrium (16.8%). Histopathological examination identified proliferative phase endometrium as the most prevalent finding (31.98%), followed by simple cystic hyperplasia (14.53%) and benign polyps (13.95%). A significant correlation was observed between USG and histopathological findings ($p < 0.001$).

Conclusions: This study findings emphasize necessity for integrating clinical assessment, imaging, and histopathological evaluation to accurately identify underlying causes of AUB and guide appropriate management strategies.

Keywords: Abnormal uterine bleeding, Ultrasonography, PALM-COEIN classification, Perimenopausal

INTRODUCTION

Uterine bleeding that deviates from normal menstrual characteristics is referred to as AUB.¹ About 30 percent of women of reproductive age suffer from AUB, which affects 15-20% of women who visit outpatient gynaecological clinics.² People who suffer from it spend a lot of their own money on medications and menstruation products, which negatively impacts their quality of life. An approximate 30% decrease in job productivity is linked to chronic AUB.^{3,4}

AUB, which can be either acute or chronic, is characterized by abnormal bleeding from the uterus that

happens outside of pregnancy and is aberrant in regularity, volume, frequency, or duration.^{5,6}

The most prevalent menstrual issue during perimenopause, which is the time between two and eight years before menopause and one year following the last menstrual cycle, is AUB.⁷ It has been shown that follicular growth is irregular throughout this period, which increases the likelihood of AUB due to fluctuations in oestrogen levels and a higher proportion of anovulatory cycles.

In addition to irregular ovulation, there are several anatomical or functional causes of AUB. The International Federation of Gynecology and Obstetrics working group

on menstrual disorders recently developed a new classification system (PALM-COEIN) for the etiology of AUB in non-gravid women.⁸ The abbreviation PALM-COEIN is used to arrange the nine basic categories: polyp; endometrial; iatrogenic; coagulopathy; ovulatory dysfunction; adenomyosis; leiomyoma; cancer and hyperplasia; and not yet classified. For women in the perimenopausal age range with AUB, FIGO advises endometrial tissue testing as the initial course of treatment.^{9,10}

The current study was carried out to investigate and analyse the structural (PALM) and functional (COEIN) components of the PALM-COEIN system of AUB in perimenopausal women in our region. Histopathological investigations and case correlation, where appropriate, were then carried out, specifically for the structural (PALM) component and COEIN (functional) aspect.

METHODS

Study design and setting

This prospective analytical study was conducted over 18 months in the Department of Obstetrics and Gynaecology, LLRM Medical college, Meerut.

Study period

This study was conducted for a period of 12 months (October 2024 to September 2025).

Sample size

Based on an expected prevalence of 11.5%, a 95% confidence level ($Z=1.96$), and a precision of 5% ($d=0.05$), the calculated sample size was 157.¹¹ To account for potential dropouts, 172 perimenopausal women presenting with AUB were enrolled.

Women aged 40 years and above up to the age of menopause presenting with AUB were included in the study. Only those women who underwent endometrial aspiration or dilation and curettage (D and C) for evaluation and were willing to participate in the study were considered eligible for inclusion.

Women who were outside the perimenopausal age group were excluded from the study. In addition, patients with known bleeding disorders, those with isolated cervical or vaginal pathologies, and women presenting with pregnancy-related bleeding were also excluded from the study.

Methodology

Participants underwent comprehensive evaluations, including demographic data collection, detailed menstrual and medical histories, and physical, systemic, and gynaecological examinations. Gynaecological

assessments focused on cervical and uterine characteristics. Pelvic ultrasonography assessed uterine size, endometrial thickness, and adnexal structures. Clinical diagnoses were categorized using the PALM-COEIN classification.

Endometrial samples obtained via biopsy or hysterectomy were subjected to histopathological examination. Findings were correlated with clinical assessments. Additional investigations included complete blood counts, coagulation profiles (when indicated), thyroid function tests, and blood glucose levels. Ovulatory dysfunction was identified by unpredictable bleeding patterns, while endometrial causes were associated with regular cyclic bleeding. Iatrogenic causes were linked to recent hormonal therapy or contraceptive use.

RESULTS

Majority of patients are in age group of 40-43 i.e. 85 (49.41%), 56 (32.55%) were between 44-46 years and rest 31 (18.02%) are between 47-49 years. The 45 (26.1%) patients have complaint of heavy and prolonged bleeding, 33 (19.1%) have post-menopausal bleeding, 30 (17.4%) have heavy menstrual bleeding, 29 (17.1%) have frequent menstrual bleeding and intermenstrual bleeding respectively and 6 (3.4%) have scanty menstrual bleeding.

Majority of them i. e., 46 (26.7%) have adenomyosis on USG findings, 38 (22.0%) have fibroid, 29 (16.8%) have thickened endometrium, 26 (15.1%) have polyps and 11 (6.3%) have ovulatory dysfunction and the findings are statistically significant as $p<0.05$.

In our study the histopathological findings of endometrial samples from 172 patients were analyzed. The most common diagnosis was proliferative phase endometrium, seen in 55 cases (31.98%), indicating a predominance of normal cyclical endometrial changes. Simple cystic endometrial hyperplasia was the next most frequent finding, observed in 25 patients (14.53%), followed closely by benign endometrial polyps in 24 patients (13.95%). Secretory phase endometrium was noted in 32 cases (18.60%), representing another normal physiological phase. Less frequent findings included disordered proliferative phase (5.81%), chronic endometritis (3.49%), and endometrial intraepithelial neoplasia (2.33%), the latter being significant due to its premalignant potential. Endometrial carcinoma, a malignant lesion, was identified in 4 patients (2.33%). Rare findings such as early secretory phase (2.33%), secretory pseudopolyps (1.74%), pill endometrium (1.16%), shedding endometrium (1.16%), and endometrial stromal tumor (0.58%) were also recorded.

Proliferative phase endometrium was most frequently associated with fibroids (22 cases) and thickened endometrium (8 cases). Benign polyps correlated strongly with USG-detected polyps (11 cases) and adenomyosis (8 cases). Secretory phase showed varied associations,

commonly with adenomyosis (12 cases) and polyps (9 cases).

Simple cystic hyperplasia was linked to multiple findings, including fibroids, thickened endometrium, and adenomyosis. Endometrial carcinoma was seen alongside diverse USG features like fibroids, thickened endometrium, and adenomyosis. Rare pathologies such as EIN, stromal tumors, and pseudopolyps showed limited or isolated USG correlations. Notably, 16 cases showed no significant USG changes, indicating limitations in ultrasound sensitivity for certain histological abnormalities. The analysis revealed a $p < 0.00$, indicating a highly significant correlation between USG and histopathological findings.

Table 1: Age-wise distribution of patients.

Age (in years)	N	Percentage (%)
40-43	85	49.41
44-46	56	32.55
47-49	31	18.02
Total	172	100.0

Table 2: Distribution of patients according to presenting complaints, (n=172).

Presenting complaint	N	Percentage (%)
Heavy and prolonged bleeding	45	26.1
Post-menopausal bleeding	33	19.1
Heavy menstrual bleeding	30	17.4
Frequent menstrual bleeding	29	17.1
Intermenstrual bleeding	29	17.1
Scanty menstrual bleeding	6	3.4

*Multiple complaints were seen in patients.

Table 3: Distribution of patients according to ultrasonography findings.

USG findings	N	Percentage (%)
Polyps	26	15.1
Adenomyosis	46	26.7
Fibroid	38	22.0
Malignancy/hyperplasia	06	3.4
Coagulopathy	00	00
Ovulatory dysfunction	11	6.3
Iatrogenic	00	00
No changes	16	9.3
Thickened endometrium	29	16.8
Total	172	100.0

*Statistical analysis- $X^2=32.456$, $DF=3$, $p=0.003$ significance.

Table 4: Distribution of patients according to histology findings.

Histo findings	N	Percentage (%)
Benign endometrial polyp	24	13.9
Chronic endometritis	6	3.4
Disordered proliferative phase	10	5.8
Early secretory phase	4	2.3
Endometrial intraepithelial neoplasia	4	2.3
Endometrial stromal tumor	1	.5
Endometrial carcinoma	4	2.3
Pill endometrium	2	1.1
Proliferative phase	55	31.9
Secretory phase	32	18.6
Secretory pseudopolyp	3	1.7
Shedding endometrium	2	1.1
Simple cystic endometrial hyperplasia	25	14.5
Total	172	100.0

Table 5: Distribution of patients according to USG findings and histological findings.

Histology	USG findings						
	Adenomyosis	Fibroid	Malignancy	No changes	Ovulatory dysfunction	Polyps	Thickened endometrium
Benign endometrial polyp	8	2	1	1	0	11	1
Chronic endometritis	1	0	1	4	0	0	0
Disordered proliferative phase	3	0	0	0	0	0	7
Early secretory phase	2	0	0	0	1	0	1
Endometrial intraepithelial neoplasia	0	1	0	0	0	0	3
Endometrial stromal tumor	0	0	0	1	0	0	0

Continued.

Histology	USG findings						
	Adenomyosis	Fibroid	Malignancy	No changes	Ovulatory dysfunction	Polyps	Thickened endometrium
Endometrial carcinoma	1	1	0	1	0	0	1
Pill endometrium	1	0	0	0	0	1	0
Proliferative phase	12	22	1	4	8	0	8
Secretary phase	12	4	1	1	1	9	4
Secretary pseudopolyp	0	0	0	0	0	3	0
Shedding endometrium	1	0	0	0	0	1	0
Simple cystic endometrial hyperplasia	5	8	2	4	1	1	4
Total	46	38	6	16	11	26	29
P value	Chi. Sq. value=10.94, $p \leq 0.00$, highly significant						

DISCUSSION

AUB during the perimenopausal years is a prevalent gynecological concern and often signifies underlying pathology requiring systematic evaluation. In the present study, conducted among women aged 40-49 years, several important clinical, USG, and histopathological correlations were observed.

Regarding clinical presentations, heavy and prolonged bleeding was the most common complaint (26.1%), consistent with findings from other studies (Munro et al) which suggest that structural causes, particularly fibroids and adenomyosis, commonly present with such symptoms in perimenopausal women.¹² Most women (62.2%) had menstrual flow lasting between 5-8 days, aligning with prior observations that increased menstrual duration is a hallmark of perimenopausal AUB (Kriplani et al).¹³

USG findings revealed that adenomyosis (24.4%) was the most common pathology, followed by fibroids (20.9%) and thickened endometrium (16.8%). The predominance of adenomyosis mirrors the findings of other Indian and international studies (Bergeron et al) highlighting the increasing recognition of adenomyosis in perimenopausal bleeding.¹⁴

Histopathological evaluation remains the gold standard for diagnosing the underlying etiology of AUB. In our cohort, proliferative phase endometrium (31.98%) was the most common finding, indicating anovulatory cycles, which are prevalent during perimenopause due to declining ovarian reserve and hormonal imbalances. Simple cystic hyperplasia (14.53%) and benign polyps (13.95%) were also frequent, with endometrial carcinoma identified in 2.33% of patients. Although rare, the identification of endometrial carcinoma in this age group emphasizes the need for timely histological evaluation in all cases of AUB to rule out malignancy, as supported by ACOG guidelines. These observations are consistent with studies by Pilli et al

and Yusuf et al who reported similar histopathological spectra in perimenopausal women with AUB.^{15,16}

The correlation between USG findings and histopathological diagnosis revealed a highly significant association ($p < 0.001$), suggesting the value of ultrasonography as a preliminary diagnostic tool, especially in settings where access to histopathology may be limited. Fibroids were most frequently associated with proliferative endometrium, and polyps with secretory or benign polyp histology. These findings emphasize the diagnostic value of transvaginal sonography (TVS) in evaluating perimenopausal AUB. TVS has been established as a sensitive and non-invasive modality for the preliminary evaluation of endometrial pathology (Epstein et al and Dueholm).^{17,18}

Limitations

This study was conducted at a single tertiary centre with a limited sample size, which may affect the generalizability of the findings. USG, while useful, missed significant endometrial pathology in some cases, and its results may be operator-dependent. Histopathological analysis was restricted to patients undergoing biopsy or hysterectomy, potentially introducing selection bias. The cross-sectional design limited assessment of longitudinal endometrial changes, and rare pathologies were observed too infrequently to allow robust statistical correlations.

CONCLUSION

This study highlights the importance of a comprehensive diagnostic approach in evaluating AUB among perimenopausal women. Adenomyosis emerged as the most prevalent USG finding. Histopathologically, the proliferative phase endometrium was most commonly observed, followed by simple cystic hyperplasia and benign polyps. A significant correlation between USG findings and histopathological diagnoses ($p < 0.001$)

underscores the diagnostic value of ultrasonography in conjunction with histopathology.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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