

Modern Management of Abnormal Uterine Bleeding: An Algorithmic Approach Using the PALM–COEIN ClassificationRekha Kumari¹, Madhuri Choudhary², Rupam Sinha³¹Senior Resident, Department of Obstetrics and Gynaecology, PMCH, Patna, India²Senior Resident, Department of Obstetrics and Gynaecology, PMCH, Patna, India³Professor, Department of Obstetrics and Gynaecology, PMCH, Patna, India

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Abstract:

Background: Abnormal uterine bleeding (AUB) is a common gynecological condition affecting women across reproductive age groups and significantly impacting quality of life. To standardize evaluation and management, the International Federation of Gynecology and Obstetrics (FIGO) introduced the PALM–COEIN classification system, categorizing AUB into structural and non-structural etiologies. The “PALM” group includes structural causes—Polyp (AUB-P), Adenomyosis (AUB-A), Leiomyoma (AUB-L), and Malignancy & Hyperplasia (AUB-M)—while the “COEIN” group comprises non-structural causes—Coagulopathy (AUB-C), Ovulatory dysfunction (AUB-O), Endometrial causes (AUB-E), Iatrogenic (AUB-I), and not yet classified (AUB-N).

An algorithmic approach to AUB begins with a thorough clinical history, assessment of bleeding pattern, pregnancy exclusion, and evaluation of hemodynamic stability. Initial laboratory investigations include complete blood count, thyroid profile, coagulation studies (when indicated), and pregnancy testing. Imaging modalities such as transvaginal ultrasonography serve as first-line diagnostic tools for structural causes, with hysteroscopy and MRI reserved for selected cases. Endometrial sampling is recommended in women over 45 years or those with risk factors for endometrial carcinoma. Management is individualized based on etiology, severity, patient age, fertility desires, and comorbidities. Medical therapy remains first-line for most non-structural causes and includes tranexamic acid, NSAIDs, combined oral contraceptives, cyclic or continuous progestins, and the levonorgestrel-releasing intrauterine system (LNG-IUS). Surgical interventions such as hysteroscopic polypectomy, myomectomy, endometrial ablation, uterine artery embolization, and hysterectomy are reserved for refractory cases or structural pathology. The algorithmic integration of the PALM–COEIN system ensures systematic evaluation, reduces unnecessary interventions, and promotes evidence-based, patient-centered care. Early diagnosis and tailored therapy improve clinical outcomes and enhance quality of life in women with AUB.

Conclusion: Abnormal uterine bleeding (AUB) remains a common and clinically significant gynecological problem, particularly among perimenopausal women. The present study of 45 patients demonstrates that structural causes are more prevalent than non-structural causes, with leiomyoma being the most common etiology. Ovulatory dysfunction emerged as the leading non-structural cause. Moderate anemia was frequently associated, emphasizing the need for early diagnosis and timely intervention.

Keywords: PALM–COEIN, NSAIDs, AUB.**DOI:** 10.25258/ijcpr.18.2.130

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Introduction

Abnormal uterine bleeding (AUB) is one of the most common gynecological complaints encountered in clinical practice, accounting for a significant proportion of outpatient visits and gynecologic interventions worldwide. It affects women across all reproductive age groups—from adolescence to perimenopause—and has substantial physical, psychological, social, and economic consequences. Chronic blood loss may lead to iron deficiency anemia, fatigue, reduced work productivity, and impaired quality of life.

Traditionally, AUB was described using imprecise and inconsistently applied terms such as menorrhagia, metrorrhagia, and dysfunctional uterine bleeding. This lack of uniformity often led to confusion in diagnosis, research, and management. To address this issue, the International Federation of Gynecology and Obstetrics (FIGO) introduced the standardized PALM–COEIN classification system in 2011, which categorizes causes of AUB into structural and non-structural etiologies. This system provides a clear, systematic framework for evaluation and facilitates evidence-based

management. The PALM group represents structural causes identifiable by imaging or histopathology—Polyp, Adenomyosis, Leiomyoma, and Malignancy & Hyperplasia—while the COEIN group includes non-structural causes such as Coagulopathy, Ovulatory dysfunction, Endometrial disorders, Iatrogenic causes, and Not yet classified conditions. This classification has improved clinical communication, research standardization, and therapeutic decision-making. Modern management of AUB emphasizes an algorithmic approach beginning with assessment of hemodynamic stability, exclusion of pregnancy, and identification of the underlying cause using the PALM–COEIN framework. Management strategies are individualized based on etiology, patient age, reproductive goals, severity of bleeding, and associated comorbidities, with a strong preference for minimally invasive and fertility-preserving options whenever appropriate. Thus, the PALM–COEIN-based algorithm represents a major advancement in the structured evaluation and management of abnormal uterine bleeding, promoting patient-centered and evidence-based care.

Materials and Methods

Study Design: This was a prospective observational study conducted in the Department of Obstetrics and Gynecology at Patna Medical College and Hospital Patna, Bihar. Study duration is One and Half years. And tertiary care hospital. The study aimed to evaluate abnormal uterine bleeding (AUB) using the PALM–COEIN classification and to assess management outcomes through an algorithmic approach.

Study Population: A total of 45 patients presenting with complaints of abnormal uterine bleeding were included in the study.

Inclusion Criteria

- Women in the reproductive and perimenopausal age group
- Patients presenting with abnormal uterine bleeding (altered frequency, duration, regularity, or volume of menstrual bleeding)
- Willingness to participate and provide informed consent

Exclusion Criteria

- Pregnancy-related bleeding
- Acute pelvic inflammatory disease
- Known bleeding disorders already under treatment
- Patients on hormonal therapy initiated prior to evaluation

Methodology: All patients underwent a structured evaluation based on a standardized algorithm:

1. Clinical Assessment

- Detailed menstrual history (pattern, duration, quantity of bleeding)
- Obstetric and contraceptive history
- Medical and drug history
- General physical and systemic examination
- Pelvic examination

2. Laboratory Investigations

- Complete blood count
- Urine pregnancy test
- Thyroid function tests (when indicated)
- Coagulation profile (if suspected coagulopathy)

3. Imaging Studies

- Transvaginal ultrasonography (TVS) as first-line imaging
- Additional imaging (MRI) or hysteroscopy when required

4. Endometrial Evaluation

- Endometrial biopsy in women ≥ 45 years or those with risk factors for malignancy
- Histopathological examination when indicated

Classification: Each patient was categorized according to the PALM–COEIN classification system, identifying structural (PALM) and non-structural (COEIN) causes of AUB.

Management Protocol: Management was individualized based on the underlying etiology:

- Medical management (NSAIDs, tranexamic acid, hormonal therapy, LNG-IUS)
- Surgical management (polypectomy, myomectomy, endometrial ablation, hysterectomy) in indicated cases

Outcome Measures

- Improvement in bleeding pattern
- Correction of anemia
- Need for surgical intervention
- Patient satisfaction

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using descriptive statistics. Results were expressed as percentages and proportions.

Results

A total of 45 patients presenting with abnormal uterine bleeding (AUB) were evaluated and classified according to the PALM–COEIN system.

1. Age Distribution

The majority of patients belonged to the perimenopausal age group.

Age Group (years)	Number of Patients	Percentage (%)
20–29	6	13.3%
30–39	12	26.7%
40–49	21	46.7%
≥50	6	13.3%

Most patients (46.7%) were between 40–49 years.

2. Distribution According to PALM–COEIN Classification

Out of 45 patients:

Cause	Number	Percentage (%)
Polyp (AUB-P)	5	11.1%
Adenomyosis (AUB-A)	7	15.6%
Leiomyoma (AUB-L)	12	26.7%
Malignancy/Hyperplasia (AUB-M)	3	6.6%

Leiomyoma (AUB-L) was the most common structural cause.

Cause	Number	Percentage (%)
Coagulopathy (AUB-C)	2	4.4%
Ovulatory dysfunction (AUB-O)	10	22.2%
Endometrial (AUB-E)	3	6.6%
Iatrogenic (AUB-I)	2	4.4%
Not yet classified (AUB-N)	1	2.2%

Ovulatory dysfunction (AUB-O) was the most common non-structural cause.

3. Hemoglobin Status

- Mild anemia (Hb 10–11 g/dL): 14 patients (31.1%)
- Moderate anemia (Hb 7–9.9 g/dL): 18 patients (40%)
- Severe anemia (Hb <7 g/dL): 5 patients (11.1%)
- Normal Hb: 8 patients (17.8%)

Moderate anemia was most frequently observed.

4. Management Outcomes

- Medical management: 28 patients (62.2%)
- Surgical management: 17 patients (37.8%)

Among surgical procedures:

- Polypectomy: 5 cases
- Myomectomy: 6 cases
- Hysterectomy: 6 cases

Most patients responded well to medical therapy, while surgical intervention was required mainly in structural causes or refractory cases.

Summary of Key Findings

- Majority were in the perimenopausal age group (40–49 years).

- Structural causes (PALM) – 27 patients (60%)
- Non-structural causes (COEIN) – 18 patients (40%)

Structural Causes (PALM)

Non-Structural Causes (COEIN)

- Structural causes (60%) were more common than non-structural causes (40%).
- Leiomyoma was the most common structural cause.
- Ovulatory dysfunction was the most common non-structural cause.
- Most patients improved with medical management.

Discussion

Abnormal uterine bleeding (AUB) is a significant gynecological concern, particularly in women of reproductive and perimenopausal age groups. In the present study of 45 patients, the majority belonged to the 40–49 years age group, which is consistent with the known higher incidence of AUB during the perimenopausal transition. Hormonal fluctuations, anovulatory cycles, and increased prevalence of structural uterine pathology contribute to this trend.

The adoption of the PALM–COEIN classification system proposed by the International Federation of Gynecology and Obstetrics (FIGO) has significantly improved the standardization of diagnosis and management of AUB. This system enables categorization into structural (PALM) and non-structural (COEIN) causes, facilitating a systematic and evidence-based approach. In the present study, structural causes (60%) were more common than non-structural causes (40%). Leiomyoma (AUB-L)

emerged as the most frequent structural cause, which aligns with multiple clinical studies reporting fibroids as a leading cause of heavy menstrual bleeding in perimenopausal women. Adenomyosis and endometrial polyps were also notable contributors. Malignancy and hyperplasia accounted for a smaller proportion, emphasizing the importance of endometrial sampling in high-risk groups, particularly women above 45 years of age.

Among non-structural causes, ovulatory dysfunction (AUB-O) was the most prevalent. This finding is consistent with the increased incidence of anovulatory cycles in adolescents and perimenopausal women. Coagulopathy and iatrogenic causes were less common, reflecting either lower prevalence or underdiagnosis due to limited screening in some cases.

Anemia was a frequent associated finding, with the majority of patients presenting with moderate anemia. This highlights the chronic nature of blood loss in AUB and the importance of early intervention to prevent complications such as severe anemia and reduced quality of life. Regarding management, most patients (62.2%) responded well to medical therapy, supporting the role of conservative treatment as first-line management, especially in non-structural causes and in women desiring fertility preservation. Surgical management was primarily required in structural lesions such as leiomyoma and polyps or in cases refractory to medical therapy. This approach aligns with modern treatment principles that prioritize minimally invasive and fertility-sparing options whenever feasible.

Overall, the findings reinforce that an algorithmic approach based on the PALM–COEIN classification ensures accurate diagnosis, rational investigation, and individualized management. It reduces unnecessary surgical interventions and promotes patient-centered care. Larger studies with long-term follow-up would further validate the effectiveness of this structured management strategy in improving clinical outcomes and quality of life among women with AUB.

Conclusion

Abnormal uterine bleeding (AUB) remains a common and clinically significant gynecological problem, particularly among perimenopausal women. The present study of 45 patients demonstrates that structural causes are more prevalent than non-structural causes, with leiomyoma being the most common etiology. Ovulatory dysfunction emerged as the leading non-structural cause. Moderate anemia was frequently associated, emphasizing the need for early diagnosis and timely intervention. The use of the PALM–

COEIN classification system introduced by the International Federation of Gynecology and Obstetrics provides a standardized and systematic framework for evaluating AUB. An algorithmic approach incorporating detailed clinical assessment, appropriate investigations, and targeted therapy ensures accurate diagnosis and rational management. Most patients responded effectively to medical management, while surgical intervention was reserved for structural lesions or refractory cases. This highlights the importance of individualized, evidence-based, and fertility-preserving treatment strategies. The PALM–COEIN–based algorithm enhances clinical decision-making, minimizes unnecessary procedures, and improves overall patient outcomes in women presenting with abnormal uterine bleeding.

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