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Original Research Article

Role of hysteroscopy in evaluating patients with abnormal uterine bleeding and its correlation with histopathology

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ABSTRACT

Background: Abnormal uterine bleeding (AUB) is a common gynaecological complaint with diverse aetiologies that often require precise evaluation to guide management. Hysteroscopy, by allowing direct visualization of the uterine cavity, has emerged as a superior diagnostic tool compared to traditional methods such as dilation and curettage. Objectives were to determine the spectrum of intrauterine abnormalities contributing to AUB through hysteroscopic evaluation, assess the diagnostic potential of hysteroscopy, and correlate its findings with histopathology.
Methods: An analytical observational study was conducted in the department of obstetrics and gynecology at Sparsh Hospital, Bangalore, from January 2023 to December 2024, involving 210 women with AUB. All participants underwent detailed clinical evaluation, transvaginal sonography (TVS), hysteroscopy, and endometrial biopsy. Hysteroscopic findings were compared with histopathological results, and diagnostic validity parameters- sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and overall accuracy- were calculated using SPSS v20.
Results: Most patients were aged 41-50 years (35.24%). Heavy menstrual bleeding was the commonest presentation (36.6%). Hysteroscopy revealed endometrial polyps (30.47%) and hyperplasia (21.4%) as predominant findings. Histopathology confirmed polyps in 28.5% and hyperplasia in 18.08%. Hysteroscopy showed sensitivity of 95.18%, specificity of 84.92%, PPV of 82%, NPV of 96.31%, and diagnostic accuracy of 90.05% in comparison to histopathology.
Conclusions: Hysteroscopy is a highly accurate, safe, and minimally invasive diagnostic modality for evaluating AUB. When combined with histopathology, it serves as the gold standard for identifying intrauterine pathology and guiding appropriate management.

Keywords: Abnormal uterine bleeding, Diagnostic accuracy, Endometrial hyperplasia, Histopathology, Hysteroscopy

INTRODUCTION

Abnormal uterine bleeding (AUB) represents a significant clinical concern affecting millions of women globally, arising from gynaecologic as well as systemic causes throughout the reproductive years and even after menopause.[1] A structured assessment beginning with a detailed history and comprehensive physical examination remains the cornerstone of AUB evaluation. Anovulatory bleeding typically presents as irregular, infrequent, and unpredictable bleeding episodes with notable variability in duration, flow, and pattern; it is not associated with detectable genital tract abnormalities and lacks consistent premenstrual symptoms that characterize ovulatory cycles. In contrast, prolonged or excessively heavy menstrual bleeding is more frequently indicative of an underlying coagulation disorder or structural uterine pathology rather than ovulatory dysfunction.[2]

According to the FIGO classification, the aetiologies of AUB encompass a broad spectrum, including polyps, adenomyosis, leiomyoma, malignancy and hyperplasia, ovulatory dysfunction, endometrial disorders, coagulopathies, iatrogenic causes, and unclassified entities. Among these categories, intrauterine structural abnormalities- such as polyps, adenomyosis-related lesions, submucous fibroids, premalignant changes, and endometrial carcinoma- form the predominant group and are primarily identified through imaging modalities and histopathological assessment.[3] Transvaginal sonography (TVS) is widely used as an initial, minimally invasive diagnostic tool for detecting such intracavitary abnormalities due to its accessibility and high patient acceptability. However, TVS alone may be insufficient for establishing a definitive diagnosis, particularly when lesion morphology is subtle or when visualization of the uterine cavity is limited by anatomical or technical factors.[4]

In scenarios where further characterization of intrauterine abnormalities is required, saline infusion sonography (SIS) offers enhanced delineation of the endometrial cavity. By instilling saline to provide a contrast-filled environment, SIS improves visualization of focal lesions and endometrial thickness variations, functioning on the same principles as ultrasound but with superior cavity definition. This technique is especially beneficial for differentiating space-occupying lesions such as polyps and submucous fibroids and demonstrates a diagnostic sensitivity that closely parallels that of hysteroscopy, making it a valuable intermediate step when TVS findings are inconclusive.[5]

Before commencing any form of treatment for abnormal uterine bleeding (AUB), establishing an accurate diagnosis is essential. Several experts recommend that endometrial sampling should be performed in all women aged ≥35 years presenting with AUB, given the increased risk of endometrial pathology in this group. Although dilatation and curettage (D and C) was historically the main diagnostic tool for assessing AUB prior to the advent of hysteroscopy, it remains a blind and often incomplete technique. Evidence shows that D and C may sample less than half of the endometrial cavity in approximately 60% of cases, limiting its diagnostic value.[6] Furthermore, D&C is less effective than hysteroscopy in identifying focal structural lesions such as endometrial polyps, submucous fibroids, intrauterine adhesions, and congenital anomalies, and carries a reported cancer detection failure rate of nearly 0.9%.[7]

Transvaginal sonography (TVS), though widely available and non-invasive, also exhibits a considerable false-negative rate and is less reliable than hysteroscopy for detecting localized intrauterine abnormalities.[8] While hysterectomy provides a complete assessment of the uterine cavity and remains the definitive gold standard for diagnosis, it is unsuitable as a routine diagnostic method due to its invasiveness.[9] In contrast, hysteroscopy offers a practical, minimally invasive alternative that allows direct visual inspection of the cervical canal and uterine cavity, enabling precise identification of intrauterine pathologies. This enhanced visualization supports more accurate diagnosis and permits targeted medical or surgical management, often reducing the need for extensive procedures.

Valle emphasized that hysteroscopy should not replace histological confirmation, as tissue diagnosis remains essential for ruling out premalignant or malignant disease.[10] Consequently, the combination of hysteroscopy with histopathological evaluation is now recognized as the modern "gold standard" for assessing AUB and guiding appropriate clinical decision-making.[11]

The present study was undertaken to determine the spectrum of intrauterine abnormalities contributing to AUB using hysteroscopic evaluation. The aim of this study is to assess the diagnostic potential of hysteroscopy in abnormal uterine bleeding and determine its correlation with corresponding histopathological findings.

METHODS

This analytical observational study was conducted in the department of obstetrics and gynecology at Sparsh Hospital, Bangalore, over a 24-month period from January 2023 to December 2024. A total of 210 women presenting with abnormal uterine bleeding (AUB) were recruited based on predefined inclusion and exclusion criteria.

Inclusion criteria

Women belonging to the reproductive, perimenopausal, and postmenopausal age groups attending the gynecology OPD or IPD with complaints of AUB were included.

Exclusion criteria

Pregnant women; women using an intrauterine contraceptive device; those with lower genital tract malignancies; patients using oral contraceptive pills, anticoagulants, or having endocrine disorders such as hyperthyroidism, hypothyroidism, adrenal disease, or prolactin abnormalities were excluded from the study.

A detailed history was obtained from all participants, followed by general, physical, systemic, and gynaecological examinations. Baseline investigations including transvaginal sonography (TVS) were performed. All eligible patients subsequently underwent hysteroscopy, and endometrial biopsy samples were collected for histopathological evaluation after obtaining written informed consent.

The procedure was performed in an operating theatre under general anesthesia, with the patient positioned in dorsal lithotomy. The cervix was cleaned using 10% povidone-iodine solution. After bimanual examination, the anterior lip of the cervix was held with a single-toothed

tenaculum. A uterine sound was inserted to determine the uterine position and uterocervical length.

A 4 mm rigid hysteroscope and 5 mm sheath with a 30° oblique lens telescope (Karl Storz) was introduced gently through the external Os and advanced under direct visualization. The hysteroscope was connected to a 0.9% normal saline distension system, and intrauterine pressure was maintained between 70-100 mmHg to obtain optimal visualization. A systematic inspection of the endocervical canal, uterine cavity, fundus, and tubal ostia was performed. Endometrial curettage was subsequently carried out, particularly from any suspicious areas identified on hysteroscopy. Curetted material was fixed immediately in 10% neutral buffered formalin and sent for histopathological examination. Post-procedure, patients were monitored in the recovery room for two hours and discharged either the same day or the following day based on clinical condition.

Hysteroscopic findings were compared and correlated with histopathological results. Categorical variables were expressed as frequency and percentage (%), while continuous variables were presented as mean±standard deviation (SD) or median as appropriate. Qualitative variables were analysed using the Chi-Square test or Fisher's exact test. Diagnostic parameters including sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and overall accuracy were calculated for hysteroscopy in detecting intrauterine pathology. A p value ≤0.05 was considered statistically significant. All data were entered into Microsoft Excel and analysed using SPSS version 20.0 (IBM Corp., Armonk, NY, USA).

RESULTS

Over a span of twenty-four months, the study enrolled 210 women who presented with symptoms at the Department of obstetrics and gynecology at Sparsh hospital, Bangalore.

Table 1: Age distribution.

Age group (years)	N	Percentage
≤40	34	16.19
41-50	74	35.24
51-60	65	30.95
61-70	21	10.00
71-80	16	7.62

The study enrolled a total of 210 women starting at age 35 years. The age distribution of patients with AUB is presented in the following table (Table 1). The majority of women with abnormal uterine bleeding belonged to the perimenopausal age group of 41-50 years, followed by those aged 51-60 years. The patients average age was 51.13 years and their ages ranged from 35 to 80 years old. This distribution highlights the increased prevalence of AUB during the perimenopausal transition, when hormonal imbalance and structural endometrial pathology are more frequent (Table 1).

Table 2: Abnormal uterine bleeding pattern.

Presenting complaint	N	Percentage
Heavy menstrual bleeding (HMB)	77	36.60
Frequent cycles + HMB	9	4.28
Frequent cycles	13	6.19
Intermenstrual bleeding (IMB)	15	7.14
Postmenopausal bleeding	60	28.50
Postmenopausal thickened endometrium	36	17.14

Heavy menstrual bleeding was the most common presenting complaint, followed by postmenopausal bleeding. The substantial proportion of postmenopausal presentations emphasizes the need for thorough endometrial evaluation in this group due to the increased risk of premalignant and malignant pathology (Table 2).

Table 3: Hysteroscopic findings in AUB.

Hysteroscopic finding	N	Percentage
Normal	48	22.80
Atrophic endometrium	26	12.30
Endometrial hyperplasia	45	21.40
Endometrial polyp	64	30.47
Endometritis	2	0.95
Adhesions	1	0.50
Submucous fibroid	11	5.23
Carcinoma	13	6.19

Hysteroscopy findings

In our study, based on hysteroscopy findings, out of 210 patients, 48 patients were reported with normal hysteroscopy findings inclusive of proliferative and secretory endometrium, and the rest of the patients with abnormal hysteroscopy findings. Hysteroscopy revealed endometrial polyps as the most frequent intrauterine abnormality, followed by endometrial hyperplasia. The Figure 4 depicts endometrial hyperplasia without atypia. Malignancy and submucous fibroids, though less frequent, were clearly identifiable, underscoring the utility of hysteroscopy in detecting focal and serious lesions (Table 3).

Histopathology

In the study, 210 patients with AUB were evaluated for endometrial pathology. Of these, 52 patients had a normal endometrium showing the proliferative and secretory phases. Histopathology demonstrated endometrial polyps as the most common finding. Hyperplasia with and without atypia constituted a significant proportion, while carcinoma was detected in a clinically important subset. These findings highlight the essential role of

histopathology in confirming diagnosis and assessing malignant potential (Table 4).

Table 4: Histopathological findings.

Histopathological diagnosis	N	Percentage
Normal	52	24.76
Hyperplasia without atypia	24	11.42
Hyperplasia with atypia	14	6.66
Disordered proliferative endometrium	9	4.28
Atrophic endometrium	22	10.47
Endometrial polyp	60	28.50
Myoma (submucous fibroid)	11	5.23
Endometritis	1	0.50
Carcinoma	17	8.09

200 out of 210 patients had the same diagnosis on both modalities, out of remaining 10 cases, 4 were missed for Normal endometrial findings, 4 for carcinoma and 2 for disordered proliferative endometrium, which is a histopathological diagnosis.

Table 5: Comparison of validities.

Diagnostic parameters	Value (%)
Sensitivity	95.18
Specificity	84.92
Positive Predictive Value (PPV)	82
Negative Predictive Value (NPV)	96.31
Diagnostic Accuracy	90.05

The study assessed the diagnostic accuracy of hysteroscopy in detecting endometrial abnormalities among women with AUB, aiming to evaluate its reliability as a diagnostic tool for these conditions. The sensitivity, specificity, positive predictive value, and negative predictive value were 95.18%, 84.92%, 82%, and 96.31% respectively. The overall diagnostic accuracy of the study was found to be 90.05% (Table 5).

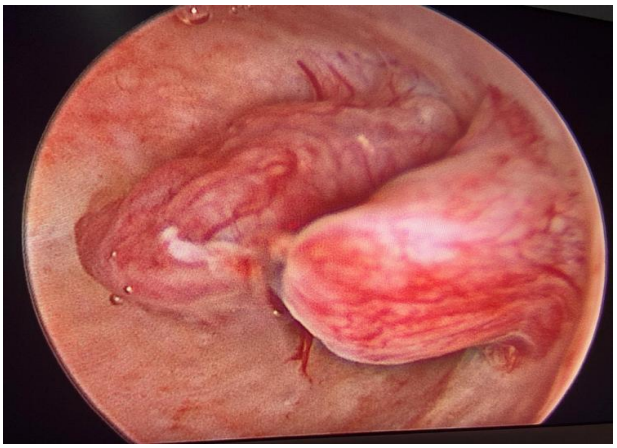

Figure 1: Hysteroscopic view of endometrial polyp.

Figure 2: Hysteroscopic view of endometrial carcinoma.

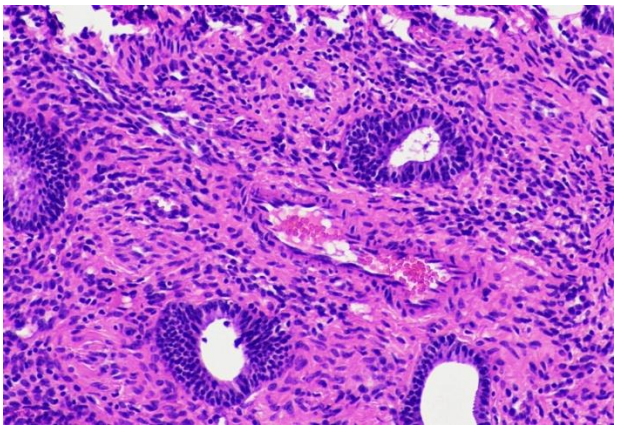

Figure 3: Endometrial polyp.

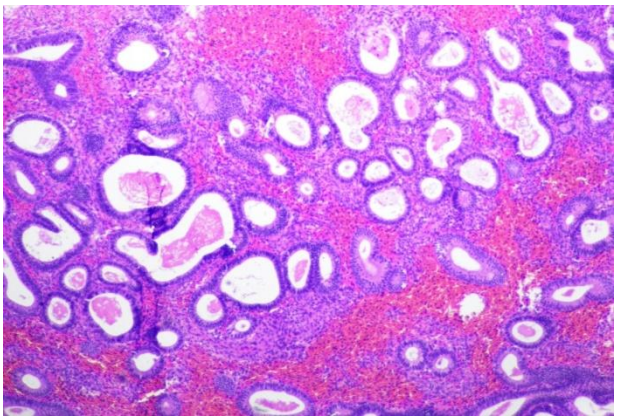

Figure 4: Hyperplasia without atypia.

Hysteroscopy showed high sensitivity and negative predictive value, indicating excellent ability to detect intrauterine pathology and reliably exclude disease. The overall diagnostic accuracy was high, supporting hysteroscopy as an effective diagnostic modality for abnormal uterine bleeding when used in conjunction with histopathological evaluation (Table 5).

DISCUSSION

Abnormal uterine bleeding (AUB) constitutes a major gynecologic complaint, accounting for approximately one-third of all visits in gynecologic outpatient clinics.[1]

The present study recruited 210 women who were over the age of 35. Age distribution analysis revealed that the majority of patients were in the 41-50-year age group (35.24%) followed by those aged 51-60 years (30.95%). The patients in the present study had a mean age of 51.13 years and their ages ranged from 35 to 80 years old. In the study by Desai et al AUB is most commonly observed in 40-49 years age group (41%) followed by 50-59 years (23%).[16] Similar age-related trends have been described by Patil et al.[11] This suggests that AUB is most prevalent during the perimenopausal and early postmenopausal periods.

Heavy menstrual bleeding (HMB) was the most common presenting complaint (36.6%) followed by Postmenopausal bleeding (28.5%). This significant proportion of postmenopausal bleeding in the present study underscores the importance of prompt hysteroscopic and histopathological evaluation to exclude malignancy. Sharma et al and Raut and Babbar also reported HMB as the predominant symptom in women with AUB.[12,17] Study by Nandan et al also had HMB as the commonest mode of presentation in 49.7% of patients followed by Postmenopausal bleeding (16.6%).[18]

The present study highlights the diagnostic accuracy and clinical value of hysteroscopy in the evaluation of abnormal uterine bleeding (AUB) and its correlation with histopathology. In this study, hysteroscopy identified normal endometrium in 22.8% of cases and a wide spectrum of intrauterine pathologies, including endometrial polyps (30.47%), endometrial hyperplasia (21.4%), atrophic endometrium (12.3%), submucous fibroids (5.23%), and carcinoma (6.19%). The overall diagnostic accuracy of hysteroscopy was 90.05%, reinforcing its role as a reliable and minimally invasive modality for direct visualization of the uterine cavity and targeted endometrial sampling.[11,12]

The hysteroscopic findings observed in the present study are comparable to those reported by Sharma et al, who demonstrated high diagnostic accuracy of hysteroscopy, particularly for focal lesions such as polyps, fibroids, and endometrial carcinoma.[12] Similarly, Patil et al reported that hysteroscopy was superior to blind dilatation and curettage in detecting endometrial hyperplasia and polyps, emphasizing its diagnostic advantage in women with AUB.[11]

Endometrial polyps were the most common hysteroscopic abnormality in the present study (30.47%). Comparable observations were reported by Pradhan et al, who identified polyps and hyperplasia as leading causes of AUB.[13] Mohite et al further demonstrated that hysteroscopy significantly improves diagnostic accuracy over ultrasonography, especially for detecting focal intracavitary lesions, explaining the higher detection rates of polyps and sub mucous fibroids in the present series.[14] The Figure 1 and Figure 3 illustrates an endometrial polyp as seen in hysteroscopy and histopathology respectively.

Histopathological examination corroborated the hysteroscopic findings, with endometrial polyps being the most frequent diagnosis, followed by normal endometrium and endometrial hyperplasia with or without atypia. A clinically significant proportion of carcinoma cases was also identified. The Figure 2 demonstrates the hysteroscopy appearance of the endometrial carcinoma. Similar histopathological distributions were reported by Shivanagappa et al, who observed normal endometrium and hyperplasia as common findings in AUB.[15] Desai et al further validated the reliability of hysteroscopy by reporting sensitivity and specificity values comparable to those seen in the present study.[16]

Correlation analysis between hysteroscopic and histopathological findings demonstrated strong agreement for focal lesions. Complete concordance was observed for submucous fibroids and adhesions, while agreement exceeded 90% for endometrial polyps and carcinoma. Moderate agreement was seen in cases of endometrial hyperplasia and atrophic endometrium, reflecting the limitation of visual assessment alone. Lower concordance for endometritis has also been reported by Nandan et al and Mohite et al, highlighting the need for histopathological confirmation in inflammatory endometrial conditions.[14,18]

The diagnostic validity parameters observed in this study, including high sensitivity (95.18%), specificity (84.92%), positive predictive value (82%), and negative predictive value (96.31%), are consistent with findings reported by Desai et al and Revel and Shushan.[16,19] Study conducted by Desai et al showed sensitivity (97.7%), specificity (78.5%), positive predictive value (78.1%), negative predictive value (97.7%) and diagnostic accuracy of 87%.[16] These results confirm that hysteroscopy is particularly effective in ruling out significant intrauterine pathology when findings are normal.

Hysteroscopy proved to be a safe diagnostic procedure in the present study, with no major complications and only minor, self-limiting adverse events. Similar low complication rates were reported by Biswas et al and Sharma et al, confirming the safety and feasibility of diagnostic hysteroscopy in routine clinical practice.[12,20]

The diagnostic accuracy of our study was 90.05%. The correlation between hysteroscopic findings and histopathological findings was found to be significant on the Kappa test (Kappa value =0.847) and p value <0.05. Overall, the findings of the present study reaffirm that hysteroscopy, when combined with histopathological examination, represents the gold standard for evaluating abnormal uterine bleeding. Its high diagnostic accuracy,

excellent correlation with histopathology, and favorable safety profile make it an indispensable tool for early diagnosis, appropriate management planning, and improved patient outcomes.[11,19]

CONCLUSION

Hysteroscopy proves to be a highly effective, minimally invasive, and reliable diagnostic tool for evaluating abnormal uterine bleeding. Its ability to directly visualize intrauterine pathology and facilitate targeted biopsies significantly enhances diagnostic accuracy compared with blind procedures. The strong correlation with histopathological outcomes in this study reinforces hysteroscopy as an essential modality, particularly for detecting focal lesions such as polyps, fibroids, hyperplasia, and malignancy. Integrating hysteroscopy into routine AUB evaluation can improve diagnostic precision and support more appropriate, organ-preserving management.

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