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Identification of pathology of abnormal uterine bleeding by hysteroscopy in women with failed medical management

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ABSTRACT

Abnormal uterine bleeding (AUB) is any menstrual cycle perturbation characterized by alterations in bleeding amount, frequency or duration that occur outside of pregnancy. It makes up to 70% of visits to gynecologists in both outpatient and inpatient practice. Hysteroscopy comes from the Greek words hystero meaning uterus and scopy meaning to look. It is the direct visualization of the cavity of the uterus by a doctor. Before hysteroscopy procedures were performed such as dilatation and curettage (D&C) or pipelle biopsy but it has now been replaced by more accurate and less invasive hysteroscopy. This prospective observational study was conducted from October 2024 to March 2025. A total of 50–80 patients diagnosed with AUB were evaluated using hysteroscopy. The correlation between ultrasonography (USG) findings and hysteroscopic findings was analysed using the Chi-Square test. Most AUB cases occurred in women aged 40–49 years. Significant correlations were found between: Polyps and polypoidal growth ($P < 0.05$); Fibroids and abnormal uterine cavity ($P < 0.05$); Heterogeneous uterus and atrophied endometrium ($P < 0.05$); Bulky uterus and thickened endometrium ($P < 0.05$). These results show a strong relationship between USG and hysteroscopic findings. Diagnostic hysteroscopy is a simple and safe way to determine the cause of abnormal uterine bleeding. It allows the physician to directly visualise the uterine cavity so that they can tailor therapy to the individual patient.

Keywords: Abnormal uterine bleeding, Hysteroscopy, Ultrasonography, Fibroids, Endometrium.

INTRODUCTION

Abnormal uterine bleeding

AUB can be used as an umbrella term to describe abnormalities of the menstrual cycle which affect quantity, frequency, and duration of flow outside of pregnancy. AUB makes up to 70% of visits to gynaecologists and can be diagnosed both inpatient and outpatient settings [1]. In 2011 FIGO released a standardized classification system for diagnosis of AUB. Polyp; adenomyosis; leiomyoma; malignancy and hyperplasia; coagulopathy; ovulatory dysfunction; endometrial; iatrogenic; not yet classified (PALM-COEIN) has since become the most commonly used name to refer to this spectrum [2].

Hysteroscopy

The term hysteroscopy comes from the Greek hysteros (uterus) and scopy (to look). Prior to the mid-19th century uterine cavity visualization procedures were largely invasive and blind, until improvements in endoscopy and distension media allowed for the birth of hysteroscopy. Conditions affecting the inside of the uterus were previously approached with blind procedures like dilatation and curettage (D&C) or sampling. Office hysteroscopy allows direct visualization of the endometrial cavity which improves upon old blind techniques [3].

Epidemiology of abnormal uterine bleeding

Abnormal uterine bleeding (AUB) spans all ages of women and is experienced by almost 30% of women throughout their lives. Bleeding can have a detrimental impact on quality of life, with heavy

menstrual bleeding having the greatest effect. The International Federation of Gynaecology and Obstetrics (FIGO) PALM–COEIN classification allows clinicians to uniformly assess all women of reproductive age presenting with AUB who are not pregnant. Age and clinical features help determine aetiology; however, a thorough workup is needed because not every pathology presents a cause of bleeding [4].

Signs and symptoms

Abnormal uterine bleeding (AUB) can present as an alteration in menstrual frequency, regularity, duration or volume. It can be accompanied by various symptoms such as dysmenorrhea and fatigue. Menorrhagia is used when menstrual blood loss is ≥60–80 mL per cycle with ovulatory cycles. Polymenorrhagia describes cycle intervals of <21 days and oligomenorrhea >35 days. Metrorrhagia is used to describe intermenstrual bleeding, and menometrorrhagia means irregular bleeding with both heavy and light flow [5].

Issues of hysteroscopy

Pain is the most common cause of office hysteroscopy failure. Pain has both anatomical and psychological influences, such as anxiety. Vasovagal reactions during office hysteroscopy are not uncommon and are managed by cessation of the procedure and supportive care [6]. Fluid overload and rare uterine trauma (0.002%–1.7%) can be avoided with careful planning, monitoring fluid infusion and drainage, utilisation of small calibre hysteroscopes and avoiding blind cervical dilatation [7, 8].

Etiopathogenesis of abnormal uterine bleeding

Abnormal uterine bleeding (AUB) in reproductive-age women results from systemic or local disturbances of endometrial haemostasis, including dysfunctional uterine bleeding, organic uterine pathology, or rarely underlying coagulopathies—especially when severe bleeding occurs at menarche [9].

Polyps

Polyps are often asymptomatic, vascular lesions of cervical or endometrial epithelium that can result in abnormal, non-menstrual bleeding. These lesions are typically benign with rare chances of malignancy [10].

Inflammation

Cervicitis may be caused by either unknown factors or pathogens such as Chlamydia trachomatis. Inflammation of the cervical epithelium leads to patients being more prone to contact bleeding with intercourse or birth control use [11].

Endometrial hyperplasia and neoplasia

Endometrial hyperplasia occurs after long-term exposure to unopposed oestrogen, often in association with chronic anovulation. Complex hyperplasia with atypia has approximately a 25% risk of developing into endometrial adenocarcinoma [12].

Leiomyomas

Benign smooth muscle tumours, which are often asymptomatic and most prevalent amongst women in their 40s–50s. Abnormal uterine bleeding can occur with leiomyomas but is more common if the fibroid involves the endometrial cavity. Increased endometrial surface area as well as local distortion of haemostasis, may contribute to this bleeding. Bleeding from the fibroid itself is very rare.

Intrauterine devices

Mechanical IUDs (inert or copper-containing) and can cause menorrhagia and intermenstrual bleeding due to local inflammatory reactions of the endometrium and increased fibrinolysis. Progestin-containing IUDs can lead to reduced menstrual blood flow but may also cause irregular bleeding or amenorrhea as well [13].

Defects in secondary haemostasis

Defects in secondary haemostasis—due to rare coagulation factor deficiencies, anticoagulant therapy, or advanced liver disease—can cause menorrhagia and abnormal uterine bleeding through impaired clotting and oestrogen metabolism, leading to endometrial hyperstimulation [14-16].

Diagnosis of AUB

The diagnostic approach aims to differentiate functional causes of abnormal uterine bleeding from structural uterine pathology through careful history, physical examination, and targeted laboratory and imaging investigations [17, 18].

Bleeding history of patient

Assessment of AUB requires detailed evaluation of bleeding pattern and volume, associated symptoms, medication and herbal use, and family history of bleeding disorders [19-22].

Physical examination

Evaluation of abnormal uterine bleeding should include careful pelvic (speculum and bimanual) examination to identify bleeding sources, with cervical screening if not up to date, while pelvic examination may be deferred in selected adolescents responding to initial therapy [23].

Laboratory testing

Initial evaluation of AUB includes complete blood count and pregnancy testing, with thyroid and targeted hormonal assays when clinically indicated, and coagulation studies if a bleeding disorder is suspected. Endometrial sampling is recommended in women ≥45 years and in younger women with risk factors or persistent symptoms, with office biopsy preferred and hysteroscopy reserved for inadequate or inconclusive results.

Imaging techniques – transvaginal ultrasound

Transvaginal ultrasonography is the first-line imaging modality for AUB, enabling assessment of endometrial thickness and detection of structural abnormalities, while guiding the need for further evaluation with hysteroscopy to identify focal lesions [24-26].

Hysteroscopy

Hysteroscopy has revolutionised modern gynaecology by enabling direct visualisation of the uterine cavity using a

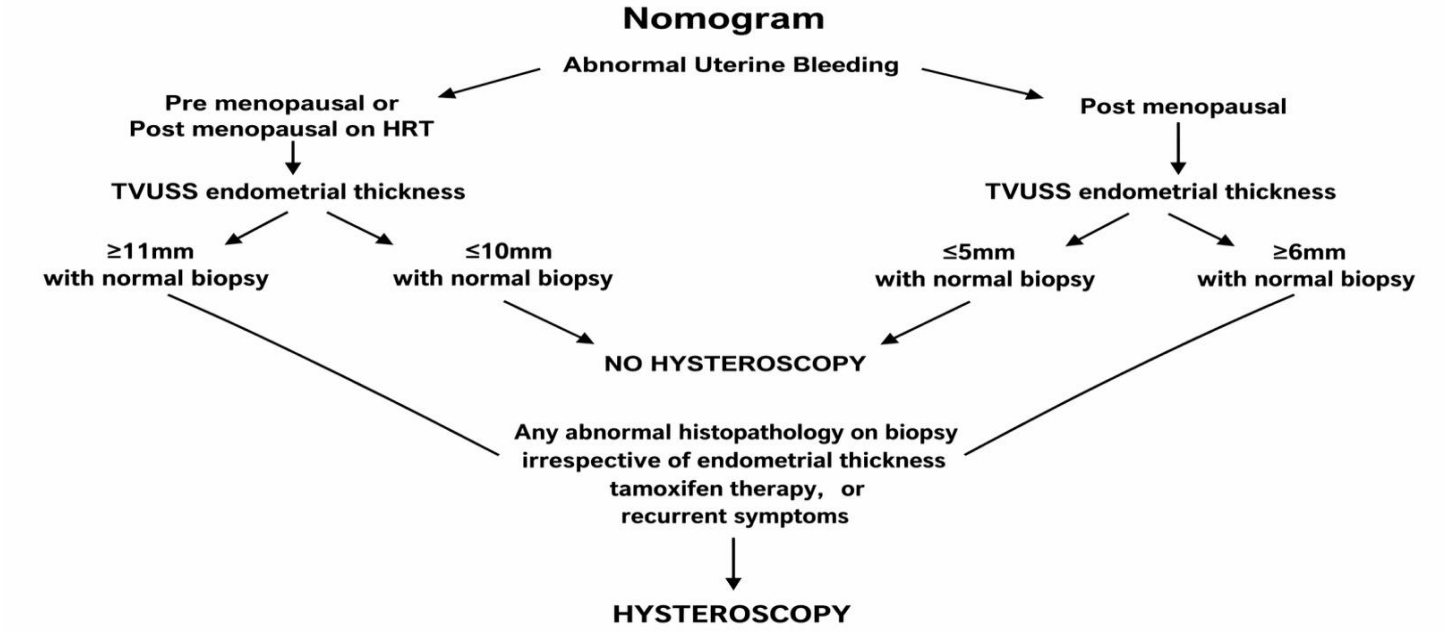
hysteroscope [27]. It involves cervical examination with a speculum and uterine distension, commonly using CO_2, to assess intrauterine pathology.

Different hysteroscopic procedures that can be done: There are majorly 3 hysteroscopic imaging techniques that can be done on a patient with Abnormal Uterine Bleeding, and these include

Outpatient diagnostic hysteroscopy

Outpatient operative hysteroscopy

Figure 1: Steps taken in order to do hysteroscopy



Digital hysteroscopic clinic

Outpatient diagnostic hysteroscopy: Advances in endoscopy and ultrasonography have improved the accurate diagnosis of intrauterine pathologies such as polyps, myomas, synechiae, adenomyosis, IUD malposition, placental remnants, and congenital anomalies. Compared with conventional D&C, hysteroscopy enables targeted hysteroscopic biopsy (THB) under direct visualisation for localised lesions. Although the lack of defined hysteroscopic criteria for endometrial hyperplasia -especially in premenopausal women-limits diagnostic accuracy, early hysteroscopic detection with THB remains valuable due to malignant potential. Blind sampling tools may aid diffuse lesions when guided hysteroscopically, while spirometer and grasp biopsy techniques allow reliable THB and visual diagnostic validation [28, 29].

Outpatient operative hysteroscopy

Outpatient operative ("see & treat") hysteroscopy combines diagnosis and treatment in a single office-based procedure using small-diameter scopes and miniaturised instruments, often without anaesthesia. The use of 5 French bipolar electrodes expanded office hysteroscopy by reducing the need for resectoscopes and operating rooms while allowing saline distension. Lindheim et al. reported a 97% success rate for office operative hysteroscopy using bipolar and mechanical devices [30, 31].

Digital hysteroscopic clinic

In precision medicine, the Diagnostic Hysteroscopy Centre (DHC) represents a novel concept integrating accurate uterine diagnosis and treatment. It combines advanced imaging technologies with in-office and ambulatory surgical care. The endoscopic tower incorporates 3D ultrasound, while hysteroscopy, ultrasound, and MRI together offer a comprehensive diagnostic and therapeutic approach.DHC clinics are characterised by high procedural capacity, allowing up to 50 procedures per room. Their patient-friendly organisation enhances workflow efficiency and comfort. Miniaturised and interchangeable hysteroscopic equipment improves patient compliance and reduces complication rates [32].

Treatment

Hormonal therapies

Estrogen and progestin contraceptives: Combination estrogen-progestin oral contraceptives (OCs) inhibit FSH release and the formation of dominant follicles. It also promotes endometrial stability and development while increasing the pregestational influence. The progestin inhibits the LH surge and ovulation, as well as the formation of an atrophic endometrial lining, reducing overall blood loss during withdrawal bleeding. Dienogest/estradiol valerate (Natazia) is the only combination OC approved by the US Food and Drug Administration (FDA) for the treatment of HMB (March 2012).

Progesteron only formulations:Because progesterone-only medications stabilise the endometrium, inhibit angiogenesis and proliferation, trigger apoptosis, and change oestradiol into oestrone, they are suitable for women who are estrogen-refractory.

Oral progestins: The schedule for using oral progestins is based on ovulatory status. For instance, oral MPA (2.5–10 mg daily), norethindrone (2.5–5 mg daily), megestrol acetate (40–320 mg daily),

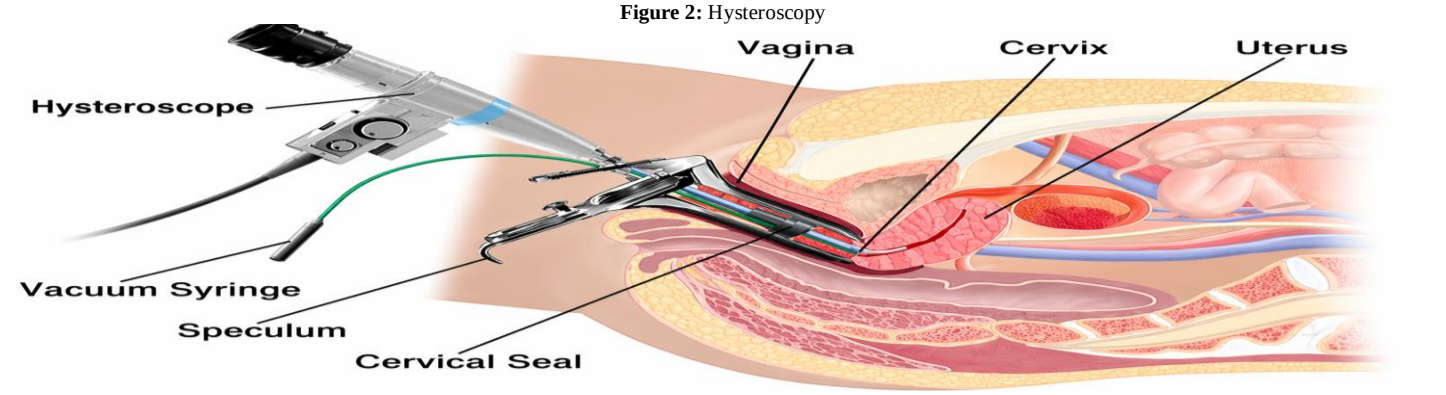
or micronised progesterone (200–400 mg daily) taken cyclically (beginning on menstrual day 5 for 21 days) or continuously reduces menstrual blood loss in women with ovulatory AUB.

Intrauterine progestogen-releasing Agents**:** The levonorgestrel-releasing intrauterine system (LNG-IUS; Mirena) reduces the mean uterine vascular density and endometrial thickness by locally administering 20 mg of progestin every 24 hours.

NSAIDs HMB: Meclomen: 100 mg three times a day and Ibuprofen 600-800 mg every six to eight hours, respectively (ideally when combined with other medications)

Tranexamic acid: Acute: 1.3 g taken orally every 8 hours for five days (recommended for ovulatory women with heavy menstrual bleeding) [33].

Figure 2: Hysteroscopy



MATERIALS AND METHODS

Study design

This was a prospective observational study done in GSL General Hospital. Women with failed medical therapy of abnormal uterine bleeding were assessed to find out the pathophysiology of abnormal uterine bleeding through hysteroscopy. The duration of study was October 2024-March 2025.

Study population

The sample size was determined based on adequacy to evaluate the questionnaire and included 50–80 patients diagnosed with abnormal uterine bleeding by hysteroscopy.

Inclusive criteria

All the inpatients and outpatients visiting the gynaecological department were diagnosed with

abnormal uterine bleeding who are not relieved with conventional medical management

Female who are 18-40 years

Exclusive criteria

Patients who have not yet started their menstruation.

Pregnant Women

Source of data collection and methods

Data were obtained from patient questionnaires, case sheets, admission records, laboratory reports, and ultrasound records. Information was also collected through interviews with patients and their representatives. Data were recorded using specially designed data collection forms after obtaining informed consent. Statistical analysis included the chi-square test to evaluate sample adequacy and suitability for factor analysis. Associations among categorical and continuous variables were also assessed.

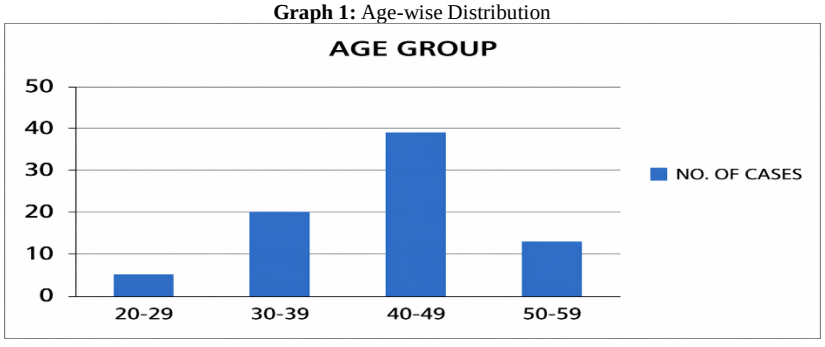
RESULTS

In GSL Hospital, a total of 78 AUB patients were observed to get insight into their health-related quality of life by confirmatory analysis.

Age-wise distribution

The study included 78 patients presenting with AUB. Out of which, based on the age distribution, 39 patients (forty-nine age group) were noted, which is the highest age group accounting for most of the patients, followed by the thirty-age group having 20 patients. This was followed by fifty age group, which had 14 patients. The least were in their twenties, which accounted for only 5 patients. Overall, it can be concluded that patients within the perimenopausal age group are more prone to AUB, specifically from the age group 40-49 years.

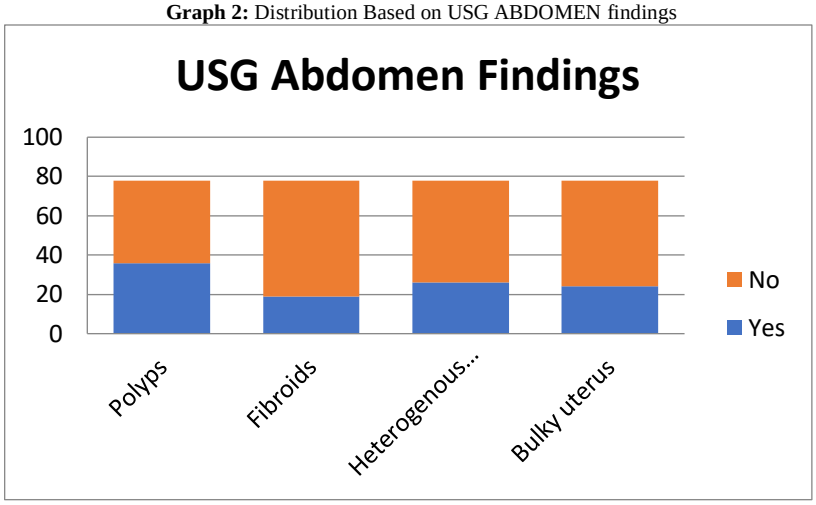
Graph 1: Age-wise Distribution



Distribution based on USG abdomen findings

Of the 78 patients with AUB, 36 have polyps, 19 have fibroids, 26 have heterogeneous uteruses, and 24 have bulky uteruses.

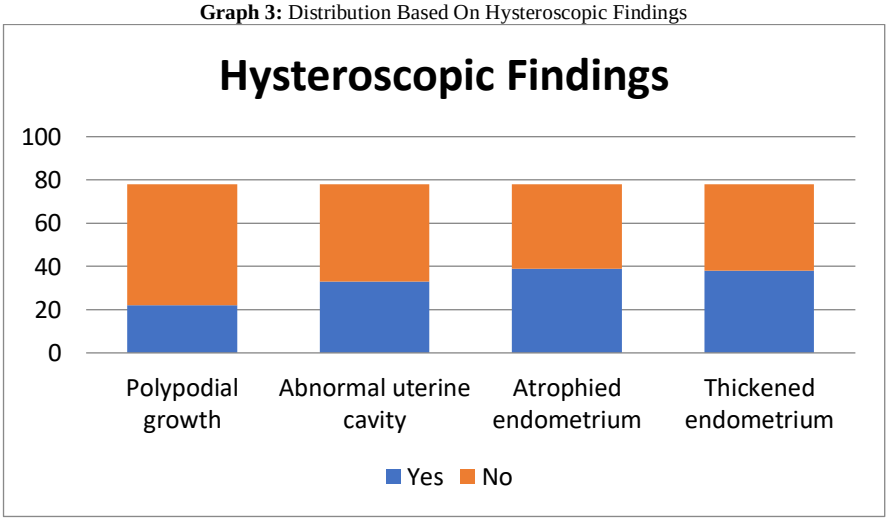
Graph 2: Distribution Based on USG ABDOMEN findings



Distribution based on hysteroscopic findings

Of the 78 AUB patients, 22 have polypoidal growth, 33 have aberrant uterine cavities, 39 have atrophied endometrium, and 38 have thicker endometrium.

Graph 3: Distribution Based On Hysteroscopic Findings



USG findings VS Hysterscopy findings corrleation:

The USG results were compared to the hysterscopic results using the Chi-Square test:

Polyps vs Polypoidal growth: We conclude that there is a significant association between POLYPS and POLYPIDAL GROWTH since the P value is less than 0.05, rejecting the null hypothesis and accepting the alternative.

Table 1: Distribution based on polyps VS polypodial growth

	Hysterscopy (polyp), yes	Hysterscopy (polyp), no	Row total	Chi-square observed value	P-value
USG (polyps) yes	36	42	78		
USG(polyps)no	22	56	78		
Column total	58	98	156	5.38	0.02

*Fibroidis vs Abnormal uterine bleeding:*We conclude that there is a significant correlation between FIBROIDS and ABNORMAL UTERINE CAVITY since the P value is less than 0.05, rejecting the null hypothesis and accepting the alternative hypothesis.

Table 2: Distribution based on fibroids vs abnormal uterine cavity

	Hysterscopy (abnormal uterine cavity)yes	Hysterscopy (abnormal uterine cavity)no	Row total	Chi-square observed value	P-value
USG (fibroid) yes	19	59	78		
USG (FIBROID) NO	33	45	78		
COLUMN TOTAL	52	104	156	5.65	0.01

Heterogenous uterus vs Atrophied endometrium: We conclude that there is a significant correlation between HETEROGENOUS UTERUS and atrophied endometrium since the P value is less than 0.05, rejecting the null hypothesis and accepting the alternative.

Table 3: Distribution based on heterogenous uterus vs atrophied endometrium

	Hysterscopy (atrophied endometrium) yes	Hysterscopy (atrophied endometrium) no	Row total	Chi-square observed value	P-value
USG (H.U) yes	26	52	78		
USG(H.U) no	33	45	78		
Column total	59	97	156	4.45	0.03

Bulky uterus vs. thickened endometrium:

We conclude that there is a significant correlation between BULKY UTERUS and THICKENED ENDOMETRIUM since the P value is less than 0.05, rejecting the null hypothesis and accepting the alternative.

Table 4: Distribution based on bulky uterus vs thickened endometrium

	Hysterscopy (thickened endometrium)yes	Hysterscopy (thickened endometrium)no	Row total	Chi-square observed value	P-value
USG (bulky uterus), yes	24	54	78		
Usg (bulky uterus), no	38	40	78		
Column total	62	94	156	5.24	0.02

DISCUSSION

The purpose of this study was to assess the value of hysteroscopy in detecting underlying pathology in women who experienced abnormal uterine bleeding (AUB) but did not improve with medication intervention. According to our research, hysteroscopy is a useful diagnostic technique for identifying serious uterine abnormalities such endometrial polyps, thicker endometrium, and submucosal fibroids.

There were 78 patients in the research, ranging in age. Women between the ages of 20 and 29 made up the smallest group (n=5), probably because structural reasons of AUB are less common in younger age groups. With no cases of cancer, endometrial polyps and proliferative endometrium were the most frequent findings in this cohort, corroborating earlier results that AUB in younger women is typically functional rather than structural.Endometrial hyperplasia and polyps were more common in the 30-39-year-old age group (n = 20). Some individuals also displayed endometrial shrinkage, particularly those with extended anovulatory cycles, which may lead to continuous bleeding.

The highest number of cases were seen among women of reproductive age undergoing perimenopause age group of 40 to 49 years old (n = 38). Most frequent associations seen were related to endometrial hyperplasia, submucosal fibroids, and polyps which could have resulted from hormonal imbalance and excessive unopposed estrogen stimulation. One woman was diagnosed to have endometrial cancer highlighting the importance of careful evaluation during this age group. Most cases among the fourteen women aged 50 to 59 years were postmenopausal women who had frequent or persistent bleeding.

Our results are in line with other research showing that the prevalence of AUB increases with age. AUB affects 5–15% of women of reproductive age, with higher incidence in older women. Additionally, 88% of our patients had a history of cesarean delivery, suggesting a possible link with AUB. Similar studies ascribed post-cesarean bleeding to endometrial inflammation and coagulation anomalies at scar sites.Thirteen women with irregular menstruation were found to have thyroid disease. In our study identified a 16.6% connection between thyroid problems and AUB, underlining the necessity of endocrine examination.

In line with previous studies, structural anomalies grew with age. Hysteroscopy revealed superior diagnostic accuracy compared to blind endometrial sampling, notably in discriminating benign from malignant lesions. Polyps were discovered in 46.15% of cases, consistent with data described polyps and hyperplasia as the most common hysteroscopic abnormalities.

Histopathological examination revealed the presence of fibroids in 24.35% of patients, while abnormal uterine cavities were detected in 42.3% of patients. These results correlate well with the WHO and Patil et al. This also parallels in which 48.7% of patients had increased endometrial thickness. Though thickness of endometrium > 10 mm significantly increased risk for cancer among postmenopausal women, there was also noted to be high incidence of atypical hyperplasia among younger patients warranting further studies.

CONCLUSION

This study assessed the diagnostic utility of hysteroscopy in uncovering underlying diseases in women with abnormal uterine bleeding that was not responsive to medical treatment. The findings have demonstrated the critical role that hysteroscopy plays in the accurate diagnosis of a population commonly affected by age-related diseases such as fibroids, polyps, and endometrial hyperplasia, among others, with an average age of 42 years. The results indicated that a range of uterine diseases was diagnosed through hysteroscopy and included endometrial polyps, fibroids, and hyperplasia. These findings can be highly important for treatment decisions. Compared to non-invasive techniques such as ultrasound or biopsy, direct visualization of the uterine canal offers a much more accurate diagnosis and can provide better detection of problems that might otherwise go unnoticed. The technique enhances diagnostic accuracy for the purpose of providing more successful AUB management in

these patients and helps doctors decide on the best course of action, whether medicinal or surgical.

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