Original Research Article

Efficacy of ultrasonography for structural categorisation of abnormal uterine bleeding

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ABSTRACT

Background: Abnormal uterine bleeding (AUB) is defined as bleeding from the uterine corpus endometrium to be precise, the bleeding is abnormal in regularity, volume, frequency, or duration. The international federation of gynecology and obstetrics (FIGO) categorized AUB based on structured medical history, laboratory tests, ultrasound, and or hysteroscopy-based techniques. The classification is based on the phrase "PALM- COEIN", (pronounced "pahm-koin") of which "PALM" represents polyp, adenomyosis, leiomyoma, malignancy (and hyperplasia) and defines structural pathologies that can be assessed visually. Transvaginal ultrasound (TVS) is the first-line imaging test for the evaluation of abnormal uterine bleeding in both premenopausal and postmenopausal women. The purpose of this study was to estimate the diagnostic effectiveness of two-dimensional ultrasound (TAS and TVS) in assessing the structural causes of AUB and to compare the histopathological and intraoperative findings with ultrasound.
Methods: It was a prospective observational study. A total of 200 women presenting with abnormal uterine bleeding between the age group of 18-55 years were included in study. All patients were subjected to routine investigations for AUB and ultrasonography (USG). Wherever appropriate the findings of USG were compared with intra-operative and histopathology findings.
Results: Diagnostic accuracy of USG was 78.1% with sensitivity and specificity of 88.5% and 60%. Positive predictive value (PPV) and negative predictive value (NPV) was 79.4% and 75%. USG is a simple, safe, fast, efficient and tolerable procedure. In diagnosing structural uterine pathology responsible for abnormal uterine bleeding, it has outstanding diagnostic accuracy and should be followed in all such cases.
Conclusions: We cannot be definitive in our approaches always, USG act as a wonderful modality to help us not only in identifying the structural causes but also the functional causes. However, the gold standard of identifying endometrial pathology is histopathology and it can't be replaced by anything.

Keywords: Abnormal uterine bleeding, Dysfunctional uterine bleeding, AUB, Leiomyoma, FIGO classification of USG

INTRODUCTION

Abnormal uterine bleeding (AUB) is defined as bleeding from the uterine corpus endometrium to be precise, the bleeding is abnormal in regularity, volume, frequency, or duration. It can be acute or chronic.

Acute AUB is characterized as a significant amount of bleeding in a non- pregnant woman of reproductive age to require immediate intervention in order to prevent further loss.[1,2] On other hand, chronic AUB is defined as bleeding from the uterine corpus that has been present for the previous six months.[1] It is a significantly debilitating clinical condition and affects 14-25% of women of reproductive age and up to 50% of peri-menopausal women.[3,5] It may have a significant personal, social, physical impact, and affect the quality of life with a significant financial burden.[6]

Historical literature of AUB reveals no universally accepted method for classifying AUB, which has hampered the investigation and categorization of possible aetiologies of AUB.[7]

The classic terminology that describes AUB includes terms that are not related to the underlying aetiology (e.g. menorrhagia and polymenorrhea). To standardize definitions, nomenclature, and the possible underlying aetiologies of AUB, it was redefined by the international federation of obstetrics and gynaecology (FIGO) in 2009 by the FIGO menstrual disorders group (FMDG).[8,9] The FIGO categorized AUB based on structured medical history, laboratory tests, ultrasound, and or hysteroscopy-based techniques.[1] The classification is based on the phrase "PALM- COEIN", (pronounced "pahm-koin") of which "PALM" represents polyp, adenomyosis, leiomyoma, malignancy (and hyperplasia) and defines structural pathologies that can be assessed visually.[1] The "COEIN" represents coagulopathy, ovulatory disorders, endometrial, iatrogenic, not otherwise classified, and defines non-structural aetiologies that cannot be assessed by imaging or histopathology.[1] The leiomyoma category (L) is subdivided into patients with at least one submucosal myoma (LSM) and those with myomas that do not impact the endometrial cavity (LO).

Various diagnostic techniques have been evolved over the periods to determine the aetiology of abnormal uterine bleeding like dilatation and curettage (D&C), hysteroscopy, transvaginal ultrasonography (TVS), and saline infusion sonography (SIS). TVS is the first-line imaging test for the evaluation of abnormal uterine bleeding in both premenopausal and postmenopausal women.

TVS is an ideal modality to diagnose structural causes of abnormal bleeding such as polyps, adenomyosis, leiomyomas, hyperplasia, and malignancy by its sheer proximity to the genital tract which takes away the impedance that the lower abdominal adiposity or fat can create. Additional benefit is that it aids in making the diagnosis of ovulatory dysfunction which can be deciphered by presence of functional cysts and correlated with the endometrial characteristics. Traditional 2-dimensional imaging can be enhanced by the addition of 3-dimension imaging with coronal reconstruction and saline infusion sonohysterography.[10]

Endometrial stripe (thickness) (ET) as measured by TVS helps in identifying suspicious malignant pathology. ET of more than 8 mm is suspicious of endometrial pathology in peri-menopausal women with AUB. ET of less than 5 mm had a 99% predictive value to exclude carcinoma as depicted by post-menopausal oestrogen/ progestin interventions (PEPI) study in postmenopausal women.[11] Patients with AUB are ideally suited to assessment by TVS at the time of presentation or assessment in the outpatient setting. A scan should be seen as a part of the overall clinical assessment of the patient and never examined in isolation. An accurate scan can enable the clinician offer appropriate medical therapy, avoid unnecessary surgery in some cases and select the correct surgical approach in others where it is appropriate. In women with AUB, TVS can be combined with outpatient endometrial sampling techniques as part of a "one-stop" approach to diagnosis and management.[12]

Ultrasonography (USG) diagnosis goes a long way in correctly diagnosing the clinical pathology of AUB. In the past D&C was the main modality used for diagnosis of AUB which was more invasive, required anaesthesia, and had post-procedure morbidities like infection, and perforation. In addition, it is a blind procedure. Apart from diagnostic use, D&C also has a therapeutic advantage for the cessation of bleeding and removal of polyps.

The advent of USG helped segregate cases so that only indicated cases need to be further diagnosed by endometrial sampling thereby reducing the rate of complications. Power Doppler is based on the amplitude of the Doppler signal. It helps in evaluating intracavitary lesions of endometrium their level of penetration, location, and adnexal pathology and vascularity in these lesions can help us in predicting clinical course and treatment. However, it is inconclusive in differentiating between benign and malignant conditions of the endometrium.

Hysteroscopy aids in examining the endocervical and uterine cavities under direct visualization and accurate localization of the pathology that guides biopsy and to excise growth if any from the uterine cavity. The office hysteroscopy is an outpatient procedure done under local or no anaesthesia outside of the formal operating theatre setting in an appropriately equipped and staffed ambulatory situations, yet guarantee patient safety and privacy, serve both diagnostic and therapeutic value, safe and well-tolerated by patient.

The purpose of this study was to estimate the diagnostic effectiveness of two-dimensional ultrasound (TAS and TVS) in assessing the structural causes of AUB and to compare the histopathological and intraoperative findings with ultrasound.

Aim

Aim of the study was to determine the efficacy of USG for structural categorisation of abnormal uterine bleeding.

Objectives

Objectives of the study were to categorise abnormal uterine bleeding into structural and non-structural aetiology based on USG; to correlate USG (TAS and/or TVS) findings with histopathology; and to identify association of common co-morbid conditions such as obesity/anaemia/polycystic ovarian disease/hypothyroidism with abnormal uterine bleeding.

METHODS

This observational and clinical prospective study was conducted in Bharati Hospital Medical College, Pune, Maharashtra during October 2018–October 2020.

All women presenting with abnormal uterine bleeding between the age group of 18-55 years in Bharati Hospital were included. Total 200 cases were included in this study. Women with pelvic organ prolapse, with any cervical or uterine malignancy, with pregnancy, on medications like steroids, neuroleptics, anticoagulants, and cytotoxic agents are excluded from study. The quantitative data was represented as their mean±standard deviation (SD). Categorical and nominal data were expressed in percentage.

The t-test was used for analysing quantitative data, or else non-parametric data were analysed by Mann Whitney test and categorical data were analysed by using the chi-square test. The significance threshold of the p value was set at <0.05. All analysis was carried out by using statistical package for the social sciences (SPSS) software version 21.

After an informed consent of each participant, the following data were collected: age, parity, obstetric history, detailed menstrual history (age of menarche and menopause, bleeding pattern, severity, and pain associated with bleeding), associated co-morbidities- obesity, hypertension, diabetes, hypo/hyperthyroidism, patient on blood thinners (aspirin, LMWH), past history (medical history focussing on risk factors of endometrial cancer, coagulopathies, and surgical history), and detailed drug history.

Detailed physical examination was done in which we looked for patient's – body mass index (BMI) (30 kg/m^2 taken as the cut off as per WHO criteria), abdominal girth (>80 cm taken as cut off as per WHO criteria), hip waist ratio (≥0.85 cm as per WHO criteria) to rule out obesity, look for signs of polycystic ovarian disease (PCOD), insulin resistance, thyroid nodules for thyroid disorders, pallor to rule out anaemia, petechiae, bruises, vaginal and cervical lesions, and uterus size., A pelvic examination and TVS were done on patients according to their age and marital status. All findings were documented in pre-defined pro-forma. All patients were then subjected to routine investigations of AUB which included- complete blood count (CBC), thyroid-stimulating hormone (TSH), urine routine, and USG.

Initially, patients were scanned transabdominally. Patients who were not fit for a transabdominal scan (like obesity, urinary incontinence and pathology not clearly seen by TAS), underwent TVS. Pathological lesions so found were studied according to the location morphological features, invasion into adjacent myometrium, and its vascularity. The ultrasonographic diagnosis was correlated with histopathological findings wherever it is applicable.

RESULTS

It was observed that mean age of the study cases was 42.17 years with most of the cases (59%) in the age range of 41 to 50 years of age (Figure 1).
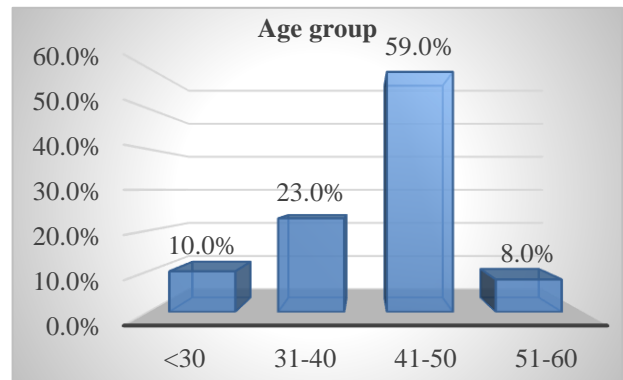

Figure 1: Distribution of study cases as per age group.

Out of the total 200 cases, 2.5 % were nullipara while 10.5% were primipara and a total of 87% cases were multipara (Figure 2). History of irregular cycles in present cycle is 46.5 % cases had irregular cycles, 11% cases were postmenopausal (Figure 3).
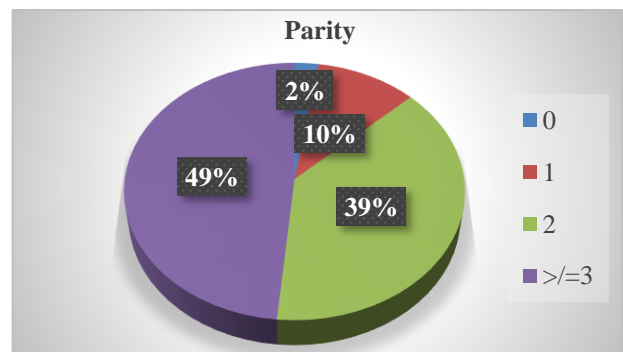

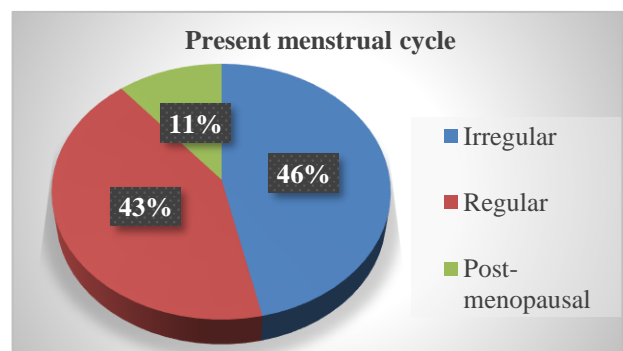**Figure 2: Distribution of study cases as per parity.**

Figure 3: Distribution of study cases as per present menstrual cycle.

In our study most common presenting complaint was heavy menstrual bleeding (74%), followed by scanty

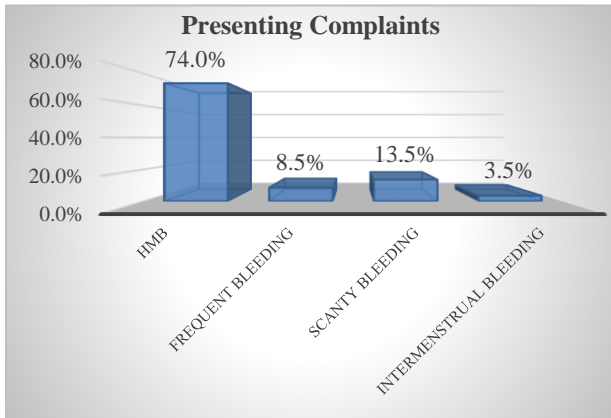bleeding (13.5%), increased frequency (8.5%) of bleeding, intermenstrual bleeding in 3.5 % cases (Figure 4).

Figure 4: Distribution of study cases as per presenting complaints.

In present study most common associated co-morbidities was obesity (21%), hypertension (10.5%), diabetes (5%), anaemia (36.5%) and raised TSH was seen in 9.5%.

Most common finding on USG was leiomyoma (44.5%), adenomyosis (21.5%), endometrial hyperplasia (9%), polyp (8%) and malignancy was suspected in 2 % cases as per the risk factors (age/symptoms/co-morbidities) and USG findings such as increased endometrial thickness and increased endometrial vascularity (Table 1).

Table 1: Distribution of study cases as per USG diagnosis.

USG diagnosis	N	%
Leiomyoma	89	44.5
Adenomyosis	43	21.5
Polyp	16	8.0
Hyperplasia	18	9.0
Malignancy	4	2.0
PCOD	2	1.0
NAD	42	21.0

On histopathology, most common diagnosis was leiomyoma (29.5%) and adenomyosis (19.5%), while endometrial hyperplasia, polyp, and malignancy (two cases were of endometrial cancer and three were of cervical cancer) were reported in 3.5%, 8% and 5.5% cases respectively (Table 2).

On ultrasonography, most common finding for adenomyosis was uterine enlargement (90.7%) along with heterogenous echotexture (79.1%). Other findings were obscure endometrial/myometrial junction (41.9%), anechoic space and wall thickness in 27.9% cases.

Out of all leiomyoma cases, type I and type II as per topographic classification were observed in 52.8% and 43.8% cases. On other hand as per Wamsteker

classification system, most common types were type 3 (13.5%), type 4 (40.4%) and type 5 (21.3%).

Table 2: Distribution of study cases as per histopathology diagnosis.

Histopathology diagnosis	N	%
Leiomyoma	59	29.5
Adenomyosis	39	19.5
Polyp	16	8.0
Hyperplasia	7	3.5
Malignancy	11	5.5
Not done	22	11.0
NAD	54	27.0

Intraoperatively, most common structural cause noted is leiomyoma (33.5%) followed by polyp (11.5%), adenomyosis (9%) and hyperplasia (8.5%).

In this study, there was good correlation between intra-op findings and USG findings in cases of polyp (87.5%) and leiomyoma (77.1%) while poor correlation was observed in cases of adenomyosis (34.3%) and malignancy cases (25%) (Table 3).

Table 3: Correlation of USG and intra-op findings.

USG		Intra-op findings	
Diagnosis	N*	N	Correlation (%)
Polyp	16	14	87.5
Adenomyosis	35	12	34.3
Leiomyoma	83	64	77.1
Malignancy	4	1	25.0

*cases where surgical management was not done were not taken

Most common treatment option seen was hysterectomy (46.5%) cases followed by dilatation and curettage (33.5%) followed by conservative management in 14% cases (Table 4). Out of 200 cases 28 patients opted for medical management, while 67 patients got relieved after diagnostic and therapeutic D&C, and among 93 cases who underwent hysterectomy, the most common indication was patient's demand followed by failure of medical line of management.

Table 4: Distribution of study cases as per management details.

Management	N	%
Biopsy taken	6	3.0
Conservative	28	14.0
D&C	71	35.5
Polypectomy	7	3.5
Hysterectomy	93	46.5
Myomectomy	7	3.5

This study results indicates, in cases of polyp, sensitivity and specificity of USG was 88.5% and 60 % while PPV

and NPV was 79.4% and 75%. Overall diagnostic accuracy was 78.1%.

In cases of adenomyosis, sensitivity and specificity of USG was 41 % and 86.3 % while PPV and NPV was 45.7% and 83.9%. Overall diagnostic accuracy was 76.4%.

In cases of leiomyoma, sensitivity and specificity of USG was 95.5% and 82% while positive predictive value (PPV) and negative predictive value (NPV) was 76.2% and 96.8%. Overall diagnostic accuracy was 87.1%.

In cases of malignancy, sensitivity and specificity of USG was 18.2 % and 98.8% while PPV and NPV was 50% and 94.8 %. Overall diagnostic accuracy was 93.8%.

Overall diagnostic accuracy of USG was 78.1 % with sensitivity and specificity of 88.5% and 60%. PPV and NPV was 79.4% and 75% (Table 5 and 6).

Table 5: Diagnostic accuracy USG for structural and non-structural cases of AUB.

USG	Histopathology		Total
	Structural	Non structural	
Structural	100	26	126
Non-structural	13	39	52
Total	113	65	178

Table 6: Diagnostic accuracy USG for structural cases of abnormal uterine bleeding.

Parameters	%
Sensitivity	88.5
Specificity	60.0
PPV	79.4
NPV	75.0
Accuracy	78.1

DISCUSSION

AUB is one of the most popular reason among majority of women seeking gynaecological guidance. More than 40% of affected women with AUB are reported to have intrauterine abnormalities.[3-5] Transvaginal ultrasound is the first-line imaging test for the evaluation of abnormal uterine bleeding in both premenopausal and postmenopausal women.

Transvaginal ultrasound can be used to diagnose structural causes of abnormal bleeding such as polyps, adenomyosis, leiomyomas, hyperplasia, and malignancy, and can also be beneficial in making the diagnosis of ovulatory dysfunction such as ovarian cyst, haemorrhagic cyst, endometriomas, tumours, and PCOS. Traditional 2-dimensional imaging is often enhanced by the addition of 3-dimension imaging with coronal reconstruction and saline infusion sonohysterography.[8]

Present hospital-based screening study aimed to determine the efficacy of USG for structural categorization of abnormal uterine bleeding. The study included a total of 200 consecutive cases having abnormal uterine bleeding and fulfilling eligibility criteria. After an informed consent of each patient, data was collected which includes age, parity, obstetric history, detailed menstrual history, associated co-morbidities, past history (medical history focusing on risk factors of endometrial cancer, coagulopathies and surgical history), and detailed drug history.

Detailed physical examination was done for patient's BMI, abdominal girth and waist to hip ratio to rule out obesity on basis of cut off set by Government of India, signs of PCOS, insulin resistance, thyroid nodules for thyroid disorders, pallor to rule anaemia, petechiae, bruises, vaginal and cervical lesions, and uterus size.

All patients were subjected to routine investigations of AUB, first and foremost thing to rule out is pregnancy in any reproductive age women presenting with abnormal uterine bleeding, and other investigations include CBC, thyroid profile, random blood sugar, and coagulation profile. A pelvic examination and TVS were done on patients according to their age and marital status. Initially patients were subjected to TAS, patients who do not fit for TAS like-obesity, urinary incontinence and pathology not clearly seen by TAS they were subjected to TVS. Pathological lesions so found were studied according to the location morphological features, invasion into adjacent myometrium, and vascularity.

Doppler studies help in suspected arteriovenous malformation, malignancy cases and in differentiating between fibroid and adenomyomas.

D&C was done either as the preoperative evaluation of hysterectomy to rule out malignancy, it serves both purposes diagnostic and as well as therapeutic. It serves as an effective way to stop acute episode of bleeding in absence of any apparent pathology, mechanism for same is unknown but it is believed that it promotes surgical denudation of the basal layer of the endometrium which stimulate all of the processes involved in cessation of normal menstrual bleeding—local clotting mechanisms, vasoconstriction of basal arterioles, and re-epithelialization.

Earlier, dilatation and curettage were the gold standard investigation for different endometrial lesions, but being an invasive procedure, it requires hospitalization with the risk of surgical trauma, and acquired infections. Therefore, it is not recommended to use it for mass screening of patients for endometrial carcinoma. Over the past decade, endometrial aspiration cytology (EAC) being a rapid and non-invasive procedure that can be done on out-patient basis, it has emerged as an attractive alternative to dilatation and curettage for early diagnosis of endometrial lesions. A D & C does not sample the entire endometrium

and can miss up to 10% of disease.[13] In present study, the ultrasonographic diagnosis was correlated with histopathological and intraoperative findings wherever it is applicable.

Demography

The mean age of the study cases was 42.17 years with most of the cases (59%) in the age range of 41 to 50 years of age. Similar observations were also made by other authors.[14-19] Panda et al found that the maximum age incidence was between 35-45 years with a mean age of 46.7 years.[20] In Gianninoto's series, the age range was 30-80 years and the commonest incidence was between 30-45 years (mean age was 43.3 years).[21] Trotsenburg reported maximum age incidence between 41-50 years with a mean age of 43.2 years.[22]

Obstetric history

Out of the total 200 cases, 2.5% were nullipara while 10.5% were primipara. A total of 87% of cases were multi-para. History of irregular menses was given by 69% of cases. In the current cycle, a history of irregularity was given by 46.5% of cases while 11% of cases were post-menopausal.

Other studies also observed that the majority of females with abnormal bleeding were multi-para (20-80%). The prevalence of multi-para females in the study by Panda et al was 88% and it was 80% in the study by Trotsenburg.[19,22]

Presenting complaints

The most common presenting complaint was heavy menstrual bleeding that is menorrhagia (74%), followed by scanty (13.5%) and increased frequency (8.5%) of bleeding. Intermenstrual bleeding was seen in 3.5% of cases. Panda et al series had 60% cases of menorrhagia followed by polymenorrhagia and metrorrhagia.[20] Goyal et al also found menorrhagia as one of the most common presenting symptoms in the study population (58%), followed by menometrorrhagia and metrorrhagia, in their study also observed menorrhagia as the commonest presenting symptom in the study population (58%) followed by menometrorrhagia and metrorrhagia.[16] In a study, Chhikara et al assessed the accuracy of the hysteroscopic diagnosis with that of histopathological reports obtained by endometrial sampling.[17] The most common symptom was menorrhagia (40%) followed by metrorrhagia (38%), polymenorrhagia (12%), and postmenopausal bleeding (10%). Similar findings were also observed by Guin et al and Sunitha et al.[23,24] Garg et al in their study of 60 cases, observed menorrhagia in 43% of the cases (n=26) of patients while polymenorrhagia and postmenopausal bleeding in 23.3% (n=14) and 13.33% (n=8) of the cases respectively.[19] Sinha et al observed 66.1% AUB cases being presented as menorrhagia, 30.4%

as polymenorrhoea, and 3.6% as intermenstrual bleeding.[25]

Co-morbidities

In the present study, associated co-morbidities were seen in 39.5% of cases. Common co-morbidities were obesity (21%), hypertension (10.5%) and diabetes (5%). Anemia was seen in 36.5% of cases. It is a known fact that the patients having abnormal bleeding reduces the hemoglobin levels, which ultimately leads to anemia. Matteson et al in their study observed approximately half (49.2%) of the AUB had a concurrent medical condition that could affect their treatment options and 14% had moderate to severe anemia.[26] Venugopalan et al in their study observed the prevalence of anemia, diabetes, and hypertension as 20%, 6%, and 2% respectively.[27]

Diagnosis

Most common diagnosis on ultrasonography was leiomyoma (44.5%), adenomyosis (21.5%), hyperplasia (9%) and polyp (8%). Malignancy was reported in 2% of cases. On USG, adenomyosis was observed with a uterine enlargement (93%) along with heterogeneous echotexture (81.4%). Other common findings were obscure endometrial/myometrial junction (81.4%), anechoic space, and wall thickness (27.9%). Type I and type II leiomyoma were observed in 53.9% and 42.7% of cases. As per the Wamsteker classification system, the most common leiomyoma types were type 3 (13.5%), type 4 (41.6%), and type 5 (21.3%).

Venugopalan et al in a similar study observed fibroid uterus (40%) as the most common cause in the study population followed by cyst (34%) and adenomyosis (6%).[27] Mishra et al in their study also observed the most common structural causes of abnormal uterine as leiomyoma (41.1%).[28] Betha et al in their study aimed to categorize women with AUB according to the "PALM COEIN" classification system.[29] The PALM group accounted for 60.4% and COEIN group accounts for 39.6% respectively. The most common cause of AUB was leiomyoma (30.4%) and ovulatory disorders were the 2nd most common cause of AUB (13.6 %). Sudha et al observed the distribution of cases according to PALM-COEIN as polyps- 4%, adenomyosis- 6%, leiomyoma-70%, malignancy- 6%, ovulatory dysfunction- 2%, endometrial- 6%, and not yet classified- 6%.[30] Wamsteker et al. found an endometrial polyp in 19%, endometrial hyperplasia in 12.2%, and submucous myoma in 7.8%.[31] Trotsenburg et al observed myomas and polyps in 14% and Dewit reported myomas in 21% and polyps in 14.4%.[22,32]

Efficacy of ultrasonography

A good correlation of USG findings with intra-op findings was seen in cases of polyp (87.5%) and leiomyoma (77.1%) while a poor correlation was observed with adenomyosis (34.3%) and malignancy cases (25%). For

overall structural causes, USG diagnosis correlated with histopathology in 78.1% of cases. The sensitivity and specificity of USG were 88.5% and 60% while PPV and NPV were 79.4% and 75%. In their research, Sujatha Audimulapu et al found that out of 50 cases, TVS findings matched with histopathology findings in 26 cases (52%), and the results differed in 24 patients (48%).[33] The sensitivity and specificity for TVS are 62.8% and 86.6%. The PPV and NPV were 91.6% and 50% respectively. In their research, Gowri et al found that the specificity, sensitivity, PPV, and NPV of TVS in the identification of endometrial pathology was 67.1%, 72.2%, 91.1%, 34.2%, respectively.[34] Haq et al aimed to determine the effectiveness of TVS in patients presenting with abnormal uterine bleeding.[35] TVS had sensitivity and specificity of 94.3% and 80.0% respectively with accuracy of 90.0% while PPV and NPV of 91.6% and 85.7% respectively. Pyari et al evaluated the diagnostic efficacy of TVS for AUB cases.[35] TVS has a sensitivity of 78.15% and specificity of 44.4% respectively. Feitosa et al in their study demonstrated 83.3% sensitivity and 83.3% specificity of USG.[36] Vathanan et al in a similar study observed that USG had a sensitivity and specificity of 60.53% and 97.06% respectively, with PPV of 95.83% and NPV of 68.75 %.[37]

In the present study, the sensitivity and specificity of USG for diagnosis of the polyp was 62.5% and 96.3% while PPV and NPV were 62.5% and 96.3%. Our results are in concordance to the study by Feitosa et al where sensitivity and specificity of TVS for polyps was 68.9% and 94.7%. Vathanan et al in their study found sensitivity and specificity of 60.53% and 97.06% respectively, PPV of 95.83%, and NPV of 68.75% for polyps.[36,37] Swathi et al observed the sensitivity and specificity of TVS for polyps as 22.1% and 95.1%. Dana et al in another similar study observed the sensitivity and specificity of TVS for polyps as 44.5% and 81.8%. Nicula et al observed that for patients with polyps, TVS sensitivity was 67% and specificity was 96.67%.[38-40] In the present study, the sensitivity and specificity of USG for diagnosis of adenomyosis was 41% and 86.3% while PPV and NPV were 45.7% and 83.9%. Swathi et al observed sensitivity and specificity of TVS for adenomyosis as 50% and 88.6% which were in accordance with our results.[38] Nicula et al observed that for patients with adenomyosis, sensitivity and specificity were 8% and 47.6% respectively.[40]

In the present study, the sensitivity and specificity of USG for diagnosis of leiomyoma was 95.5% and 82% while PPV and NPV were 76.2% and 96.8%. Vathanan et al in their study observed the following results for leiomyoma: sensitivity 57.14%, specificity 93.48%, PPV 84.21%, and NPV 78.18%. Swathi et al observed sensitivity and specificity of TVS for leiomyoma as 100% each while PPV and NPV were 91.9% and 92% respectively.[37,38] Nicula et al. observed that for patients with leiomyoma, sensitivity and specificity were 94% and 77.8% respectively.[40]

In the present study, the sensitivity and specificity of USG for diagnosis of malignancy was 18.2% and 98.8% while PPV and NPV were 50% and 94.8%. Swathi et al in their study observed only 3 cases of malignancy, with a sensitivity of 0% and specificity of 100%.[38] The negative predictive value was 97%. Nicula et al observed that for patients with malignancy, sensitivity and specificity were 67% and 100% respectively.[40]

Limitations

It was difficult to follow up patient who were on medical management. It was difficult to counsel patients to not to opt for operative intervention directly as majority of patients want a permanent solution and not to try any other options for treatment.

CONCLUSION

AUB being a debilitating disorder affecting women of all age groups women in all aspects, causing social embarrassment, management of such common condition needs good systematic approach and good clinical practice towards the cause that must be standardized. The present study observed that ultrasonography is a good diagnostic and screening method in evaluating structural causes of AUB with high accuracy especially polyps and leiomyomas. These structural abnormalities are best identified by sonographic evaluation of genital tract and colour Doppler examination has been found to add better value to investigation. Specially, the endometrial cavity can be best evaluated by sonography, the presence of endometrial polyp, endometrial indentation due to myxoma, endometrial thickening, collection in endometrial cavity can be studied in details by USG. With the advent of USG only indicated cases need to be further diagnosed by endometrial sampling there by reducing rate of complications. In this study we have noted one more important aspect, that needs consideration, out of 200 cases, 93 patients underwent hysterectomy. Most common indication for this morbid procedure was patients' demand, so it is important to note that in a greater number, people demanded hysterectomy as definitive treatment due to social embarrassment, fear of malignancy, due to pain and associated symptoms that effect their day to day lives making them to choose more morbid procedure at an early age.

In the end, the current study concludes that ultrasonography is a simple, safe, fast, efficient and tolerable procedure. In diagnosing structural uterine pathology responsible for abnormal uterine bleeding, it has outstanding diagnostic accuracy and should be followed in all such cases. There are various kinds of options in these patients for treatment especially in young age where hysterectomy can't be an option always. This kind of surveillance helps us in offering appropriate treatment to these patients. The gold standard of identifying endometrial pathology is histopathology and it can't be replaced by anything.

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