INTRODUCTION

Abnormal uterine bleeding (AUB) describes all abnormal patterns of menstrual bleeding that may result from a wide variety of causes including anovulation, pregnancy, uterine pathology and coagulopathies. It occurs in various forms such as menorrhagia, polymenorrhea, polycystic ovary syndrome, metrorrhagia, and menometrorrhagia. It accounts for more than 70% of all gynaecological consultations in the peri and post-menopausal age group. Globally, the prevalence of AUB varies in different populations, with the overall prevalence fluctuating between 10% and 30%. In India, the reported prevalence of AUB is around 17.9%.

There are various causes of abnormal uterine bleeding. To standardize nomenclature of AUB, a new system known by the acronym PALM-COEIN, was introduced in...
2011 by FIGO. The PALM-COEIN system is based on etiology and pathology of disorder, where PALM
Describing structural causes (polyp, adenomyosis, leiomyoma, malignancy and hyperplasia) and COEIN
denoting non-structural causes of AUB (coagulopathy, ovulatory disorders, endometrial factors, iatrogenic and
not classified). Exogenous causes are foreign body, trauma and medications- sex steroids, anticoagulants,
hyperprolactinemia inducing. Infective causes are sexually transmitted disease (STD), tuberculosis (TB),
chronic endometritis etc. With ageing, risk of benign and malignant neoplastic
growth increases. Even so, malignant neoplasms,
especially endometrial carcinoma are found more often in
this age group. Less commonly, oestrogen producing
ovarian carcinoma may cause endometrial hyperplasia
with uterine bleeding. Similarly, ulcerative vulvar,
vaginal or cervical neoplasms can be sources. And rarely,
ersosanguinous discharge from a fallopian tube cancer
may appear as uterine bleeding. Thus bleeding in this
demographic usually prompts evaluation to exclude these
cancers.7 The specific diagnostic approach depends on whether the
patient is premenopausal, perimenopausal or
postmenopausal. In premenopausal women with normal
findings on physical examination the most likely
diagnosis is dysfunctional uterine bleeding secondary to
anovulation and the diagnostic investigation is targeted at
identifying the etiology of anovulation.8 Dysfunctional
uterine bleeding is diagnosed by excluding pregnancy,
iatrogenic causes, systemic conditions and genital tract
pathology.

In perimenopausal women endometrial biopsy and other
methods of detecting endometrial hyperplasia or
carcinoma must be considered early in investigation. An
international expert consensus from the FIGO Menstrual
Disorders working group has proposed a standardized
classification system for AUB to facilitate greater
appreciation of the complexities of this clinical entity.
The PALM side of the classification refers to structural
causes that could be evaluated and diagnosed on imaging
and or biopsy. The COEIN side allows consideration of
underlying medical disturbances that could result in
AUB. Imaging studies are indicated when examination
suggests structural causes for bleeding or when
conservative management has failed or when there is a
risk of malignancy [obesity, diabetes, nulliparity, history
of PCOS, family history of hereditary non-polyposis
colorectal cancer (HNPCC)].9

In post-menopausal women with AUB, uterine pathology,
particularly endometrial carcinoma is common. Thus, in
this age group; endometrial biopsy or transvaginal
sonography is included in the initial investigation. If
imaging is indicated, transvaginal ultrasound should be
the first one of imaging modality for AUB.10 Saline infusion
sonography and diagnostic hysteroscopy could be used in
the diagnosis and characterization of discrete intrauterine
abnormalities such as sub mucosal fibroid.11

Ultrasonography can be as good as histopathology in the
diagnosis of abnormal uterine bleeding. Studies have
been conducted across the different parts of the world to
correlate the ultrasonographic findings with histopathology in the diagnosis of abnormal uterine
bleeding. However, very few studies are conducted in our
country in this regard, in particular, in Manipur. Hence,
our study was conducted to determine the causes of
abnormal uterine bleeding and to correlate and validate
the ultrasonographic findings with HPE findings in
diagnosis of AUB among women who underwent
hysterectomy for AUB.

METHODS

A hospital based cross-sectional analytical study was
conducted among patients with abnormal uterine bleeding
who underwent abdominal hysterectomy from September
2017 to August, 2019 in the department of Obstetrics and
Gynaecology in collaboration with department of
Pathology, Regional Institute of Medical Sciences,
Imphal. Patients with gestational bleeding genital
prolapse, bleeding diathesis and trauma induced bleeding
were excluded. The study was conducted after obtaining
permission from the Institutional Ethics Committee,
RIMS, Imphal.

Sample size and sampling

Assuming the specificity of ultrasound as 89% and
prevalence of AUB as 10%, the sample size was
estimated to be 85 at 95% confidence level and a
precision of 7%, using the formula for diagnostic tests.12
All the patients who underwent abdominal hysterectomy
were included in the study until the sample size was
reached.

Study procedure

After obtaining informed consent was obtained from the
participants, the detailed clinical history including age,
parity, the chief presenting complaints, menstrual,
contraceptive, medical history (age of patient, patterns of
abnormal uterine bleeding, severity, associated pain,
family history, and use of medication) and socio
demographic profile were then recorded. Following the
socio demographic and clinical characteristics, general
physical examination (pallor, oedema, neck glands,
thyroid and systemic examination and pelvic examination
(per speculum, pap-smear, bimanual examination) was
carried out for the participants.

All the routine investigations including complete
haemogram, urine routine examination, liver and kidney
function tests, ABO grouping and Rh typing, blood sugar
estimation, thyroid profile along with necessary
investigations like ultrasonogrphy (trans-vaginal) and
coagulation profile, fundoscopy, MRI (if neurological damage suspected) were also performed. Data was recorded in a pre-designed proforma.

Ultrasoundography was performed using MODEL SONOACE X8 (Samsung Medison Co. Ltd, Korea), Curvilinear probe (5-7 MHZ) and power/NETZ/ALIMENTATION- 100 to 120/200 to 240v. Hysterectomy specimens were subjected to histopathological examination. Histopathological examination was carried out using automated tissue processor (Leica, China), binocular light microscope (India, model no- CH2Oib1MF), rotary microtome (Leica, China) and hematoxylin and eosin stain.

**Statistical analysis**

Data was analysed using SPSS version 21.0 IBM. Categorical variables like parity; menstrual complaints etc. we’re expressed as frequency and percentages. Continuous variables like age, duration of complaints etc. are expressed as mean (standard deviation) or median (inter quartile range) depending upon the type of distribution. The validity of ultrasonographic findings is presented in terms of sensitivity, specificity, positive predictive value and negative predictive value.

**RESULTS**

A total of 86 patients with abnormal uterine bleeding who underwent abdominal hysterectomy were included. The mean age of the patients was 41.9 (9.1) years with a minimum of 28 years and a maximum of 66 years.

**Table 1: Socio-demographic characteristics of the patients with abnormal uterine bleeding who underwent abdominal hysterectomy in a tertiary care centre, Imphal (N=86).**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Frequency (n)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age category (years)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;45</td>
<td>63</td>
<td>73.2</td>
</tr>
<tr>
<td>45-60</td>
<td>19</td>
<td>22.1</td>
</tr>
<tr>
<td>≥61</td>
<td>4</td>
<td>4.7</td>
</tr>
<tr>
<td><strong>Parity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>3</td>
<td>3.5</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
<td>5.8</td>
</tr>
<tr>
<td>2</td>
<td>31</td>
<td>36.0</td>
</tr>
<tr>
<td>3</td>
<td>29</td>
<td>33.8</td>
</tr>
<tr>
<td>4 and above</td>
<td>18</td>
<td>20.9</td>
</tr>
</tbody>
</table>

Table 1 shows nearly 3/4th (73.2%) of the participants were in less than or equal to 45 years followed by 45-60 years age group (22.1%) and 3.5% of the participants were nulliparous, 5.8% were primipara. and the remaining participants were multiparous women.

**Table 2: Clinical profile of patients with abnormal uterine bleeding who underwent abdominal hysterectomy in a tertiary care centre, Imphal (N=86).**

<table>
<thead>
<tr>
<th>Anaemia</th>
<th>Frequency (n)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No anaemia (&lt;12 mg/dl)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mild anaemia (11.0-11.9 mg/dl)</td>
<td>8</td>
<td>9.3</td>
</tr>
<tr>
<td>Moderate anaemia (8.0-10.9 mg/dl)</td>
<td>75</td>
<td>87.2</td>
</tr>
<tr>
<td>Severe anaemia (&lt;8 mg/dl)</td>
<td>3</td>
<td>3.5</td>
</tr>
</tbody>
</table>

**Menstrual complaints**

- Menorrhagia: 34, 39.5%
- Metrorrhagia: 18, 20.9%
- Menometorrhagia: 12, 14.0%
- Polymenorrhagia: 9, 10.5%
- Postmenopausal bleeding: 13, 15.1%

**Duration of symptoms (months)**

- 1-3: 24, 27.9%
- 4-6: 43, 50.0%
- 7-12: 13, 15.1%
- >12: 6, 7.0%

**Co-morbidities**

- No co-morbidity: 57, 66.3%
- Diabetes: 9, 10.5%
- Hypertension: 7, 8.1%
- Diabetes + hypertension: 3, 3.5%
- Heart disease: 5, 5.8%
- Others*: 5, 5.8%

*Others include thyroid disorders, asthma etc.

Table 2 shows majority (87.2%) of the patients had moderate anaemia. None of the patients were normal with respect to the haemoglobin level. The most common menstrual complaint was menorrhagia (39.5%) followed by metorrhagia (20.9%). Postmenopausal bleeding was present in 15.1% of the patients. The mean duration of the symptoms was 5.2 (3.3) months with a minimum of one month and a maximum of 14 months. About half of the patients (50.0%) were having symptoms for 4-6 months duration. Only six patients presented with the symptoms for more than 12 months. About 2/3rd of the patients were without any comorbidity. Diabetes was present in 10.5% of the patients and hypertension was present in 8.1% of the patients.

Table 3 shows ultrasonographically 54 (62.8%) cases were fibroid uterus, 8 (9.3%) cases were adenomyosis, 6 (7.0%) cases were thickened endometrium and one case was endometrial polyp. Seventeen (19.7%) cases were bulky uterus. Table 4 shows nearly 2/3rd (65.1%) of the patients had leomyomatous changes on histopathological examination. The myometrium was normal in 19.8% cases. Of the 17 cases diagnosed as bulky uterus on USG, 11 cases had normal endometrium, two cases had leomyomatous changes and four cases had...
adenomyomatous changes. Endometrium was hyperplastic (53.5%) in majority followed by secretory (22.1%) and proliferative (10.5%). Two patients were found to have carcinoma on histopathological examination. Cervix was normal in 38.4% cases. Cervix was inflammatory type in 58.1% cases and CIN1 was observed in three cases. Simple atypical, complex typical and complex atypical hyperplasia was present in 2.2%, 8.7% and 6.5% cases.

Table 3: Ultrasonographic diagnosis of the patients with abnormal uterine bleeding who underwent abdominal hysterectomy in a tertiary care centre, Imphal (N=86).

<table>
<thead>
<tr>
<th>Ultrasonographic diagnosis</th>
<th>Frequency (n)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fibroid</td>
<td>54</td>
<td>62.8</td>
</tr>
<tr>
<td>Bulky uterus</td>
<td>17</td>
<td>19.7</td>
</tr>
<tr>
<td>Adenomyosis</td>
<td>8</td>
<td>9.3</td>
</tr>
<tr>
<td>Thickened endometrium</td>
<td>6</td>
<td>7.0</td>
</tr>
<tr>
<td>Endometrial polyp</td>
<td>1</td>
<td>1.2</td>
</tr>
</tbody>
</table>

Table 4: Histopathological findings among patients with abnormal uterine bleeding who underwent abdominal hysterectomy in a tertiary care centre, Imphal (N=86).

<table>
<thead>
<tr>
<th>Histopathological findings</th>
<th>Frequency (n)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myometrium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>17</td>
<td>19.8</td>
</tr>
<tr>
<td>Leomymomatous changes</td>
<td>56</td>
<td>65.1</td>
</tr>
<tr>
<td>Adenomyomatous changes</td>
<td>13</td>
<td>15.1</td>
</tr>
<tr>
<td>Endometrium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hyperplastic</td>
<td>46</td>
<td>53.5</td>
</tr>
<tr>
<td>Secretory</td>
<td>19</td>
<td>22.1</td>
</tr>
<tr>
<td>Proliferative</td>
<td>9</td>
<td>10.5</td>
</tr>
<tr>
<td>Atrophic</td>
<td>6</td>
<td>7.0</td>
</tr>
<tr>
<td>Inflammatory</td>
<td>3</td>
<td>3.4</td>
</tr>
<tr>
<td>Carcinoma</td>
<td>2</td>
<td>2.3</td>
</tr>
<tr>
<td>Polyp</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Cervix</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>33</td>
<td>38.4</td>
</tr>
<tr>
<td>Inflammatory</td>
<td>50</td>
<td>58.1</td>
</tr>
<tr>
<td>CIN1</td>
<td>3</td>
<td>3.5</td>
</tr>
<tr>
<td>Type of endometria hyperplasia (N=46)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simple typical</td>
<td>38</td>
<td>82.6</td>
</tr>
<tr>
<td>Simple atypical</td>
<td>1</td>
<td>2.2</td>
</tr>
<tr>
<td>Complex typical</td>
<td>4</td>
<td>8.7</td>
</tr>
<tr>
<td>Complex atypical</td>
<td>3</td>
<td>6.5</td>
</tr>
</tbody>
</table>

Table 5 shows the validity of ultrasonography in diagnosing leiomyoma and adenomyosis. The sensitivity, specificity, positive predictive value, negative predictive value and kappa statistics of USG for diagnosing leiomyoma was 92.9%, 93.3%, 96.3%, 87.5% and 84.9% respectively. The sensitivity, specificity, positive predictive value, negative predictive value and kappa statistics of USG for diagnosing adenomyosis was 53.8%, 98.6%, 87.5%, 92.3% and 62.3% respectively.

Table 5: Summary of validity of ultrasonography with histopathology for diagnosis of leiomyoma and adenomyosis (N=86).

<table>
<thead>
<tr>
<th></th>
<th>Leiomyoma (%)</th>
<th>Adenomyosis (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>92.9</td>
<td>53.8</td>
</tr>
<tr>
<td>Specificity</td>
<td>93.3</td>
<td>98.6</td>
</tr>
<tr>
<td>Positive predictive value</td>
<td>96.3</td>
<td>87.5</td>
</tr>
<tr>
<td>Negative predictive value</td>
<td>87.5</td>
<td>92.3</td>
</tr>
<tr>
<td>Kappa statistics</td>
<td>84.9</td>
<td>62.3</td>
</tr>
</tbody>
</table>

Figure 1 shows that majority of patients who were diagnosed as fibroid in USG had presented with menorrhagia (61.1%). Menometrorrhagia (29.4%) was the common presentation in patients with bulky uterus. None of the patient presented with menorrhagia that had diagnosis of adenomyosis, thickened endometrium and endometrial polyp. Among six patients with thickened endometrium on USG, three patients presented with postmenopausal bleeding and 2 patients presented with Metrorrhagia and one patient with polymenorrhagia.

**DISCUSSION**

Histopathological diagnosis has been considered as the gold standard in the diagnosis of abnormal uterine bleeding. This is one of the fewer studies conducted across the country to decipher the utility of ultrasound in the diagnosis of abnormal uterine bleeding.

In our study, most number of patients (44.2%) were in the age group of 36-45 years with majority of them above 40
years. This observation is comparable to studies conducted by Talukdar et al, Pillai et al and Jetley et al where the most common age group of abnormal uterine bleeding was 40-45 years.12,13 This might be due to the fact that perimenopause, also called the menopausal transition, is the interval in which a woman’s body makes a natural shift from more-or-less regular cycles of ovulation and menstruation toward permanent infertility, or menopause. This phase generally occurs at around 40-50 years of age. This result is also consistent with numerous studies conducted across our country,15,20 in which AUB was most common in peri-menopausal age group.

The most common menstrual complaint was menorrhagia which was observed in 39.5% of the cases. This finding is comparable to studies conducted by Talukdar et al where menorrhagia was the common menstrual problem in 43.69% of the patients.12 Same results were observed by studies conducted by Jetley et al, Goyal et al, Gupta et al, Bolde et al, Verma et al and Rani et al in which clinical presentation as menorrhagia in AUB evaluation revealed 46.4%, 58%, 53%, 46.86%, 57% and 48% respectively.14,21-25 Majority of patients (50%) who attended the hospital for treatment were suffering for 4-6 months which is comparable to studies conducted by Talukdar et al (54.37%) and Kathuria et al (50%).12,26

Fibromyoma was diagnosed by ultrasound in 62.8% of the patients and it was the common diagnosis in this study. The study result is consistent with many other studies conducted across the globe, where fibroid uterus was the common condition associated with abnormal uterine bleeding.12,20,21,27-29 Unless uterine polyp, uterine fibroid develops during the reproductive age group, which would have contributed to the above finding, since majority of patients in this study were in the reproductive age group. Adenomyosis was the next common condition diagnosed by ultrasound which is also comparable with other studies.

The sensitivity, specificity, positive predictive value and negative predictive value of USG for diagnosing leiomyoma was 92.9%, 93.3%, 96.3% and 87.5% respectively. Study conducted by Talukdar et al showed the similar results in which sensitivity and specificity was 89.13% and 89.47% respectively.12 The results were consistent with numerous studies, where the ultrasound was as good as histopathology in the diagnosis of uterine fibroid in patients with abnormal uterine bleeding.21,27,30-32 However a study conducted by Hunter et al showed a sensitivity of 75% for USG in diagnosing uterine fibroid, even though it showed a specificity of 90%.33 Similarly, a study conducted by Erdem et al showed a specificity of 100%.34 The agreement (kappa) between USG and histopathology in the diagnosis of uterine fibroid was 0.849 which is similar to studies conducted by Shobitha et al31 and Goyal et al21 which showed an excellent agreement of 0.72 and 0.898 respectively.21,31

Contradictory to diagnosing fibroid, the USG had a lesser sensitivity in diagnosing adenomyosis, although it had a good specificity. The sensitivity and specificity for diagnosing adenomyosis was found to be 53.8% and 98.6% respectively which is similar to results of Talukdar et al, in which the sensitivity and specificity was found to be 47.62% and 98.78% respectively.12 Similarly, Nicula et al reported a sensitivity of 8% for diagnosing adenomyosis.27 Hence, USG has a limitation in tissue characterization in diagnosis of adenomyosis. The agreement (kappa) between USG and histopathology was 0.623.

Out of 86 patients those who has presented as AUB and underwent Hysterectomy, we got two carcinoma endometrium cases (2.3%) in HPE and out of these two HPE confirmed carcinoma endometrium cases, USG detected thickened endometrium 1 case and bulky uterus in other case. This finding is comparable to studies conducted by Talukdar et al where CA endometrium found in 2.8% cases.12 So USG detected thickened endometrium and bulky uterus in postmenopausal woman presents as a postmenopausal bleeding is a good indicator of endometrial carcinoma.

The major strength of the study is that it is one of the fewer studies conducted in this part of the country with adequate sample size, which ensured its generalisability to the similar setting. The selection bias was kept to minimum by including all the patients of all ages who underwent hysterectomy for abnormal uterine bleeding.

The limitation of the study is that the number of patients for pathologies other than fibroid and adenomyosis were very less and comparability was not possible.

CONCLUSION

Uterine fibroid was the leading cause of abnormal uterine bleeding for which hysterectomy was done. The study provides a concrete evidence that ultrasonography has good diagnostic accuracy as histopathology in the diagnosis of fibroid in patients with abnormal uterine bleeding. However, as with all the diagnostic procedures, the utility of ultrasound in the diagnosis of adenomyosis is questionable, since it has a low sensitivity amidst good specificity. The low sensitivity might be due to lesser patients with adenomyosis. In addition to that, the combination of procedures viz. ultrasound/hysteroscopy and endometrial biopsy with hysteroscopy can aid in a better diagnosis rather than a single procedure.

Recommendations

Further studies are recommended with combination of all the procedures viz. ultrasound/hysteroscopy and endometrial biopsy with hysteroscopy to look into the diagnostic utility of the combination of procedures in a cost-effective way.
REFERENCES
