EVALUATION OF ENDOMETRIAL PATTERNS IN ABNORMAL UTERINE BLEEDING BY TRANSVAGINAL ULTRASOUND AND HISTOPATHOLOGY IN PERIMENOPAUSAL WOMEN
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Abstract

Evaluation of endometrial thickness by Transvaginal ultrasound and its correlation with Histopathology in perimenopausal woman with abnormal uterine bleeding. The objective of this research is to 1. Detect the usefulness of Transvaginal ultrasound in helping to diagnose the pattern of endometrium.2) To correlate the endometrial thickness by Transvaginal ultrasound with endometrial histopathology in perimenopausal women with abnormal uterine bleeding. 3) To reduce the need of invasive procedures. This Prospective observational study was conducted in patients who came to Saveetha Medical College, OBG department, Chennai in age group between 40-50 years with abnormal uterine bleeding. TVS and endometrial sampling are done for every patient and Endometrial thickness and Endometrial Patterns by Histopathology are correlated. Hyperplasia are diagnosed with Endometrial thickness more than 8mm in our study. TVS with HPE helps us to diagnose atypical hyperplasia in earlier stages which is a precursor of malignancy (adenocarcinoma-29%). This study helps us to individualize patients with AUB, who may need endometrial sampling to rule out endometrial abnormalities.

Keywords: Abnormal uterine bleeding, Transvaginal ultrasound, Endometrial thickness, perimenopausal women, Endometrial pattern


Introduction:

Abnormal uterine bleeding is the one of the most common problems encountered in gynaecology outpatient department. It accounts for about 30% of all patients coming to gynaecological outpatient department and this proportion rises to 69% in perimenopausal group and also the most common cause of hysterectomy in perimenopausal age group. Perimenopause generally refers to the time period in the late reproductive age.
group usually around late 40’s to early 50’s (Williams gynaecology, 2nd edition). It is the period 2-8 years preceding menopause and 1 year after the menopause usually around 40-50 years of age (WHO & NAMS – North American Menopause Society). This is the transitional phase during which the regular cyclical pattern of menses of a woman changes to irregular cyclical pattern. Abnormal uterine bleeding is defined as any change in the frequency, duration or flow of menstruation and comes under the term “Heavy Menstrual Bleeding”. AUB is responsible for more number of visits to gynaecology OPD among women in Perimenopausal age group. The causes of bleeding in elderly women are hormonal and also local pathology like polyp, fibroid, benign and malignant ovarian tumour. A newer classification has been proposed by FIGO for abnormal uterine bleeding. There are 9 categories within the classification system named for the acronym “PALM COEIN”. PALM refers to structural causes, where structural causes are polyp, fibroid, carcinoma which can be diagnosed through imaging modality like ultrasound. COEIN refers to non-structural causes which include coagulopathy, ovulatory dysfunction, endometrial pathology, and iatrogenic. Hence, AUB after 40 years needs evaluation to exclude polyp, fibroid, carcinoma from hormonal pathology. Adenocarcinoma of endometrium is often preceded by a proliferative precursor called "Endometrial Hyperplasia". Life expectancy is now increased and we are in an era of geriatric medicine. Preventive medicine is gaining more importance as more women are entering the climacteric phase apart from facing psychological derangement; they are scared by taboos about malignancies of genital tract. So early diagnosis and proper treatment of endometrial hyperplasia is essential to prevent its progress to endometrial carcinoma. Endometrial abnormalities are common diagnostic challenges facing the radiologist and gynaecologist. In abnormal uterine bleeding, transvaginal ultrasound plays a pivotal role by aiding to find out the etiology, early diagnosis and follow up of endometrial pathology.

**You need to reference your article!!!!!!!**

**Materials and methods:**

**Study Design**

Prospective observational study was conducted for in patients who come to Saveetha Medical College, OBG department, Chennai in age group between 40-50 years with abnormal uterine bleeding in women between 40-50 years of age with abnormal uterine bleeding between 2016-2018 with sample size of 82.

**Inclusion criteria**

Perimenopausal patients in age group 40-50 years with abnormal uterine bleeding

**Exclusion criteria**

Patients already on medical management with hormones for past 6 months, Patient with abnormal uterine bleeding in the other age group, Active genital tract infection and malignancies, Patients who have other causes of AUB (polyp, adenomyosis, fibroids, ovarian malignancies, iatrogenic and medical disorder)

**Methodology**

[Annals of Tropical Medicine & Public Health](http://doi.org/10.36295/ASRO.2020.2323105)
After getting informed consent and ethical clearance, subjects were recruited for this study. A detailed history were taken, which includes (name, age, address, occupation, socioeconomic status, presenting complaints, associated symptoms, menstrual history, marital history, obstetric history, past medical/surgical history, contraceptive history, family history). General examination was done. Breast and thyroid examined. Height, weight and BMI calculated. Vitals such as pulse rate, blood pressure, temperature, respiratory rate were recorded. Cardiovascular, respiratory, abdominal, neurological examinations were done. A detailed Gynecological examination namely per speculum and bimanual pelvic examination were done. Blood Investigations (complete blood count, blood grouping & typing, bleeding time & clotting time, coagulation profile, thyroid function test, fasting blood sugar/postprandial blood sugar, renal function test, serology – HIV, HbsAg, VDRL) was done by collecting 12 ml of blood. Then ECG, chest x-ray were taken. These patients were first subjected to trans abdominal and then transvaginal ultrasound after explaining the procedure. TVS was done with empty bladder using 7.5MHZ intravaginal transducer. Maximum thickness of endometrium in A-P dimension was taken. If blood/fluid is present, thickness of 2 layers are taken separately and noted. After obtaining anesthetic fitness, subjects were posted for the surgery with informed written consent. Endometrial biopsy will be taken by one of the methods (Pipelle biopsy/ Fractional curettage/ hysteroscopy guided biopsy)

Procedure of dilatation and curettage: Patient with empty bladder was put in lithotomy position. Patient was given IV sedation under strict aseptic precautions pelvic examination was done to know the position of the cervix, position and size of the uterus and adnexa. Posterior wall of vagina retracted with slim speculum. Endocervical curettings were taken. Uterine sound passed to know the position of uterus and uterocervical length. The cervical canal was serially dilated with Mathew Duncan’s metal dilators of increasing size of 6-10mm as required, and curettage was done with sharp metal curette from all the walls of the uterus including fundus. The material obtained was sent for histopathological examination in a bottle containing 10% formalin. Time schedule for uterine curettage

RESULTS :

Figure 1: Age distribution

![AGE GROUP](image)

Figure 2 : Parity

Figure 3: Menstrual Pattern

Figure 4: Bleeding duration

Figure 5: BMI

Annals of Tropical Medicine & Public Health  
http://doi.org/10.36295/ASRO.2020.2323105
Table 7: Endometrial thickness

<table>
<thead>
<tr>
<th>ET</th>
<th>No. of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;5mm</td>
<td>4</td>
<td>4.9%</td>
</tr>
<tr>
<td>5-8mm</td>
<td>36</td>
<td>43.9%</td>
</tr>
<tr>
<td>8.1-12mm</td>
<td>28</td>
<td>34.2%</td>
</tr>
<tr>
<td>12.1-16mm</td>
<td>7</td>
<td>8.5%</td>
</tr>
<tr>
<td>&gt;16mm</td>
<td>7</td>
<td>8.5%</td>
</tr>
<tr>
<td>Total</td>
<td>82</td>
<td>100%</td>
</tr>
</tbody>
</table>

Figure 6

Which figure???
Among 82 perimenopausal women, 36 (43.9%) women had endometrial thickness between 5-8mm, 28 (34.1%) women had endometrial thickness of 8.1-12mm, 7 (8.5%) shows endometrial thickness of 12.1-16mm, 7 had ET more than 16 mm and 4 women (4.9%) shows endometrial thickness of less than 5mm.

**Figure 7: Endometrial thickness**

![Endometrial thickness chart](chart.png)

**Table 8: Histopathology Report**

<table>
<thead>
<tr>
<th>HPE Result</th>
<th>No. of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proliferative endometrium</td>
<td>45</td>
<td>54.9%</td>
</tr>
<tr>
<td>Disordered proliferative endometrium</td>
<td>5</td>
<td>6.1%</td>
</tr>
<tr>
<td>Secretory endometrium</td>
<td>26</td>
<td>31.7%</td>
</tr>
<tr>
<td>Senile cystic atrophy</td>
<td>3</td>
<td>3.7%</td>
</tr>
<tr>
<td>Simple hyperplasia without atypia</td>
<td>2</td>
<td>2.4%</td>
</tr>
<tr>
<td>Complex hyperplasia without atypia</td>
<td>1</td>
<td>1.2%</td>
</tr>
<tr>
<td>Total</td>
<td>82</td>
<td>100%</td>
</tr>
</tbody>
</table>

Most common type of endometrial pattern was proliferative endometrium. Out of 82 women, 54.9% had proliferative type of endometrium, 31.7% women had secretory pattern, 6.1% had disordered proliferative endometrium, 3.7% had senile cystic atrophy, 2.4% had simple hyperplasia and 1.2% had complex hyperplasia.
Figure 8  Histopathology Report

![Histopathology Report](image)

Table 9: Comparing endometrial thickness by transvaginal sonography with endometrial histopathology

<table>
<thead>
<tr>
<th>ET (mm)</th>
<th>Proliferative endometrium</th>
<th>Secretary endometrium</th>
<th>Senile cystic atrophy</th>
<th>Disordered proliferative endometrium</th>
<th>Simple hyperplasia without atypia</th>
<th>Complex hyperplasia without atypia</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;5</td>
<td>3 (75%)</td>
<td>1 (25%)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5-8</td>
<td>25 (69.4%)</td>
<td>7 (19.4%)</td>
<td>2 (5.6%)</td>
<td>2 (5.6%)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8.1-12</td>
<td>12 (42.9%)</td>
<td>12 (42.9%)</td>
<td>0</td>
<td>3 (10.7%)</td>
<td>1 (14.3%)</td>
<td>0</td>
</tr>
<tr>
<td>12.1-16</td>
<td>1 (14.3%)</td>
<td>4 (57.1%)</td>
<td>1 (14.3%)</td>
<td>0</td>
<td>0</td>
<td>1 (14.3%)</td>
</tr>
<tr>
<td>&gt;16</td>
<td>4 (57.1%)</td>
<td>2 (28.6%)</td>
<td>0</td>
<td>0</td>
<td>1 (14.3%)</td>
<td>0</td>
</tr>
</tbody>
</table>

Chi square test

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>Df</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>30.916</td>
<td>20</td>
<td>&lt;0.001*</td>
</tr>
</tbody>
</table>

*-Significant

P value < 0.5 is generally considered as significant

In this study, the correlation between ET and TVS has P value of < 0.001, hence it is statistically significant.

Table 10: Efficacy of TVS

<table>
<thead>
<tr>
<th>TVS</th>
<th>HPE</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>True Positive</td>
<td>True Negative</td>
</tr>
<tr>
<td>True Positive</td>
<td>3</td>
<td>39</td>
</tr>
<tr>
<td>True Negative</td>
<td>0</td>
<td>40</td>
</tr>
<tr>
<td>Total</td>
<td>3</td>
<td>79</td>
</tr>
</tbody>
</table>
Following observations were made for TVS in this study,

True Positive - 3
False Positive - 39
True Negative - 40
False Negative - 0
Sensitivity - 100%
Specificity - 50.6%
NPV - 100%
PPV - 7.1%
Accuracy - 52.4%

Table 9 explains the efficacy of TVS in predicting endometrial hyperplasia. Sensitivity was found to be 100% in detecting abnormal endometrial pattern with negative predictive value of 100%.

Table 11: Efficacy of TVS (ET >8mm)

N=42

<table>
<thead>
<tr>
<th>TVS</th>
<th>HPE</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>True Positive</td>
<td>True Negative</td>
</tr>
<tr>
<td>True Positive</td>
<td>3</td>
<td>39</td>
</tr>
<tr>
<td>True Negative</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>3</td>
<td>39</td>
</tr>
</tbody>
</table>

Following observations were made for TVS in this study (ET >8mm)

True Positive - 3
False Positive - 39
Sensitivity - 100%
PPV - 7.1%

Accuracy - 7.1% 

This table shows women who had endometrial thickness above 8 mm (42 women) with sensitivity was found to be 100% with PPV of 7.1%.

**TABLE 12: Efficacy of TVS (ET 8-12mm)**

N= 28

<table>
<thead>
<tr>
<th>TVS</th>
<th>HPE</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>True Positive</td>
<td>True Negative</td>
</tr>
<tr>
<td>True Positive</td>
<td>1</td>
<td>27</td>
</tr>
<tr>
<td>True Negative</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>27</td>
</tr>
</tbody>
</table>

True Positive - 1  
False Positive - 27  

Sensitivity - 100%  
PPV - 3.6%  
Accuracy - 3.6%

This table shows women with ET between 8.1mm- 12mm (28 women)

Here the sensitivity is 100% with PPV of 3.6%.

**TABLE 13: Efficacy of TVS  (ET 12.1-16mm)**

N=7

<table>
<thead>
<tr>
<th>TVS</th>
<th>HPE</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>True Positive</td>
<td>True Negative</td>
</tr>
<tr>
<td>True Positive</td>
<td>1</td>
<td>6</td>
</tr>
</tbody>
</table>
Following observations were made for TVS in this study,

<table>
<thead>
<tr>
<th></th>
<th>HPE</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>True Positive</td>
<td>True Negative</td>
</tr>
<tr>
<td>True Positive</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>True Negative</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>6</td>
</tr>
</tbody>
</table>

This table shows women with ET between 12.1mm- 16mm (7 women)

Here the sensitivity is 100% with PPV 14.3%

Table 14: Efficacy of TVS (ET >16mm)

N=7

Following observations were made for TVS in this study,

True Positive - 1
False Positive - 6


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Sensitivity  -  100%
PPV  -  14.3%
Accuracy  -  14.3%

This table shows women with ET between >16mm. (7 women)

Here the sensitivity is 100% with PPV 14.3%

Discussion:

Abnormal uterine bleeding is a common problem in perimenopausal women. It should be evaluated for early diagnosis and treatment of endometrial hyperplasia which may proceed to endometrial carcinoma if untreated. All perimenopausal women need admission and for many years diagnostic curettage was required to exclude endometrial abnormalities. Nowadays new modalities have come to diagnose and confirm our diagnosis.

In our study the efficacy of transvaginal sonogram for diagnosing endometrial abnormalities as a cause of abnormal uterine bleeding and its correlation with histopathology of endometrium by fractional curettage was studied. Totally 82 patients in perimenopausal age group were enrolled in our study. In our study, 69.5% of patients belong to the age group 40-45 years. 30.5% of patients belong to the age group 46-50 years. This study closely related to Archana bhosle, cornitese(8). Majority of women with abnormal uterine bleeding were found to be multiparous (73.2%) followed by uniparous(18.3%) and nulliparous (8.5%). Most common presentation was menorrhagia in 80.5% of perimenopausal women. Bhosle(5) ( 2010) said that maximum incidence was menorrhagia (53.3%). Majority of perimenopausal women in our study had abnormal uterine bleeding less than 3 months 56.1%, followed by 3-6 months 24.4%. Additional findings in our study were, among 82 perimenopausal women, 8 patients were obese with BMI more than 30. In our study among 82 patients, 20.7% of patients had Diabetic Mellitus and 19.5% of patients had Hypothyroidism, 7.3% of patients had Bronchial Asthma, 4.9% of patients had Hypertension, 2.4% of patients had Hyperthyroidism, 1.2% of patients had Conductive hearing loss, 1.2% of patients were treated for pulmonary tuberculosis and 1.2% had Squint corrected. 41.4% of patients had no associated medical disorder. Measurement of endometrial thickness by transvaginal ultrasound was done and it correlated well with abnormal endometrial histopathology in these perimenopausal women. In perimenopausal bleeding, for many years the widely done procedure for obtaining endometrial sampling was fractional curettage. The false negative rate in this procedure was found to be 2-6% in diagnosing endometrial hyperplasia and endometrial carcinoma (14). Only 10% of women undergoing endometrial sampling were found to have atypical pathology which needs medical or surgical intervention. Most of the time the patients undergoing endometrial sampling needs only hormonal management.

Among 82 cases, 3 patients had endometrial hyperplasia i.e. 3.6%. 45 cases (69.4%) had proliferative endometrium followed by 26 cases (31.7%) Secretory endometrium. Majority was proliferative endometrium among perimenopausal women. Endometrial thickness between 8-12mm, we found 28 women, among them 1
had simple hyperplasia without atypia. (3.6%). Endometrial thickness between 12.1-16mm, we found 7 patients and 1 had complex hyperplasia without atypia (14.3%). Endometrial thickness more than 16 mm, we had 7 patients and 1 showed simple hyperplasia without atypia. (14.3%). As endometrial thickness increases, the percentage of endometrial hyperplasia also increases and in turn there is increased chance of malignancy. This is supported by the study done by Chapavit Get Pook et al, hence progression to endometrial hyperplasia to carcinoma is increased as ET increases, so timely intervention is needed to diagnose early and manage accordingly. In our study, 3 patients showed hyperplasia and the endometrial thickness for those patients were above 8mm. This closely relates to the study done by Chapavit Get Pook et al (2007) reported that cut off of 8mm by transvaginal ultrasound showed sensitivity of 83.9%, specificity of 58.8% and negative predictive value of 90.4% for abnormal endometrial pathology.

Hence by correlating TVS result with endometrial patterns by histopathological examination in total 82 women, Transvaginal ultrasound can be considered as a good screening method and by comparing endometrial thickness with histopathology in our study the sensitivity (to pick up high risk patients going in for atypical hyperplasia) was found to be 100%, negative predictive value was 100% (True negatives i.e the probability that patients with a negative screening test) with accuracy of 52.4%. In this study, the correlation between ET and TVS has P value of < 0.001, hence it is statistically significant. We found abnormal endometrial patterns above 8mm of endometrial thickness. In our study group, total no of women who had endometrial thickness above 8mm were 42/82 which almost comes to 50% of our study group. By symptoms, majority of women complained of menorrhagia with endometrial thickness above 8mm.

Correlation of TVS with histopathology for these 42 women also showed sensitivity of 100% with positive predictive value of 7.1% (ET >8mm). PPV observed for ET 8-12mm was 3.6% which increases to 14.3% for ET of 12-16mm and 14.3% for ET of >16mm. In our study, it was observed that efficacy of TVS with ET > 8mm can be considered for invasive procedure, as the sensitivity remains 100% and not to miss any endometrial abnormalities between 8-12 mm of ET inspite of PPV being 3.6%.

The World Health Organization (WHO) and International Society of Gynecological Pathologists designated a classification system for endometrial hyperplasia with varying malignant potential (kuruman,1985; Silverberg,2003)

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Types</th>
<th>Progression to carcinoma (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Simple hyperplasia</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Complex hyperplasia</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Simple atypical hyperplasia</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>Complex atypical hyperplasia</td>
<td>29</td>
</tr>
</tbody>
</table>
Novak et al

Hence progression to carcinoma is 1% in simple and 3% in complex hyperplasia without atypia.

✓ This study suggests that endometrial thickness of 8mm or less in perimenopausal women does not need fractional curettage as no abnormal endometrial patterns were noted in this group.

✓ Endometrial thickness of more than 8mm should be considered as an indication for diagnostic endometrial sampling in perimenopausal women.

✓ In our study, three cases showed endometrial hyperplasia with ET more than 8mm which is considered abnormal.

Conclusion:

Patients with AUB should be investigated promptly with Transvaginal sonogram, as first line of investigation which is non invasive, safe and cost effective. TVS also helps to exclude other cause of AUB like polyp, fibroid, missed IUCD, adnexal pathology. In perimenopausal age group endometrial thickness of less than 8mm correlates well with histopathology report of endometrium and it rules out endometrial abnormalities. If the thickness is more than 8mm, there are chances of endometrial abnormalities so it warrants endometrial sampling. Hyperplasia is diagnosed with endometrial thickness more than 8mm in our study. TVS with HPE helps us to diagnose atypical hyperplasia in earlier stages which is a precursor of malignancy (adenocarcinoma- 29%). This study helps us to individualize patients with AUB, who may need endometrial sampling to rule out endometrial abnormalities.

Statistical tools: The information collected regarding all the selected cases were recorded in a Master chart. Data analysis was done with the help of SPSS ver. 17.0.

Ethical clearance: Institutional Human Ethical committee clearance has been obtained.

Source of funding: Own funding

Conflict of Interest - NIL

ACKNOWLEDGEMENT:

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REFERENCES:


3. BenaceraffBR,shipTD,Bromley B: which patients benefit from a 3D reconstructed coronal view of the uterus added to the standard routine 2D pelvic sonography.AJR 190(3): 626.2008


12. Dubinsky T.J, H.R. Parvey, N.Maklad The role of transvaginal sonography and endometrial biopsy in the evaluation of peri and postmenopausal bleeding AM J Roentgenol, 169(1997); 145-149

13.Fleisher AC Gordon AN. ENT mans, Kepple Dm, TVS of the endometrium.1990;(2) 85-110


15. Freimanis MG and Jones AF; Transvaginal sonography. Radioclinic North America 1992; 30(s) 955-76


17. Igal Wolman MD, et al examined 25 patients

18. Ivan Fistronic MD, MSc., Branko Hodik, Ph.D, Petar Klaric, PH.D., Ljubomir Jokanovic, MSc, Goran Grunisic, MSc, Tumislar Ivicevic MD. Transvaginal sonographic Assessment of premalignant and malignant changes in the Endometrium in the Post menopausal bleeding. Journal of Clinical Ultrasound, 1997


25. Munro MG, Critchley Ho, Broder MS (2011). Eraser is or the FIGO working group and menstrual disorders. FIGO classification system (Palm-Coen) for causes of abnormal uterine bleeding in non-gravid women of reproductive age. Int J Gynecol obstet. Apr 113; 3-13


38. Woolock JG. Critchley HO, Munro MG, Broder MS, Fraser IS. Review of the confusion in current and historical terminology and definitions for disturbances of menstrual bleeding, fertile steril, 2008; 90: 2269-80
