Section: Radiodiagnosis

Original Research Article

ULTRASOUND EVALUATION OF ENDOMETRIAL THICKNESS AND PATTERN IN WOMEN PRESENTING WITH ABNORMAL UTERINE BLEEDING CORRELATED WITH HISTOPATHOLOGY

Indira N[1], Kannar Vidyavathi[2]

[1]Professor, Department of Radiodiagnosis & Imaging, East Point College of Medical Sciences & Research Centre, Bengaluru, Karnataka, India
[2]Professor, Department of Pathology, East Point College of Medical Sciences and Research centre, Bengaluru, Karnataka, India

Received *: 20/07/2025*
Received in revised form *: 05/09/2025*
Accepted *: 26/09/2025*

Corresponding Author:
Dr. Indira N,
Professor, Department of Radiodiagnosis & Imaging, East Point college of Medical Sciences & Research Centre, Bengaluru, Karnataka, India.
Email: drindiraniranjan@gmail.com

DOI: 10.70034/ijmedph.2025.4.24

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2025; 15 (4); 124-130

ABSTRACT

Background: Abnormal Uterine bleeding (AUB) is bleeding from the uterus that is longer than usual or occurs at an irregular time. Transvaginal Sonography (TVS) is the initial diagnostic modality in assessment of patients presenting with AUB. It is inexpensive, non- invasive way to visualize the endometrium and endometrial cavity. This study was undertaken to find out the diagnostic accuracy of TVS in diagnosing normal and abnormal endometrium in patients presenting with AUB, by comparing the ultrasound findings with histopathology, to measure endometrial thickness and pattern, to find out any intraluminal pathologies and to evaluate cut off values for endometrial thickness for identifying normal and abnormal endometrium.

Materials and Methods: This prospective, comparative study is done over period of 2 years. A total of 196 women, above the age of 18 years presenting with complaints of abnormal bleeding uterine were included in the study. Any vaginal or cervical cause of bleeding, blood dyscrasias, pregnancy related causes of bleeding, patient with history of drug intake like anticoagulants and hormone replacement therapy were excluded. These women underwent clinical examination, investigations and TVS, followed by endometrial sampling/ pipelle sampling / hysteroscopy with biopsy or hysterectomy.

Results: 120(61.22 %) of patients presented with HMB or menorrhagia as clinical symptom. By histopathology, 128 (65.3%) cases had normal endometrium and 68 (34.69%) had abnormal endometrium. TVS diagnosed endometrium as normal in 138 (70.4%) cases with Sensitivity, Specificity, PPV, NPV and diagnostic accuracy of 91.2%, 98.3%, and 89.7%, 84% and 87.7% respectively. TVS diagnosed endometrium as abnormal in 58 (29.6%) cases with Sensitivity, Specificity, PPV, NPV and Diagnostic Accuracy of. 79.1, 93.2%, 79.1% 93.2% and 89.7% respectively. Type A endometrium was seen in 127 (64.7%) cases and Type B in 71 (35.3%) cases. Type B was more associated with endometrial pathologies. A cut off value of 14mm of endometrial thickness on TVS has better Sensitivity, Specificity, PPV, NPV and diagnostic accuracy of TVS is 91.3%, 88.2%,86.8% , 90% and 88.7% (P value <0.001) as compared to a cut off value of 12mm on TVS with Sensitivity, Specificity, PPV, NPV and diagnostic accuracy of 84.1%, 64.5%,82.6% , 71.4 % and 71.4 % respectively.

Conclusion: Transvaginal Sonography is the initial diagnostic modality in assessment of patients presenting with AUB. Transvaginal Sonography can predict normal and abnormal endometrium with overall Sensitivity, Specificity, PPV, NPV and diagnostic accuracy of 91.3%, 88.2%, and 86.8%, 90% and 88.7% respectively. Type B endometrium is more associated with endometrial abnormalities. A cut off value of 14mm gives better Sensitivity, Specificity,

PPV and NPV and Diagnostic accuracy of 91.3%, 88.2%, and 86.8%, 90% and 88.7% respectively.
Keywords: AUB, premenopausal, PALM COEIN, Histopathology, Transvaginal Sonography, Endometrial thickness, Endometrial Pattern, Cut off Values.

INTRODUCTION

AUB is one of the most common complaints presenting in gynec OPD and accounts for 17.9% of Indian population.[1] Diagnostic curettage is the method of choice for evaluating endometrial abnormalities, but it is an invasive procedure.[2]

Pelvic ultrasound is the initial diagnostic imaging modality in evaluation of endometrium in women presenting with abnormal uterine bleeding. It will determine the etiology of the bleeding such as fibroid uterus, increased endometrial thickness or a focal mass. Thickened endometrium will indicate an underlying pathology or hormonal imbalance or malignancy.[3]

TVS is an inexpensive, non- invasive modality to visualize the endometrial cavity. TVS identifies myometrial abnormalities, such as fibroids and adenomyosis, thickened endometrium, due to hyperplasia or endometrial cancer that may warrant a histopathological diagnosis.[4] TVS can reliably assess endometrial thickness and uterine cavity morphology.[5]

The endometrial thickness and patterns can be measured by Transvaginal Sonography (TVS) and can help in identifying endometrial malignancy.[6] The endometrium pattern Type A (trilamellar) or Type B (non trilamellar/homogenous) is used to determine the course of treatment in infertility studies.[7] The pattern of endometrium (Type A or Type B) can be detected accurately by sonological examination.[8]

Various cut offs have been proposed for measuring thickened endometrium. Most common is cut off value of 12mm thickness,[9] of the endometrium, however it is found to be inaccurate. Kotdawala P et al, have advocated that an endometrial thickness threshold of >4mm in postmenopuausal women and > 14mm in premenopausal women indicates an underlying endometrial pathology and warrants for histopathological evaluation of the endometirum.[10] Recent study by Singh M et al,[11] have advocated that simple hyperplasia was detected when the endometrial thickness of > 11-16mm, and abnormal endometrium was detected when endometrial thickness is >15mm.[8]

Aims & objectives of the study:

1. To correlate the ultrasound findings with the histopathological findings in discriminating normal from abnormal (pathological) endometrium.
2. To measure and evaluate the accuracy of ultrasound in evaluating endometrial thickness and its pattern in patients presenting with abnormal uterine bleeding.
3. To identify any intraluminal pathologies by ultrasound in patients presenting with AUB.
4. To determine cut off limits with reference to endometrial thickness in patients presenting with AUB

MATERIALS AND METHODS

The study is prospective and observational with Descriptive and Analytical statistics analysis and study design is for 2 years. The cases were studied for a period of 24 months in East Point College of Medical Sciences and Research Centre, Bangalore.

Patients referred to Department of Radiodiagnosis for pelvic ultrasonography with history of AUB, over period of 2yrs from January 2021 – December 2022 were included in the study.

Inclusion criteria

A total of 196 cases more than 18 years, who can give consent were included.

Exclusion criteria

Patients presenting with vaginal or cervical cause of bleeding, blood dyscarias, Pregnancy related causes of bleeding, patient with h/o drug intake (Anticoagulant and hormone replacement therapy). The sample size was estimated depending on the sensitivity of TVS in detection of abnormalities 54 %.[11]

Using formula: Sample size n = DEFF* Np (1-p)] / [dxd/zxz 1- alpha/2* (N-1)+ (1-p)] P= 95%, p=1-P, d=7, Za =1.96 The sample size calculated was 195.11

Methodology

All data are recorded including age, parity, onset, duration of complaints, interval and amount of bleeding, obstetrical, medical and surgical interventions and any previous treatment history. All patients were clinically evaluated for general, systemic, and gynecological examination. Informed written consent was obtained for USG and special consent was taken for TVS. Ethical clearance was obtained from ethical committee.

Initially USG is done by transabdominal route with transabdominal probe with full urinary bladder to measure the uterus. TVS was done to rule out any uterine or adnexal pathology and also to measure the endometrium. The thickest part of endometrium was measured perpendicular to its longitudinal plane in anteroposterior diameter, between echogenic borders. Endometrial pattern was classified into Type A (trilamellar) and Type B (non trilamellar). Patient underwent endometrial sampling/ pipelle sampling/ hysteroscopy with endometrial biopsy or hysterectomy. Ultrasound findings were compared with histopathological findings.

All data was entered in MS Excel sheet and analyzed by descriptive statistics for proportion and mean, inferential statistics by chi square test for significant difference between proportions. Sensitivity analysis, positive predictive and negative predictive value was calculated. Correlation between the variable will be analyzed using Spearmen's correlation test. P value < 0.05 was considered for statistical significance.

RESULTS

A total of 196 patients were included in the study. In our study, AUB was found more commonly in 36-40 years same as found in 74 cases (37.7%) in premenopausal women. [Figure1]

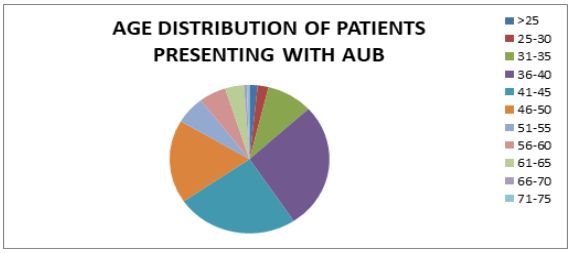

Figure 1: Shows distribution of age of patients presenting with AUB.

52 (26.5%) patients underwent endometrial sampling, 44 (22.4%) patients underwent Pipelle sampling, hysterectomy in 87 cases (44.3%) and hysteroscopy and biopsy in 13 cases (6.6%).

Heavy menstrual bleeding (HMB) or menorrhagia is the most common complaint found in 120 cases (61.22%), followed by metrorragia in 33 cases (16.8%), PMB was in 33 cases (6.8%), oligomenorrhea in 3 cases (1.5%) irregular bleeding in 8 cases (4%).

All 196 patients underwent TVS, and TAS was done whenever required. Out of 196 cases studied, 128 (65.30%) cases were found to have normal endometrium and 68(34.7 %%) had abnormal endometrium as histopathological findings.

Among normal endometrium on histopathology, 62 (31.63%) cases had proliferative endometrium, 33 (16.83%) cases had secretory endometrium, 22 (11.22%) cases had atrophic endometrium, 17(8.67%) disordered proliferative, 4(2.04%) had decidual/menstrual endometrium in 3cases (1.5%). [Figure 2]

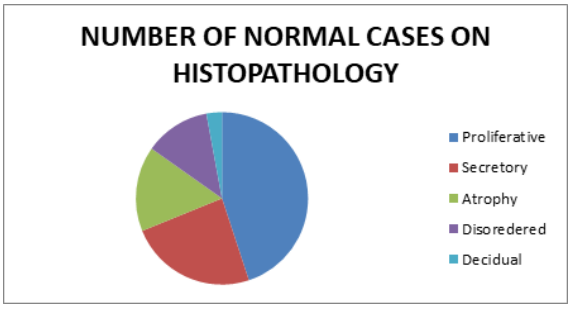

Figure 2: Showing distribution of normal endometrium on histopathology.

Among the abnormal endometrium on histopathology, polyp was seen in 24 (35.2%) cases, Simple hyperplasia without atypia was seen in 22(11.22%) cases, cystoglandular hyperplasia was seen 2 (2.94%) cases, complex hyperplasia without atypical in 1(1.47%) case, complex with atypia in 1 (1.47%) case, endometritis in 5 (7.35 %), endometrial carcinoma in 3(4.41%) cases. [Figure 3]

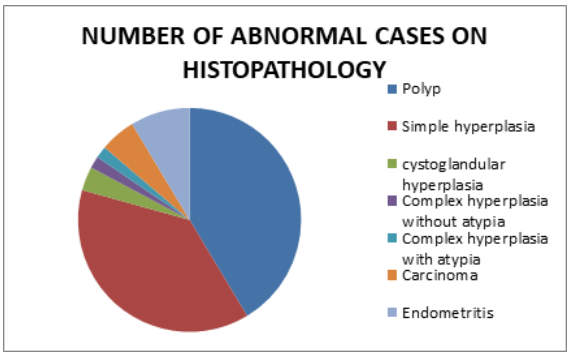

Figure 3: Showing distribution of abnormal endometrium on histopathology.

The endometrial thickness on TVS for women presenting with a proliferative histopathology was seen between 5-9.9mm mm in 44 cases (70.95%). Only one patient with proliferative histopathology had endometrial thickness more than 14mm. (figure 6). Secretory endometrium was also seen on TVS between 5-9.9mm in 15 cases (45.4%) and between 10-13.9 mm in 12 cases (36.3%), only 5 patients with secretory histology had endometrial thickness more than 14mm. Atrophic endometrium was seen with thickness of less 4.9mm in 17 cases (77.2%). Disordered proliferative phase seen in 8 cases (47.0%) in 5-9.9mm. Decidual/menstrual endometrium was seen 5-9.9mm in 3 cases (75%). [Figure 4]

The endometrial thickness on TVS for women presenting with histological diagnosis of polyp was seen with endometrial thickness <14mm seen in 12 (50%) cases and >14mm in 12 (50%) cases. The endometrial thickness on TVS for women presenting with histological diagnosis of simple hyperplasia was seen with endometrial thickness <14mm was seen in 9(40.9%) cases and >14mm in 13(59%) cases. The endometrial thickness on TVS for women presenting with histological diagnosis of cystoglandular hyperplasia was seen with endometrial thickness <14mm was seen in 1(50%) case and >14mm in 1 (50%) case. The endometrial thickness on TVS for women presenting with histological diagnosis of complex hyperplasia without atypia was seen with endometrial thickness <14mm was seen in 1case. The endometrial thickness on TVS for women presenting with histological diagnosis of complex hyperplasia with atypia was seen with endometrial thickness >14mm in 1case. The endometrial thickness on TVS for women presenting with histological diagnosis of endometritis was seen with endometrial thickness < 14mm in 1 (20%) case and >14mm was seen in 4

cases (80%). The endometrial thickness on TVS for women presenting with histological diagnosis of carcinoma was seen with endometrial thickness > 14mm in all 3 cases (100%). The maximal endometrial thickness was seen in a women diagnosed with malignant mixed adenocarcinaoma measuring 33mm, papillary adenocarcinoma measuring 25mm followed by endometroid adenocarcinoma measuring 14mm. [Figure 4]

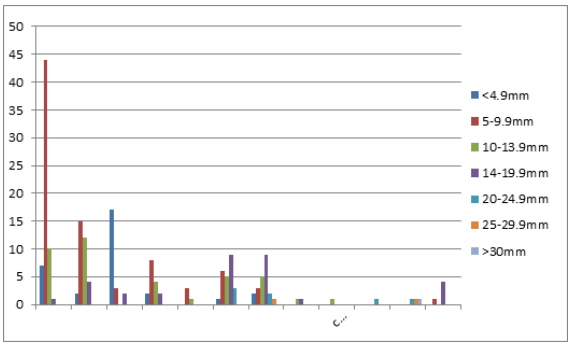

Figure 4: The endometrial thickness on TVS compared with histopathology

The sensitivity, specificity, PPV, NPV and diagnostic accuracy of TVS in diagnosing endometrium as normal when compared with histopathology is 91.2%, 98.3%, 89.7%, 84% and 87.7% respectively. [Figure 5]

The sensitivity, specificity, PPV, NPV and diagnostic accuracy of TVS in diagnosing endometrium as abnormal when compared with histopathology is 79.1, 93.2%, 79.1% 93.2% and 89.7% respectively. [Figure 5]

The overall Sensitivity, Specificity, PPV, NPV and Diagnostic Accuracy of TVS compared with histopathology is 91.2%, 98.3%, 89.7%, 84% AND 87.7%. [Figure 5]

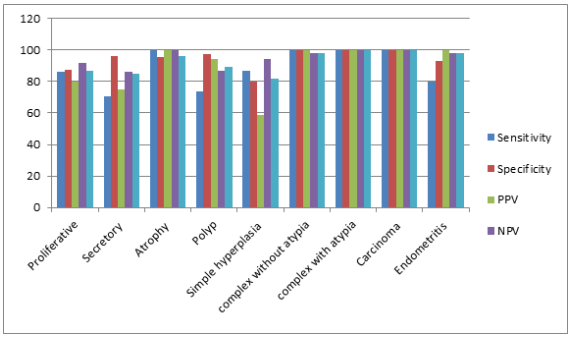

Figure 5: Accuracy of TVS compared with histopathology.

Pattern of endometrium: Type A (lamellar) pattern was seen in 92 (46.93%) cases, Type B (non – lamellar) endometrium was seen in 69 cases(35.2%), thin endometrium in 22 (11.22%) cases and intraluminal pathologies in 13 cases (6.63%).10 cases as polyps with stalks; 3cases of endometritis in the form of clots, collection and calcifications. [Figure 6]

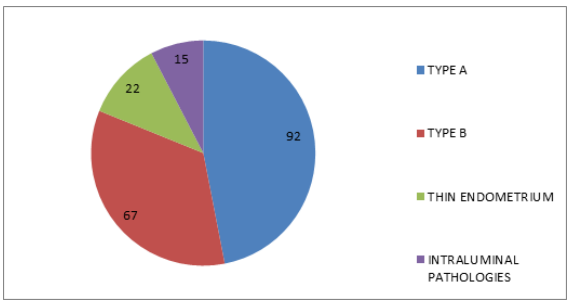

Figure 6: Distribution of pattern of endometrium on TVS.

Type A (total 92 cases) was seen between 5-9.9 mm on TVS in 68 (73.9 %) patients followed by 10-11.9 in 7 (7.6 %) cases. Only 3 (3.26%) cases had Type A endometrium on TVS measuring >14mm. Type B or homogenous (total cases-69) was seen in between 10-13.9mm endometrial thickness on TVS in 32cases (46.3 %), followed by 14 cases(20.2%) in 14-19.9mm. 33 cases (47.8%) is seen in endometrial thickness of more than 14mm. Thin endometrium less than 4.9mm was seen in 19 (86.3%) cases of atrophy, and only 3(13.6%) cases were seen as type A at 5-9.9mm. [Figure 7]

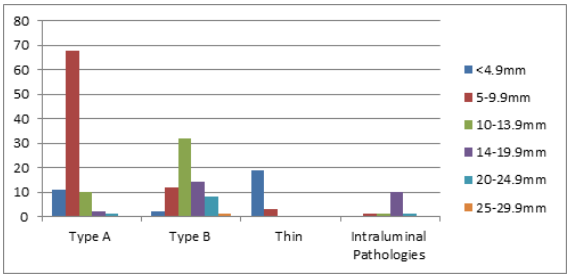

Figure 7: Showing endometrial pattern and endometrial thickness on TVS

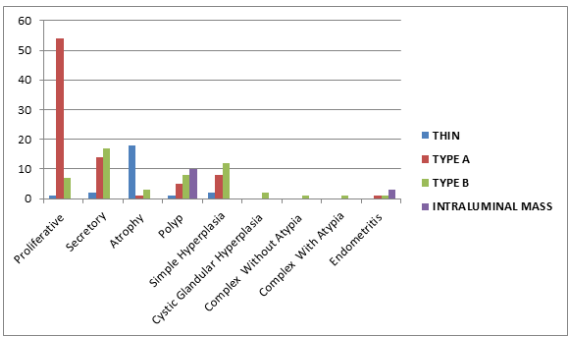

Figure 8: Comparison of endometrial pattern on TVS with histopathology

Type A endometrium on TVS was seen in 79 (63.2%) of normal endometrium, predominantly in proliferative phase and 14(19.7%) cases of abnormal endometrium. Type B endometrium was seen in 38cases (30.4%)cases of normal and 28 (39.4%) cases of abnormal endometrium. [Figure 8]

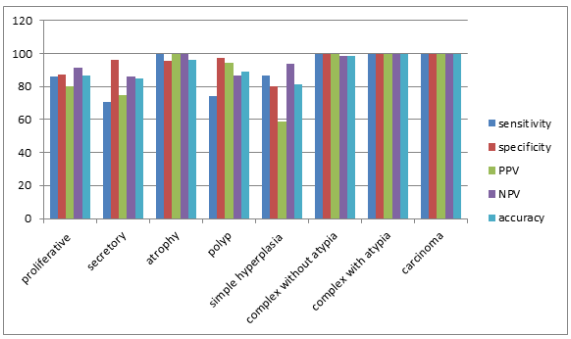

Figure 9: Diagnostic accuracy of TVS with endometrial thickness cut off value of 14mm.

If cut off value of 12mm is applied for our study, sensitivity, specificity PPV, NPV and diagnostic accuracy is 84.1%, 64.5%, 82.6%, 71.4% and 71.4%. [Figure 9]

A cut off value of l4mm gives higher Sensitivity, Specificity, PPV, NPV And Diagnostic Accuracy of 91.3%, 88.2%, 86.8%, 90% and 88.7% respectively ($p<0.001$). [Figure 10]

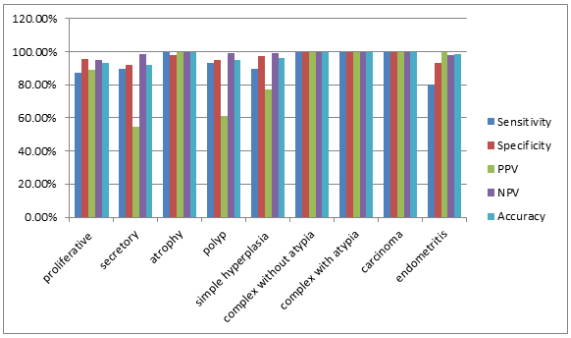

Figure 10: Diagnostic Accuracy of TVS with endometrial thickness cut off value of 12mm.

DISCUSSION

The reported prevalence of AUB in India is about is 17.9 %.[1] The causes of Abnormal Uterine Bleeding (AUB), which is standardized in the FIGO classification (PALM – COEIN),[12] were followed. According to PALM-COEIN, potential structural causes were seen in 107 cases, this is similar to study done by Rajani et al,[13] who also reported structural causes were the main reason for AUB. Structural abnormalities were noted in the form of fibroids in 42 (21.4%) cases, adenomyosis in 24 (12.24%) cases, both fibroid and adenomyosis in 8 (4%) cases, polyp in 24 (12.24%) cases, simple hyperplasia without atypia in 22 (11.22%) cases, cystoglandular hyperoplasia in 2 (2.94%) cases, complex hyperplasia with and without atypia in 2 cases and (2.94%) malignancy in 3 (4.41%) cases.

Leiomyoma is the most common structural abnormality seen in the myometrium noted in 42 (21.4%) cases, similar to study done by Ratnani R et al,[14] who also found 35% of fibroids as most common abnormality in TVS. TVS was able to detect 23 cases (54.7%) of fibroids in 42 cases, only 4 cases (16.6%) of out of 24 cases of adenomyosis were detected. Both fibroid and adenomyosis were diagnosed in 5 cases (62.5 %) out of 8 cases. Polyp was the most common endometrial abnormality seen in 24 cases (12.24 %) similar to study by Lee SC et al,[15] with prevalence of 7.8-34.9%.

A total of 196 patients were included in the study. In our study, AUB was found more commonly in 36-40 years same as found in 74 cases (37.7%) in premeopausal women. Sahu et al,[16] studied 150 patients and reported that 121 (80.6%) of 150 patients in premenstrual group were affected by AUB. PMB was seen in 30 cases (15.3%). [Figure 1]

52 (26.5%) patients underwent endometrial sampling, 44 (22.4%) patients underwent Pipelle sampling, hysterectomy in 87 cases (44.3%) and hysteroscopy and biopsy in 13 cases (6.6%). [Figure 2]

Heavy menstrual bleeding (HMB) or menorrhagia is the most common complaint found in 120 cases (61.22%), followed by metrorragia in 33 cases (16.8%), PMB was seen in 33 cases (6.8%), oligomenorrhea in 3 cases (1.5%) irregular bleeding in 8 cases (4%). Similar to study by Nair et al,[17] who have reported 64% of 50 patients presenting with HMB.

Structural abnormality was noted in 107 cases (54.59%) in the form of fibroid in 42 cases (21.4%), adenomyosis in 24 cases (12.24%) both fibroid and adenomyosis in 8 cases (4%).

Out of 196 cases studied, 128 (65.30%) cases were found to have normal endometrium and 68(34.7 %%) had abnormal endometrium as histopathological findings. This is similar to study by Begum NV et al, studied 150 women and concluded 128(85.3%) had normal endometrium and 22 (15%) had abnormal endometrium.[8] [Figure 3]

Among normal endometrium showing cyclical pattern of either proliferative or secretory endometriun on histopathology, 62 (31.63%) cases had proliferative endometrium, 33 (16.83%) cases had secretory endometrium, 22 (11.22%) cases had atrophic endometrium, 17(8.67%) disordered proliferative, 4(2.04%) had decidual/menstrual endometrium in 3cases (1.5%). Proliferative endometrium was most common endometrium seen, similar to study done by Shobha et al,[18] who have reported 44 (29.2 %) cases of proliferative endometrium in their study. [Figure 4]

Among the abnormal endometrium on histopathology, polyp was seen in 24 (35.2%) cases, Simple hyperplasia without atypia was seen in 22(11.22%) cases, cystoglandular hyperplasia was seen 2 (2.94%) cases, complex hyperplasia without atypical in 1(1.47%) (1, complex with atypia in 1 (1.47%), endometritis in 5 patients (7.35%), endometrial carcinoma in 3(4.41%) cases. The three malignancies are papillary adenocarcinoma measuring 25 mm, followed by malignant mixed adenocarcinaoma measuring 33mm and 14mm in endometroid adenocarcinoma. [Figure 5]

The endometrial thickness on TVS for women presenting with a proliferative histopathology was

seen between 5-10mm in 44 cases (70.95%). Only one patient with proliferative histopathology had endometrial thickness more than 14mm. Figure 6. Secretory endometrium was also seen on TVS between 5-10mm in 15 cases (45.4%) and between 10-14mm in 12 cases (36.3%), only 5 patients with secretory histology had endometrial thickness more than 14mm. Atrophic endometrium was seen with thickness of less 5mm in 17 cases (77.2%). Disordered proliferative phase seen in 8 cases (47.0%) in 5-10mm. Decidual/menstrual endometrium was seen 5-10mm in 3 cases (75%). This is similar to study by Shobha et al,[18] who also found (29.2 %) of 44 cases of proliferative endometrium in 5-10mm thickness in their study.

The endometrial thickness on TVS for women presenting with histological diagnosis of polyp was seen with endometrial thickness <14mm seen in 12 (50%) cases and >14mm in 12 (50%) cases. The endometrial thickness on TVS for women presenting with histological diagnosis of simple hyperplasia was seen with endometrial thickness <14mm was seen in 9(40.9%) cases and >14mm in 13(59%) cases. The endometrial thickness on TVS for women presenting with histological diagnosis of cystoglandular hyperplasia was seen with endometrial thickness <14mm was seen in 1(50%) case and >14mm in 1 (50%) case. The endometrial thickness on TVS for women presenting with histological diagnosis of complex hyperplasia without atypia was seen with endometrial thickness <14mm was seen in 1case. The endometrial thickness on TVS for women presenting with histological diagnosis of complex hyperplasia with atypia was seen with endometrial thickness >14mm in 1case. The endometrial thickness on TVS for women presenting with histological diagnosis of endometritis was seen with endometrial thickness < 14mm in 1 (20%) case and >14mm was seen in 4 cases (80%). The endometrial thickness on TVS for women presenting with histological diagnosis of carcinoma was seen with endometrial thickness > 14mm in all 3 cases (100%). The maximal endometrial thickness was seen in a women diagnosed with malignant mixed adenocarcinaoma measuring 33mm, papillary adenocarcinoma measuring 25mm followed by endometroid adenocarcinoma measuring 14mm. [Figure 6]

The Sensitivity, Specificity, PPV, NPV and Diagnostic Accuracy of TVS in diagnosing endometrium as normal when compared with histopathology was 91.2%, 98.3%, 89.7%, 84% and 87.7% respectively. The Sensitivity, Specificity, PPV, NPV and Diagnostic Accuracy Of TVS in diagnosing endometrium as abnormal when compared with histopathology was 79.1, 93.2%, 79.1% 93.2% and 89.7% respectively. The overall sensitivity, specificity, PPV, NPV and diagnostic accuracy of TVS compared with histopathology is 91.2%, 98.3%, 89.7%, 84% and 87.7%. [Figure 7] Mathew et al, 19 in their study found that sensitivity of TVS in detection of these abnormalities was 54%, whereas the specificity was 100%. Positive predictive value was 100% and negative predictive value was 81.1 %, as their study included women of perimenopusal age and our study included women of all ages more than 18 years.

Pattern of Endometrium : Type A (lamellar) pattern was seen in 92 (46.93%) cases, Type B (non –lamellar) endometrium was seen in 81 cases (41.32%), thin endometrium in 22 (11.22%) cases and intraluminal pathologies in 13 cases (6.63%). [Figure 8] In 125 normal cases on histopathology, Type A endometrium on TVS was seen in 54(58.06) cases of proliferative phase, 14 (42.42%) cases of secretory phase. Type B endometrium was noted on TVS in 17 (51.51%) cases of secretory phase. Thin endometrium was seen in 18 (81.81) cases of atrophic endometrium. [Figure 8]

In 71 abnormal cases on histopathology, polyp was seen having Type A endometrium on TVS in 5(20.8%) cases, Type B endometrium in 8 (33.33%) cases, intraluminal masses in 10 cases (41.66%). Simple hyperplasia showed Type A endometrium in 8 (36.36%) cases, type B in 12 (54.54%) cases. Cystic glandular hyperplasia had Type B endometrium with cystic spaces in 2 cases. Carcinoma had Type B endometrium with irregular borders in 3 cases. Complex hyperplasia with and without atypia had Type B endometrium on TVS. Endometritis had Type A in 1(20%) case, Type B in 1 (20%) case and 3 (60%) cases of intraluminal pathologies. Figure 8 Type A endometrium on TVS was seen in 79 (63.2%) of normal endometrium, predominantly in proliferative phase and 14(19.7%) cases of abnormal endometrium. Type B endometrium was seen in 11 (28.2%) of normal and 28 (71.8%) cases of abnormal endometrium. So it is inferred that Type B pattern of endometrium on TVS is seen in abnormal endometrium. [Figure 8]

Cut off Values

In our study including 196 cases of women of all ages for cut off value of 14mm, 138 (70.4%)cases of women of normal endometrium on histopathology, 125 (90.5%) cases consisted of endometrial thickness of less than 14 mm, and only 10 cases (8%) of normal endometrium had endometrial thickness of >14mm. 58 (29.6%) cases of women of abnormal endometrium, 34 (58.6%) cases consisted endometrial thickness of more than 14 mm, and 24 (41.3 %) cases of abnormal endometrium had endometrial thickness of <14mm. Hence the sensitivity, specificity, PPV, NPV and Diagnostic Accuracy is found to 91.3%, 88.2%, 86.8%, 90% and 88.7% respectively ($p<0.001$). This is similar to study by Sahu H et al, who have also found that endometrial thickness of >14mm in premenopausal women indicates an underlying endometrial pathology and is an indication for histopathological evaluation of the endometrium.[16] [Figure 9]

If cut off value of 12mm is applied for our study, sensitivity, specificity PPV, NPV and diagnostic accuracy is 84.1%, 64.5%, 82.6%, 71.4% and 71.4%. Priya Thakur et al,[9] in their study compromising of 48 women of perimenopausal age group presenting

with AUB, have found that Sensitivity and Specificity to be 61.9 % and 77.8% respectively($p<0.048$). Our study, including women of all age group has better Sensitivity, Specificity, PPV, NPV and Diagnostic Accuracy of 91.3%, 88.2%, 86.8%, 90% and 88.7% respectively ($p<0.001$) when cutoff value of 14mm was applied as compared to cutoff value of 12mm. [Figure 10]

CONCLUSION

Transvaginal Sonography is the initial diagnostic modality in assessment of patients presenting with AUB. It is inexpensive, non- invasive way to visualize the endometrium and endometrial cavity. Transvaginal sonography can predict normal and abnormal endometrium with overall Sensitivity, Specificity, PPV, NPV and Diagnostic Accuracy of 91.2%, 98.3%, 89.7%, 84% and 87.7%. Type B endometrial pattern is associated with more endometrial abnormalities as compared to Type A endometrial pattern. A cut off value of l4mm gives higher Sensitivity, Specificity, PPV, NPV And Diagnostic Accuracy of 91.3%, 88.2%, 86.8%, 90% and 88.7% respectively ($p<0.001$).

REFERENCES

1. Sharma A, Dogra Y. Trends of AUB in tertiary centre of Shimla hills. J Midlife Health. 2013 Jan;4(1):67–8. doi:10.4103/0976-7800.109648. PMID: 23833543; PMCID: PMC3702075.
2. Mahajan N, Aggarwal M, Bagga A. Health issues of menopausal women in North India. J Midlife Health. 2012 Jul;3(2):84–7. doi:10.4103/0976-7800.104467. PMID: 23372325; PMCID: PMC3555032.
3. Kumar P, Malhotra N. Clinical types of abnormal uterine bleeding. In: Kumar P, editor. Jeffcoate's Principles of Gynecology. 7th ed. New Delhi: Jaypee Brothers Medical Publishers (P) Ltd.; 2008. p. 599.
4. Dubinsky TJ. Value of sonography in the diagnosis of abnormal vaginal bleeding. J Ultrasound Med. 2004;32(3):348-353.
5. Crosbie E, Morrison J. The emerging epidemic of endometrial cancer: time to take action. Cochrane Database Syst Rev. 2014 Dec 22;(12):ED000095.
6. Fleischer AC, Kalemeris GC, Machin JE, Entman SS, James AE. Sonographic depiction of normal and abnormal endometrium with histopathology correlation. J Ultrasound Med. 1986;5(8):445-52. doi:10.7863/jum.1986.5.8.445.
7. Chen S, Wu PR, Luo C, et al. Combined analysis of endometrial thickness and pattern in predicting the outcome of in vitro fertilization and embryo transfer. Reprod Biol Endocrinol. 2010;8:30.
8. Begum NA, Chandra LHC, Pukale RS. Evaluation of endometrial thickness with TVS in perimenopausal women presenting with AUB and correlation with HPE findings. Int J Reprod Contracept Obstet Gynecol. 2019;8(11):4496-4502.
9. Thakur P, Duggal BS, Santosh Siddid, et al. A prospective comparative study of endometrial thickness by transvaginal sonogram and its correlation with histopathology in perimenopausal women with abnormal uterine bleeding. Sch Int J Obstet Gynec. 2017;4(5):202-209.
10. Kotdawala P, Kotdawala S, Nagar N. Evaluation of endometrium in peri-menopausal abnormal uterine bleeding. J Mid-life Health. 2013;4(1):16–21.
11. Singh M, Sachan R, Yadav A. Significance of endometrial thickness on TVS in heavy menstrual bleeding. J Curr Res Sci Med. 2019;5(1):28-32.
12. Munro MG, Critchley HO, Broder MS, Fraser IS. FIGO classification system (PALM-COEIN) for causes of abnormal uterine bleeding in non-gravid women of reproductive age. Int J Gynaecol Obstet. 2011;113(1):3-13.
13. Vaidhya R, et al. Prevalence of abnormal uterine bleeding and its associated risk factors in women of perimenopausal age group: a retrospective study. J Clin Diagn Res. 2022 Dec;16(12)
14. Ratnani R, Meena NA. Clinico-pathological analysis of cases of abnormal uterine bleeding according to PALM-COEIN classification: study based in a rural teaching hospital of Central India. J Med Sci Clin Res. 2017;5(9):28196-28200.
15. Lee SC, Kaunitz AM, Sanchez-Ramos L, Rhatigan RM. The oncogenic potential of endometrial polyps: a systematic review and meta-analysis. Obstet Gynecol. 2010;116(5)
16. Sahu H, Varma AV, Karmarkar S, et al. Endometrial histopathology in abnormal uterine bleeding and its relation with thyroid profile and endometrial thickness. Cureus. 2023 Apr 21;15(4):e37931. doi:10.7759/cureus.37931.
17. Nair R, Mallikarjuna M. Clinical profile of patients with abnormal uterine bleeding at a tertiary care hospital. Int J Reprod Contracept Obstet Gynecol. 2015;4(6):1753-7.
18. Pillai SS. Sonographic and histopathological correlation and evaluation of endometrium in perimenopausal women with abnormal uterine bleeding. Int J Reprod Contracept Obstet Gynecol. 2014 Mar;3(1):113-7.
19. Mathew M, Gupta R, Krolikowski A. Role of transvaginal ultrasonography and diagnostic hysteroscopy in the evaluation of patients with abnormal uterine bleeding. Int J Gynaecol Obstet. 2000;71(3):251-63.