

# Comparative Study of Transvaginal Sonography and Hysteroscopy for the Detection of Endometrial Lesions in Women with Abnormal Uterine Bleeding in Perimenopausal Age Group

<sup>1</sup>Amruta Gadge, <sup>2</sup>Neema Acharya, <sup>3</sup>Samarth Shukla, <sup>4</sup>Suresh Phatak

## ABSTRACT

**Aim:** The aim of the study is to compare the diagnostic accuracy of transvaginal ultrasound and hysteroscopy correlated with histopathology in evaluation of endometrial lesions in perimenopausal women with abnormal uterine bleeding.

**Settings and design:** A cross-sectional study done in Department of Gynecology, from August 2015 to June 2017.

**Materials and methods:** A total of 100 perimenopausal women with abnormal uterine bleeding (AUB) were included in the age group 40 to 55 years. Transvaginal ultrasound (TVS), hysteroscopy and endometrial biopsy were performed on all patients. Findings were compared with histopathological examination taken as gold standard.

**Results:** Menorrhagia was most common bleeding pattern seen in 44% cases. The TVS findings in correlation with HPE where fibroid and hyperplasia with polyp were 100% diagnosed while hyperplasia, polyp and normal findings were diagnosed 53.33%, 88.89% and 53.33% respectively. Hysteroscopy findings in correlation with HPE where fibroid, hyperplasia and hyperplasia with polyp were 100% diagnosed while polyp and normal findings were diagnosed 83.33%, 73.33% respectively. Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy of TVS and hysteroscopy were 82.05%, 72.73%, 91.43%, 53.33%, 80% and 89.74%, 100%, 100%, 73.33%, 92% respectively.

**Conclusion:** We conclude that TVS is a good diagnostic initial modality for the diagnosis of endometrial lesions in AUB. But hysteroscopy should be done as a basic investigation even in cases where TVS is normal and endometrial biopsy should be taken where hysteroscopy shows normal findings.

**Keywords:** Endometrial polyp, Hysteroscopy, Submucous fibroid, Transvaginal ultrasound (TVS).

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## INTRODUCTION

World Health Organization (WHO) defines perimenopause as 2 to 8 years of the time period preceding menopause and the 1-year post final menses. About 20 to 25% of gynecological out patient department (OPD) visits are related to AUB.<sup>1</sup> In perimenopausal women, AUB is diagnosed when there is a substantial change in frequency, duration or amount of bleeding during or between periods. The percentage goes to almost 69% in a given age group.<sup>2,3</sup>

These women with abnormal uterine bleeding may present with different clinical scenarios like anemia, pain, or infertility.<sup>4</sup> Ultrasonography, hysteroscopy, and dilation and curettage (D and C) are the traditional diagnostic modalities.<sup>5</sup> Most of these abnormalities are related to endometrial cavity lesions. Endometrial abnormalities are challenging to diagnose only by ultrasound. For the evaluation of AUB, TVS is a main diagnostic modality as the initial step.<sup>6</sup> Almost in one-sixth of these perimenopausal patients, endometrial lesions are missed or are not diagnosed when TVS is used alone. With recent advances in minimally invasive gynecology, hysteroscopy is an emerging tool and recommended to evaluate the endometrium in perimenopausal women with abnormal bleeding further when ultrasound is normal.<sup>7,8</sup>

Hence the aim of this study is, therefore, to compare hysteroscopy with transvaginal sonography in detecting the endometrial lesions leading to AUB in perimenopausal age group.

<sup>1</sup> Junior Resident <sup>2-4</sup> Professor

<sup>1,2</sup> Department of Obstetrics and Gynecology, Jawaharlal Nehru Medical College, Sawangi (Meghe), Wardha, Maharashtra, India

<sup>3</sup> Department of Pathology, Jawaharlal Nehru Medical College, Sawangi (Meghe), Wardha, Maharashtra, India

<sup>4</sup> Department of Radiology, Jawaharlal Nehru Medical College, Sawangi (Meghe), Wardha, Maharashtra, India

**Corresponding Author:** Neema Acharya, Professor, Department of Obstetrics and Gynecology, Jawaharlal Nehru Medical College, Sawangi (Meghe), Wardha, Maharashtra, India, e-mail: neemasacharya@gmail.com

## AIM

The study aims to compare the diagnostic accuracy of two-dimensional (2D) transvaginal ultrasound and hysteroscopy correlated with histopathology in an evaluation of endometrial lesions in perimenopausal women with AUB.

## OBJECTIVES

- To study the findings of transvaginal sonography in cases of AUB in the perimenopausal age group to detect endometrial lesions
- To study the findings of hysteroscopy in cases of AUB in the perimenopausal age group to detect endometrial lesions
- To compare findings of 2D TVS with hysteroscopy in diagnosing endometrial lesions
- To correlate the accuracy of both with histopathology as a standard of final diagnosis.

## MATERIALS AND METHODS

The present study was a cross-sectional study conducted in Department of Obstetrics and Gynecology at Acharya Vinoba Bhave Rural Hospital, Sawangi (Meghe), Wardha over a period of 2 years extending from August 2015 to June 2017.

The patients included had the following criteria:

### Inclusion Criteria

- Perimenopausal age group (40–55 years)
- Having abnormal uterine bleeding

### Exclusion Criteria

- Patients not giving consent
- Evident drug intake or general cause that can lead to vaginal bleeding
- Vaginal, vulval or cervical causes of bleeding

### Intervention

- All the patients were hospitalized.
- All the patients were subjected (detailed clinical history, clinical examination including general, abdominal and Pelvic examination in the form of bimanual and speculum examination) to detect any abnormal findings and to exclude any local cause of bleeding.
- Laboratory investigations including complete blood count (CBC), coagulation profile, random blood sugar (RBS), liver, and kidney function tests (KFT).

- All patients underwent TVS followed by postmenstrual hysteroscopy.
- Two dimensional (2D) TUS using a general electric ultrasound machine with a transvaginal probe (GE 6.5 MHz) measuring the uterine size and endometrial thickness is done.
- The hysteroscopic examination was done with 2.9 mm diagnostic telescope and procedure was done under general anesthesia. Gross endometrial lesions like polyps, fibroids, hyperplasia, and abnormal vascular patterns were noted. In indicated cases, hysteroscopic guided biopsy or polypectomy was done.
- Diagnostic hysteroscopy was carried out to all patients under general anaesthesia by an operator who is blinded to the ultrasound findings. Standard guidelines for diagnostic hysteroscopy were followed for the operative procedure.
- The results of the 2D ultrasound and hysteroscopy are compared with histopathology findings.
- All the specimens are placed in formalin 10% and sent for histopathological correlation.
- Paraffin tissue blocks were prepared, and 3 to 4 micrometer thick sections were cut and stained with routine hematoxylin and eosin. A detailed histological study was carried out, and the findings were noted.
- The results of the ultrasound report and hysteroscopy were compared with final histopathology report.

## STATISTICAL ANALYSIS

Statistical analysis was done by using descriptive and inferential statistics using Chi-square test, sensitivity, specificity, PPV, NPV and accuracy and software used in the analysis were Statistical Package for the Social Sciences (SPSS) 22.0 version and Graph Pad Prism 6.0 version and  $p < 0.05$  is considered as the level of significance ( $p < 0.05$ ).

## OBSERVATIONS AND RESULTS

### Results

A total of 100 women giving consent for this study are enrolled from August 2015 to June 2017. Table 1 shows the

**Table 1:** Demographic distribution of women

Parameter	Most common finding	Percentage (%)
Age group	40 to 44 years (44.34 ± 4.13) (40–55 years)	45
Parity	Multiparous women	71
Bleeding pattern	Menorrhagia	44
Duration of symptoms	< 6 months	53
Previous cycles	Irregular	60%

**Table 2:** USG findings in correlation to HPE findings

USG findings	HPE findings	No of patients	Percentage (%)
Fibroid (n = 10)	Fibroid	10	100
Hyperplasia (n = 30)	Fibroid	4	13.33
	Hyperplasia	16	53.33
	Polyp	4	13.33
	Normal	6	20.00
Hyperplasia + polyp (n=12)	Hyperplasia + polyp	12	100
Polyp (n = 18)	Hyperplasia	2	11.11
	Polyp	16	88.89
Normal (n = 30)	Atrophic endometrium	6	20.00
	Hyperplasia	6	20.00
	Hyperplasia+polyp	2	6.67
	Normal	16	53.33

demographic parameters of these patients. Most common age group was 40 to 44 years, mean age being 44.34 ± 4.13 years. Seventy-one percent of cases were multiparous, i.e., para 2 and 3. Menorrhagia was the most common bleeding pattern seen in 44% of cases. Fifty-three patients had symptoms for less than 6 months before seeking a medical opinion. Sixty percent of patients had previous irregular menstrual cycles.

Table 2 shows TVS findings in correlation with HPE where fibroid and hyperplasia with polyp were 100% diagnosed while hyperplasia, polyp, and normal findings were diagnosed 53.33%, 88.89%, and 53.33% respectively.

Table 3 shows mean ET in cases is 10.22 ± 3.08 mm. In cases with atrophic endometrium, it is 8.66 ± 3.14 in mm. Mean ET in fibroid is 10.07 ± 2.81 mm. Mean ET in cases with hyperplasia is 10.16 ± 2.66 mm. Mean ET in cases with hyperplasia with polyp is 11.35 ± 2.46 mm; in polyp 12.15 ± 2.36 mm and in normal cases is 8.31 ± 3.46 mm.

Table 4 shows hysteroscopy findings in correlation with HPE where fibroid, hyperplasia, and hyperplasia with polyp were 100% diagnosed while polyp and normal findings were diagnosed with 83.33%, 73.33% respectively.

**Table 4:** Sensitivity and specificity of USG and HPE findings

USG findings	HPE findings		x <sup>2</sup> -value	p-value
	Positive	Negative		
Positive	64	6	24.52	0.0001,S
Negative	14	16		
Total	78	22		
Sensitivity	82.05% (71.72–89.83%)			
Specificity	72.73% (49.78–89.27%)			
PPV	91.43% (82.27–96.79%)			
NPV	53.33% (34.33–71.66%)			
Accuracy	80%			

**Table 3:** Endometrial thickness in various histopathological findings

HPE findings	No of women	ET			Mean ± SD
		< 6 MM	6–12 MM	> 12 MM	
Atrophic endometrium	6	1	4	1	8.66 ± 3.14
Fibroid	14	0	12	2	10.07 ± 2.81
Hyperplasia	24	0	20	4	10.16 ± 2.66
Hyperplasia+ polyp	14	0	10	4	11.35 ± 2.46
Polyp	20	0	10	10	12.15 ± 2.36
Normal	22	3	16	3	8.31 ± 3.46
Total	100	4	72	24	10.22 ± 3.08

Table 5 shows sensitivity, specificity, positive predictive value; negative predictive value and accuracy of TVS as compared to histopathological findings were 82.05%, 72.73%, 91.43%, 53.33% and 80% respectively which statistically significant (0.0001, S).

Table 6 shows sensitivity, specificity, positive predictive value; negative predictive value and accuracy of hysteroscopy as compared to histopathological findings were 89.74%, 100%, 100%, 73.33% and 92% respectively which statistically significant (0.0001, S).

**Table 5:** Hysteroscopy findings in relation with HPE findings

Hysteroscopy findings	HPE findings	No. of patients	Percentage (%)
Fibroid (n = 14)	Fibroid	14	100
Hyperplasia (n = 18)	Hyperplasia	18	100
Hyperplasia + Polyp (n = 14)	Hyperplasia + polyp	14	100
Polyp (n = 24)	Polyp	20	83.33
	Hyperplasia	4	16.66
	Normal	22	73.33
Normal (n = 30)	Atrophic endometrium	6	20
	Hyperplasia	2	6.66

**Table 6:** Sensitivity and specificity of hysteroscopy and HPE findings

Hysteroscopy Findings	HPE Findings		x <sup>2</sup> -value	p-value
	Positive	Negative		
Positive	70	0	65.81	0.0001,S
Negative	8	22		
Total	78	22		
Sensitivity	89.74% (80.79–95.47%)			
Specificity	100% (84.56–100%)			
PPV	100% (94.87–100%)			
NPV	73.33%(54.11–87.72%)			
Accuracy	92%			

**Table 7:** Accuracy rates of TVS with hysteroscopy

TVS	Hysteroscopy	
Sensitivity	82.05%	89.74%
Specificity	72.73%	100%
PPV	91.43%	100%
NPV	53.33%	73.33%
Accuracy	80%	92%

Table 7 shows comparison of sensitivity, specificity, PPV, NPV and accuracy of TVS and hysteroscopy to be 82.05%, 72.73%, 91.43%, 53.33%, 80% and 89.74%, 100%, 100%, 73.33%, 92% respectively.

## DISCUSSION

The present study was conducted in the Department of Obstetrics and Gynecology, Acharya Vinoba Bhave Rural Hospital, Jawaharlal Nehru Medical College Sawangi (Meghe), Wardha on 100 patients fulfilling the inclusion criteria.

As shown in Table 1, the common age group in our study was 40-44 years among 40-55 age group. Desai et al.<sup>9</sup> did their study with age interval 40-56 years. In a study done by Mahapatra et al.<sup>10</sup> on clinicopathological evaluation of AUB, they found that AUB was commonly seen among 40 to 45 years of age group.

In our study, the highest incidence of AUB was seen in multiparous, i.e., para 2 and 3 (71%). It is in concordance with the result of the study done by Joshi et al.<sup>11</sup> in which they found 61.5 % of multiparous patients and 21.2% nulliparous patients in a study of a histopathological audit of the endometrium. Khan et al.<sup>12</sup> did a study on 500 patients with abnormal uterine bleeding and found that 54% were multiparous and 5.4% were nulliparous which is similar to our study. In our study, the commonest bleeding pattern seen in patients is menorrhagia (44%) followed by menometrorrhagia (24%). It is in accordance with the study done in 2011 on 60 patients, in which the commonest bleeding pattern was menorrhagia (40%) followed by menometrorrhagia in 34%. With regards to the pattern of bleeding, Bhosle et al.<sup>13</sup> stated that maximum incidence was of menorrhagia (53.3%), followed by 28.2% and 12.2% with polymenorrhea and intermenstrual bleeding respectively. The study conducted by Rifat et al.<sup>14</sup> reported 47.2% of cases with menorrhagia, which is similar to our study.

As shown in Table 2, when we compared TVS findings with HPE findings, we found that normal cases and hyperplasia cases were maximum. In a study done by Sharma et al.,<sup>15</sup> maximum cases were seen having normal endometrium in USG findings comprising 38% of patients while hyperplasia is seen in 22% patients and polyp in 6% patients which is almost similar to our study. Out of 30 normal cases that were diagnosed

by TVS, actual normal histopathology was found in 16 cases, and rest cases had histopathology suggestive of atrophic endometrium in 6 cases, hyperplasia in 6 cases and hyperplasia with polyp in two cases. Out of 30 cases of hyperplasia diagnosed in TVS, 16 were having a histopathological diagnosis as hyperplasia, four were suggestive of fibroids and six cases having normal histology. In 18 cases of polyps diagnosed in TVS, 16 were confirmed as endometrial polyps in HPE while rest 2 cases had hyperplasia which TVS failed to diagnose.

In our study, as shown in Table 3, mean ET was found to be  $10.22 \pm 3.08$  (2-16 mm). Maximum patients had ET between 6-12 mm. It is similar to a study done by Pyari et al.<sup>16</sup> where they found maximum patients had ET between 6-10 mm on TVS. Pyari et al.<sup>16</sup> found mean endometrial thickness of  $17.1 \pm 2.10$  mm in endometrial hyperplasia,  $10.5 \pm 2.89$  mm in endometrial polyps,  $8.76 \pm 1.87$  mm in the functional endometrium. Pillai et al.<sup>17</sup> found that on TVS examination, an endometrial thickness between 5 and 9.9 mm is common. Mean ET was found to be  $10.22 \pm 3.08$  (2-16 mm). When we compare endometrial thickness by ultrasound, we found mean  $\pm$  SD endometrial thickness was  $12.15 \pm 2.36$  in an endometrial polyp,  $10.16 \pm 2.66$  in endometrial hyperplasia,  $10.07 \pm 2.81$  in fibroid,  $11.35 \pm 2.46$  in hyperplasia + polyp and  $8.31 \pm 3.46$  in normal uteri. This is in concurrence with Deckardt et al.<sup>18</sup> who studied the histological diagnosis and related endometrial thickness obtained by endovaginal scanning in a similar study comparing TVS, hysteroscopy, and D and C for the diagnoses of intrauterine pathology in 1286 women complaining of perimenopausal bleeding.

As shown in Table 4, when we compared hysteroscopy findings with HPE findings, we found that hysteroscopy was able to diagnose fibroids, hyperplasia, and hyperplasia with a polyp in 100% cases each while polyps were diagnosed in 83.33% each and normal findings in 73.33%. El-Khayat et al.<sup>19</sup> found that hysteroscopy was able to diagnose fibroids, normal findings and polyps in 100% cases, hyperplasia in 66.66% of cases and hyperplasia with polyps in 85.17% cases. Out of 30 cases diagnosed as normal in hysteroscopy, HPE confirmed as normal in 22 cases, atrophic endometrium in six, and hyperplasia in two cases. Out of polyp diagnosed in 24 cases on hysteroscopy, HPE confirmed the diagnosis in 20 cases while remaining cases were having hyperplasia.

As shown in Table 5, in our study, TVS has 82.05% sensitivity, 72.73% specificity, 91.43% positive and 53.33% negative predictive value in correlation to HPE. It's in accordance with the study done by Vitner et al.<sup>20</sup> in a comparative study between ultrasonography and hysteroscopy in the diagnosis of uterine pathology. Their

results showed that ultrasound has 93% sensitivity, 58% specificity, 84.3% positive and 78.3% negative predictive value. Similarly, Ryu et al.<sup>21</sup> concluded that the sensitivity and specificity for TVS were 79.0% and 45.8% which is in similar to our study.

As shown in Table 6, our study confirms the sensitivity of 89.74%, specificity of 100%, the positive predictive value of 100% and negative predictive value of 73.33% of hysteroscopy. It is in accordance with the study done by Ryu et al.<sup>21</sup> studied 105 patients complaining of AUB, the patients were initially evaluated on the same day with both TVS and hysteroscopy, hysteroscopy with biopsy, curettage or hysterectomy was performed, and the results of TVS and hysteroscopy examination were correlated with the pathological findings. The sensitivity and specificity were 79.0% and 45.8% for TVS, and 95.1% and 83.3% for hysteroscopy, respectively. The study done by Tandulwadkar et al.<sup>22</sup> showing the sensitivity of hysteroscopy was 97%, and specificity was 98.66% while the sensitivity of TVS was found to be 79%. They concluded that hysteroscopy is highly accurate for evaluating endometrial pathology.

In Table 7, we found that hysteroscopy (92%) was a little more accurate than TVS (80%). Vasanthi et al.<sup>23</sup> found sensitivity and specificity were 66.7% and 75% respectively for TVS. PPV, NPV and accuracy were 74%, 95% and 68% respectively for TVS. Our study showed sensitivity and specificity were 82.05% and 72.73% respectively for TVS. PPV, NPV and accuracy were 91.43%, 53.33% and 80% respectively for TVS. Choudhari et al.<sup>24</sup> found sensitivity and specificity were 98.3% and 80.5% respectively for hysteroscopy. PPV, NPV and accuracy were 89.7%, 96.7% and 91.8% respectively for hysteroscopy. Our study showed sensitivity and specificity were 89.74% and 100% respectively for hysteroscopy. PPV, NPV and accuracy were 100%, 73.33% and 92% respectively for hysteroscopy.

## CONCLUSION

We compared the diagnostic accuracy of two-dimensional transvaginal ultrasound and hysteroscopy correlated with histopathology in an evaluation of uterine cavity lesions in perimenopausal women with abnormal uterine bleeding.

The sensitivity of hysteroscopy was 89.74%, and that of TVS was 82.05%.

Hysteroscopy was highly specific (100%) as compared to TVS. Specificity of TVS was only 72.73%.

Positive predictive value of hysteroscopy was 100%, and TVS was 91.43%.

Negative predictive value of hysteroscopy though was less, i.e., 73.33%, it was significantly higher as compared to that of TVS.

The accuracy of hysteroscopy was 92%, and it was significantly higher than accuracy of TVS which was 80%.

We conclude that TVS is a good initial noninvasive diagnostic modality for the diagnosis of endometrial lesions in AUB. But hysteroscopy should also be done along with it as basic investigation even in cases where TVS report is normal. Hysteroscopic guided endometrial biopsy should be mandatory even if the hysteroscopy findings are normal as few of the cases may have abnormal histopathology report.

## LIMITATIONS

The study was done in a limited age group, and only endometrial lesions were assessed in this study. Hence the accuracy of these modalities in other causes of AUB in other age groups was beyond the scope of our study.

## RECOMMENDATIONS

Hysteroscopy should be used in AUB in perimenopausal age group. It should be the part of basic investigations of AUB in perimenopausal age group more so in cases where no pathology was found in sonography. Added advantage of hysteroscopy is the simultaneous treatment of endometrial lesions.

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