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Comparison Between Endometrial Thickness by TVS and Endometrial Histopathology in Postmenopausal Women

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Abstract

Background: The ability to observe the female reproductive organs up close, which is not possible with transabdominal ultrasonography, makes transvaginal ultrasound imaging distinctive. Additionally, this is a closer-up imaging technique without the use of ionizing radiation, in contrast to computer tomography (CT).

Aim and objectives: To compare endometrial histology with TVS for the purpose of diagnosing endometrial pathology, if any is present.

Subjects and methods: The current investigation was carried out at the Al-Azhar University Hospitals' obstetrics and gynecology clinics. The Study duration started from September 2022 until September 2023. In this study, 50 postmenopausal women received TVS and endometrial biopsy, depending on the indication.

Result: The patients' mean age was 58.63 ± 7.12 years, and their mean BMI was 27.54 kg/m^2 which represents 56.5% of the patients whom from rural areas. TVS showed a significant sensitivity (81.4%) and specificity (73.2%) in diagnosing endometrial disease based on endometrial thickness.

Conclusion: TVS is more accurate and detecting endometrial pathology with sensitivity of 81.4% and specificity of 73.2%.

Keywords: Comparison, Endometrial thickness, Histopathology, Postmenopausal women, TVS

1. Introduction

Transvaginal sonography (TVS) is a straightforward, viable, and cost-effective technique utilized in the diagnostic evaluation for identifying abnormalities inside the female genital canal, including endometrial diseases. The TVS is widely regarded as an essential diagnostic tool, and as such, it is commonly utilized by the majority of gynecologists in their routine clinical practice.¹

Despite being launched over 50 years ago, technological improvements have led to the development of high-resolution imaging techniques for seeing the endometrial cavity. These techniques have shown to be crucial in delivering more precise and reliable information about both normal and pathological structures within the cavity.²

The diagnosis of uterine fibroids and endometrial polyps is frequently made by the use of sonographic imaging. In particular, an elevated endometrial thickness, particularly in menopausal women, may indicate the existence of an abnormality within the endometrium. Hence, it is widely acknowledged as the primary diagnostic method for women with abnormal uterine bleeding (AUB).³

The measurement of endometrial thickness (ET) using transvaginal ultrasonography is a common practice in assessing patients with early stages of chronic liver disease, as well as those with abnormalities in the uterus. ET is determined by measuring the maximal anterior-posterior thickness of the endometrial echo along the axis of a transvaginal image of the uterus.⁴

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Postmenopausal women experiencing vaginal bleeding and having an endometrial thickness of less than 5 mm. A measurement of 5 mm is indicative of a significantly elevated risk of endometrial cancer in women experiencing postmenopausal bleeding.⁵

It is recommended that an endometrial biopsy be performed in women aged 35 and above who present with AUB in order to exclude the presence of endometrial cancer or pre-malignant conditions such as typical hyperplasia.⁶

The inclusion of endometrial biopsy is also warranted for women aged 18–35 years experiencing AUB if they possess risk factors for endometrial cancer or if AUB persists despite medical intervention.⁷

The majority of hyperplasia observed in menopausal women is commonly linked to prolonged anovulation. In general, postmenopausal women who have hyperplasia or cancer tend to experience moderate to heavy vaginal bleeding, in contrast to those with atrophic endometrium who may just have minimal spotting per vaginam.⁸

The objective of this study is to analyze the diagnostic accuracy of transvaginal ultrasound (TVS) in comparison to endometrial histology for the evaluation of endometrial pathology.

2. Patients and methods

This prospective observational study will involve a sample of 50 postmenopausal ladies who will have transvaginal ultrasound (TVS) and endometrial histopathology, regardless of the rationale. The participants for this study will be chosen among the attendees of the El-Hussein Obstetrics and Gynecology clinics, which are part of the Al-Azhar University Hospitals' out-patient department. The Study duration started from September 2022 until September 2023. The systematic random method will be employed to obtain the samples. The study protocol has received approval from the Local Ethics Committee, and written informed consents have been collected.

Inclusion criteria: The study will include individuals between the age range of 45–75 years who are seeking gynaecological care, as well as those who have experienced a cessation of monthly flow for a period of at least one year.

Exclusion criteria: Participants who expressed a lack of willingness to engage in the study, did not provide written informed consent, and individuals with bleeding disorders.

2.1. Sample size

This study base on study carried out by *Wanderley et al., 2016*.⁹ The sample size was calculated using

Epi Info STATCALC, taking into account the following assumptions: The statistical analysis was conducted at a 95% two-sided confidence level, with a power of 80% and a margin of error of 5%. The ultimate maximum sample size obtained from the Epi-Info output was 111.

2.2. Methods

2.2.1. Transvaginal sonography (model: philips clear vue)

The evaluation of TVS will be conducted by a proficient gynecologist, under the guidance of a seasoned gynecologist who possesses extensive expertise in the field of sonography. The normal endometrium can be characterized by the presence of an echogenic line positioned centrally, which is clearly distinguishable from the edges of the myometrium.

Pathological conditions were identified when there were aberrant structures exhibiting a range of linings or varying echo-density. The measurement of endometrial thickness in the longitudinal plane will be conducted in accordance with international recommendations. The presence of a heterogenous endometrium with an uneven contact between the endometrium and myometrium, with or without fluid accumulation, may lead to suspicion of endometrial cancer. The loss of the subendometrial halo is observed in cases with invasive uterine cancer. The presence of an intracavitary collection can be visualized within the intrauterine cavity.

2.2.2. Endometrial biopsy

This procedure may be done with or without anesthesia. This is medicine that allows you to sleep during the procedure. You lie on your back with your feet in stirrups, similar to having a pelvic exam. Your health care provider gently inserts an instrument (speculum) into the vagina to hold it open so that your cervix can be viewed. The cervix is cleaned with a special liquid. Numbing medicine may be applied to the cervix. The cervix may then be gently grasped with an instrument to hold the uterus steady. Another instrument may be needed to gently stretch the cervical opening if there is tightness.

An instrument is gently passed through the cervix into the uterus to collect the tissue sample. The tissue sample and instruments are removed. The tissue is sent to a laboratory there, it is examined under a microscope. If you had anesthesia for the procedure, you are taken to a recovery area.

2.2.3. Endometrial histopathology

The Department of Pathology at our hospital will conduct analysis on endometrial samples. The histological specimen, which has been preserved in a solution of 10% formalin, will undergo processing using hematoxylin and eosin staining techniques, followed by visualization under a microscope. The results obtained from the Transvaginal sonography (TVS) will be juxtaposed with the conclusions derived from histopathological analysis.

Uterine curette: Conducted by using 'Blake Universal' model instrument.

2.3. Statistical analysis

The data were gathered, tabulated, and subjected to statistical analysis using SPSS 22.0 for Windows (SPSS Inc., Chicago, IL, USA). The normality of the data was assessed using the Shapiro–Wilk test. The qualitative data were expressed in the form of frequencies and relative percentages. The Chi-square test (χ^2) and Fisher's exact test were employed to assess the disparity between categorical variables, as stated. The quantitative data were presented as the mean \pm standard deviation (SD) for parametric data, and as the median and range for non-parametric data.

All statistical comparisons were conducted using a two-tailed approach to determine significance. A *P* value equal to or less than 0.05 is indicative of statistical significance, a *P* value less than 0.001 suggests a highly significant difference, and a *P* value greater than 0.05 suggests a lack of statistical significance.

3. Result

Table 1.

The presented table illustrates that the average age of the patients was 58.63 ± 7.12 years, accompanied with an average body mass index (BMI) of 27.54 kg/m^2 . The majority of patients in the study sample resided in rural areas, accounting for 56% of the total (Table 2).

This table shows that, 22% of the patients were diabetics, and 38% of the patients were hypertensive (Table 3).

Table 1. The demographic characteristics of the patients under study.

	Patients (<i>n</i> = 50)
Age (years)	
Mean \pm SD	54.63 \pm 6.12
BMI (kg/m ²)	
Mean \pm SD	27.54 \pm 3.65
Residence	
Urban	22 (44%)
Rural	28 (56%)

Table 2. Comorbidities among the patients who were examined.

	Patients (<i>n</i> = 50)
No comorbid	20 (40%)
Diabetes	11 (22%)
Hypertension	19 (38%)

Table 3. Menopausal duration among the patients who were examined.

Menopausal duration	Patients (<i>n</i> = 50)
<5 years	23 (46%)
5–10 years	17 (34%)
>10 years	10 (20%)

This table shows that, 46% of the patients were menopausal <5 years, 34% of the patients were menopausal 5–10 years, and 20% were >10 years (Table 4).

This table shows that, the most prevalent finding was endometrial atrophy (44%) followed by Endometrial polyp (26%) (Table 5).

This table shows that, mean endometrial thickness by TVS was 9.72 ± 6.36 mm (Table 6).

This table shows that, endometrial thickness was significantly highest among endometrial carcinoma followed by endometrial polyp and was lowest among Endometrial atrophy.

Ultrasound pictures of endometrial thickness.

AUC	S.E.	Sig.	95% Confidence Interval	Sensitivity	Specificity
0.753	0.079	0.030	0.598–0.907	81.4%	73.2%

Endometrial thickness by TVS was significant in detecting endometrial pathology with sensitivity of 81.4% and specificity of 73.2% (Tables 7 and 8).

The presented table demonstrates that transvaginal ultrasound (TVS) is a statistically significant method for detecting endometrial disease, as indicated by the sensitivity of 75% and specificity of

Table 4. Histopathology findings among the patients who were examined.

Histopathology findings	Patients (<i>n</i> = 50) N (%)
Endometrial atrophy	22 (44)
Endometrial hyperplasia	10 (20)
Endometrial polyp	13 (26)
Endometritis	3 (6)
Endometrial carcinoma	2 (4)

Table 5. Endometrial thickness by TVS among studied patients.

	Patients (<i>n</i> = 50)
Endometrial thickness (mm)	
Mean \pm SD	9.72 \pm 6.36

Table 6. Endometrial thickness according histopathology findings among studied patients.

Endometrial thickness (mm) Mean \pm SD	Patients (n = 50)
Endometrial atrophy	3.76 \pm 1.59
Endometrial hyperplasia	12.85 \pm 6.43
Endometrial polyp	14.94 \pm 7.23
Endometritis	12.37 \pm 0.812
Endometrial carcinoma	20.81 \pm 9.54
P value	<0.001

Table 7. Diagnosis accuracy of TVS vs histopathology in detecting endometrial pathology among the studied patients.

TVS	Histopathology		Total	P
	Abnormal	Normal		
Abnormal	21 (73.3%)	5 (18.2%)	26 (52%)	<0.001
Normal	7 (10.7%)	17 (81.8%)	24 (48%)	
Total	28 (100%)	22 (100%)	50	

Table 8. Endometrial pathology thickness values among the patients who were examined.

Statistic	Value	95% CI
Sensitivity	75%	55.13%–89.31%
Specificity	77.27%	54.63%–92.18%
Positive Predictive Value	80.77%	65.37%–90.33%
Negative Predictive Value	70.83%	55.15%–82.75%
Accuracy	76%	61.83%–86.94%

77.3%. Additionally, the positive predictive value (PPV) was found to be 80.8% and the negative predictive value (NPV) was 70.8%, resulting in an overall accuracy of 76%.

4. Discussion

Our results supported with Paçarada et al. (2009).¹⁰ The individuals who documented that patients exhibiting an endometrial thickness of less than 3 mm displayed histological observations consistent solely with residual endometrial proliferation. There was a consistent decline in nonpathological results as the endometrial thickness increased, and it was observed that an endometrial thickness of 7 mm was exclusively related with pathological findings.

Also our results supported with Tsikouras et al. (2007).¹¹ The objective of their study was to conduct a retrospective evaluation of the efficacy of TVS in detecting endometrial illness in asymptomatic postmenopausal women. The research encompassed a cohort of 750 women who had reached menopause and were between the ages of 52 and 65, with a mean age of 58.5.

Also our results supported with Beeresh et al. (2019).¹² The objective of their research was to assess the utility of TVS as the primary diagnostic tool for

evaluating postmenopausal hemorrhage, with biopsy as gold standard. Age distribution ranged between 42 and 72 yrs. Most of the women belonged to 46–50 yrs of age (30%), 76% of women were below 60 yrs of age.

Also our results supported with Syed et al. (2023)¹³ who aimed to assess the histopathological profile of endometrial thickness and serum LDH in women with post-menopausal bleeding. Total 101 women were selected. The age of menopause was between 40 and 45 years in 15.8% of the women, 39.5% of women were between 45 and 50 years and 44.5% were above 50 years of age.

In our current study showed that the most prevalent finding according histopathology findings was endometrial atrophy (44%) followed by endometrial polyp (26%) followed by endometritis, endometrial hyperplasia followed by endometrial atrophy.

Our results supported with Paçarada et al. (2009).¹⁰ The study found that among individuals with an endometrial thickness over 10 mm, histological analysis identified various diseases including hyperplasia, polyposis, carcinomas, and other abnormalities. A total of 23% of the patients had alterations in the structure of atypical hyperplasia, whereas endometrial cancer was detected in 5% of the patient population.

The findings of our present study indicate that the average endometrial thickness, as measured by transvaginal ultrasound (TVS), was determined to be 9.72 \pm 6.36 mm.

Our results supported with Singh et al. (2016).⁶ The individual or group responsible for providing the information regarding the mean endometrial thickness on transvaginal ultrasound (TVS) was not specified. However, it was reported that the mean endometrial thickness on TVS was 5.76 \pm 3.3877 mm, with a range of 2.2–18 mm.

Also Beeresh et al. (2019)¹² reported that the mean endometrial thickness was 3.86 mm and there were no cases of cancer with thin endometrium. All patients with malignancy had an ET more than 12 mm with mean ET of 21 mm. The Mean endometrium in carcinoma endometrium was 21.29 mm.

In our current study showed that endometrial thickness was significantly highest among endometrial carcinoma followed by endometrial polyp and was lowest among endometrial atrophy.

The findings of our present study indicate that transvaginal ultrasonography (TVS) is a valuable tool for diagnosing endometrial pathology, as evidenced by the significant correlation observed between endometrial thickness and such conditions. The sensitivity and specificity of TVS in this regard were determined to be 81.4% and 73.2%, respectively.

Our results supported with Paçarada et al. (2009).¹⁰ The individual who arrived at the determination that the utilization of TVS, in conjunction with histopathology derived from endometrial curettage, can enhance the precision of pathological observations, as well as the discernment of endometrial assessment in postmenopausal females, is not specified.

Also ABDEL-RAHMAN et al. (2021).¹⁴ The researcher determined that the examination of endometrial thickness (ET) and uterine size via transvaginal ultrasound (TVS) is a dependable approach for screening postmenopausal women with postmenopausal bleeding (PMP). There is no evidence of aberrant endometrium in postmenopausal women with an endometrial thickness of less than 4 mm. Conversely, all cases of endometrial carcinoma are associated with an endometrial thickness greater than 9 mm.

Also our results supported with Tsikouras et al. (2007).¹¹ The researchers have reached the conclusion that TVS is an effective and well-received noninvasive technique for promptly identifying endometrial abnormalities in postmenopausal women who do not exhibit any symptoms.

Also Gull et al. (2003).¹⁵ The conclusion drawn by the researchers is that transvaginal sonographic scanning is a highly effective method for determining the need for more study, such as curettage or any sort of endometrial biopsy.

Also our results supported with Park et al. (2019).¹⁶ The individual or group responsible for the determination that transvaginal ultrasound (TVS) is an effective method for detecting endometrial hyperplasia with atypia (EH+) is not specified. However, their findings indicate that using a cut-off value of 8 mm for endometrial thickness (ET) in TVS has a high sensitivity in identifying endometrial diseases. Additionally, this method has the capability to identify women who are extremely unlikely to have EH+, which helps avoid the need for more invasive procedures such as endometrial biopsy.

4.1. Limitations of the study

The present investigation is limited by a small sample size and a relatively brief follow-up period.

4.2. Recommendation

It is recommended that, future studies be conducted using well-designed randomized controlled trials or large, comparative observational studies. The sample size of future studies should be large enough to provide meaningful conclusions and to control for confounding factors.

4.3. Conclusion

TVS and endometrial histopathology are often employed methods for evaluating endometrial thickness and diagnosing endometrial illness. TVS, being a safe, straightforward, noninvasive, and cost-effective technique, is particularly valuable in the diagnostic process of endometrial disease. Furthermore, TVS demonstrates a higher level of accuracy in identifying endometrial disease, exhibiting a sensitivity of 81.4% and a specificity of 73.2%.

Ethics information

The study protocol has received approval from the Local Ethics Committee, and written informed consents have been collected.

Funding

None.

Conflicts of interest

There are no conflicts of interest.

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