



Original Article

Endometrial assessment by transvaginal ultrasonography and correlation with histopathology among post menopausal women

Hari Kishor Shrestha¹, Ram Chandra Adhikari², Khadga Bahadur Shrestha³

¹Consultant Radiologist, Om Hospital & Research Centre Private Limited, Kathmandu, Nepal.

²Department of Pathology, T.U. Teaching Hospital, Maharajgunj, Kathmandu, Nepal.

³Department of Community Medicine & Public Health, Kathmandu, Nepal.

ABSTRACT

Keywords:

Endometrium;
Sonography;
Transvaginal;
Uterine size;

Background: Transvaginal ultrasonography has increased the reliability of imaging diagnosis of women with endometrial pathologies and this technique has become widely used to evaluate endometrial thickness in women with postmenopausal bleeding.

Materials and methods: 359 women presenting with history of at least three months amenorrhea were undergone transvaginal ultrasonography with measurement of endometrial thickness and uterine size. Endometrial biopsies were taken in 69 cases (19.2%) only.

Results: The median age of patients was 53 years with the age range of 42 years to 81 years. Abdominal pain was the commonest symptoms followed by backache. 3/69 cases with histopathological diagnoses had normal sized uterus, while 66 cases had bulky (>6.0 cm) uterus. 58/69 cases showed > 5 mm thick endometrium and the endometrium was abnormal in 31/69 cases. The sensitivity, specificity, positive predictive value and negative predictive value of transvaginal ultrasonography to detect abnormal endometrium were 91.2%, 22.9%, 53.4% and 72.7% respectively. The sensitivity, specificity, positive predictive value and negative predictive value of transvaginal ultrasonography to detect endometrial hyperplasia and carcinoma were 100%, 17.5%, 10.3% and 100% respectively.

Conclusions: Transvaginal sonographic evaluation of endometrial thickness and uterine size is useful for exclusion of endometrial pathology and to avoid unnecessary invasive surgical procedures.

Correspondence:

Dr. Ram Chandra Adhikari, MD

Department of Pathology, T.U. Teaching Hospital

Maharajgunj, Kathmandu, Nepal

ORCID ID: 0000-0002-1605-2898

Email: rcadhikari@hotmail.com

Received : December 29th 2019 ; Accepted : February 2nd 2020

Citation: Shrestha HK, Adhikari RC, Shrestha KB. Endometrial assessment by transvaginal ultrasonography and correlation with histopathology among post menopausal women. J Pathol Nep 2020;10:1613-7DOI: 10.3126/jpn.v10i1.26936

Copyright: This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.



INTRODUCTION

Pelvic ultrasound has been used to evaluate the uterine cavity for fibroids, endometrial thickness, endometrial homogeneity and the presence of abnormal vascularity within the endometrium. The technique has been demonstrated to be reproducible and reliable.¹ However, thereafter many studies have been conducted on the use of transvaginal sonography (TVS) and this technique has become widely used to evaluate endometrial thickness in women with postmenopausal bleeding.²

TVS is an easy, fast and cheap technique to exclude pathologic conditions in the endometrium. The threshold of 5 mm endometrial thickness effectively excludes endometrial abnormalities in postmenopausal patients and even patients on hormone replacement therapy.³⁻⁵ The hallmark of endometrial pathology are heterogeneity and high echogenicity of the endometrium.⁶

As per WHO classification, endometrial epithelial precursors are hyperplasia without atypia and atypical hyperplasia.⁷ Endometrial epithelial tumors are endometrioid carcinoma, mucinous carcinoma, serous carcinoma, clear cell carcinoma, neuroendocrine tumor, mixed cell adenocarcinoma, undifferentiated carcinoma and dedifferentiated carcinoma. Tumor-like lesions mentioned in WHO classification are polyp, metaplasia, Arias-Stella reaction, and lymphoma-like lesion.⁷

The high resolution images obtained with TVS enable the detection of endometrial abnormalities ranging from simple increased endometrial thickness measurements to sophisticated morphologic evaluation of complex endometrial architecture.⁸ The most widely used technique for obtaining a sample of endometrium is the curettage and 80% of all curettage procedures performed for postmenopausal bleeding result in benign diagnoses.^{9,10} So, the use of TVS has been well established to avoid unnecessary curettage with multiple articles published in the literature. This study was an attempt to evaluate the role of TVS in diagnosing endometrial pathologies.

MATERIALS AND METHODS

359 women presenting with history of at least three months amenorrhea were included in this study after written consent. Transvaginal ultrasonography was performed in all cases with measurement of endometrial thickness and uterine size. Any other abnormalities like fibroid or parauterine cyst were also noted. Endometrial biopsies were taken in 69 cases (19.2%) only. Statistical analysis was done using SPSS version 20.

RESULTS

A total of 359 postmenopausal women were undergone TVS. The mean and median age of patients was 55 years and 53 years respectively with the age range of 42 years to 81 years. The maximum numbers of patients were in age group of 50-59 years (79.6%). 284 out of 359 patients visited for

Table 1: Distribution of megakaryocytes in various hematological conditions with thrombocytopenia

Chief complaint	No. of patients (%)
Per vaginal bleeding	93 (32.7%)
Per vaginal discharge	57 (20.1%)
Abdominal pain	135 (47.5%)
Backache	100 (35.2%)
Itching of vulva	19 (6.7%)
Uterovaginal prolapse	20 (7.0%)

one or more complaints and 75 for routine check-up without any clinical symptoms. Abdominal pain is commonest symptoms followed by backache (Table 1). There was history of oral contraceptives intake in 15 patients and 95 patients were hypertensive.

In postmenopausal women, the normal length of uterus is usually between 4-6 cm.¹ In this study, 6 cm was taken as cut-off value. 3 out of 69 cases with histopathological diagnosis have normal sized uterus, while 66 cases had bulky (>6 cm) uterus (Table 2).

The endometrial thickness measured by TVS is tabulated in table 3&4. Fifty-eight out of 69 cases showed more than 5 mm thick endometrium and the endometrium is abnormal in 31 cases. Histopathological examination was done in 69 cases only.

Normal endometrium comprised weakly proliferative endometrium, inactive endometrium, endometrial atrophy and pill effect. The category of abnormal endometrium included endometrial polyp, disordered proliferative endometrium (fig. 1), non-atypical hyperplasia, atypical hyperplasia / endometrial intraepithelial neoplasia (fig. 2) and endometrial carcinoma (fig. 3).

The endometrial thickness of 5 mm was taken as cut-off value for discriminating normal and abnormal endometrium.¹ The sensitivity, specificity, positive predictive value and negative predictive value of TVS to detect abnormal endometrium are 91.2%, 22.9%, 53.4% and 72.7% respectively. In this study, there was single case of endometrial carcinoma having endometrial thickness of 20 mm. The sensitivity, specificity, positive predictive value and negative predictive value of TVS to detect endometrial hyperplasia and carcinoma are 100%, 17.5%, 10.3% and 100% respectively.

Table 5 demonstrates the prediction of endometrial

Table 2: Size of uterus in women with normal and abnormal endometrium

Size of uterus (cm)	No. of women	Normal endometrium Number (%)	Abnormal endometrium Number (%)	Total
<=6 cm	3	3 (4.3)	0 (0)	3
>6 cm	66	8 (11.6)	58 (84.1)	66
Total		11	58	69

2 = 22.1 (p<0.000), highly significant

Table 3: Endometrial thickness in relation to histopathological diagnosis

ET (mm)	WPE	IE	EP	DPE	NAH	AH	EC	EA	PE	Total
<5	3(4.3%)	0(0%)	2(2.9%)	1(1.4%)	0(0%)	0(0%)	0(0%)	4(5.8%)	1(1.4%)	11(15.9%)
5-10	12(17.4%)	1(1.4%)	7(10.1%)	8(11.6%)	2(2.9%)	0(0%)	0(0%)	4(5.8%)	0(0%)	34(49.3%)
>10	7(10.1%)	0(0%)	3(4.3%)	7(10.1%)	1(1.4%)	2(2.9%)	1(1.4%)	0(0%)	3(4.3%)	24(34.8%)
Total	22(31.9%)	1(1.4%)	12(17.4%)	16(23.2%)	3(4.3%)	2(2.9%)	1(1.4%)	8(11.6%)	4(5.8%)	69(100%)

EM: endometrial thickness, WPE: weakly proliferative endometrium, IA: inactive endometrium, EP: endometrial polyp, DPE: disordered proliferative endometrium, NAH: non-atypical hyperplasia, AH: atypical hyperplasia, EC: endometrial carcinoma, EA: endometrial atrophy, PE: pill effect.

Table 4: Prediction of abnormal endometrium using endometrial thickness

Endometrial thickness	Normal endometrium No. of cases (%)	Abnormal endometrium No. of cases (%)	Total (%)
<5 mm	8(11.6)	3(4.3)	11(15.9)
5-10 mm	17(24.6)	17(24.6)	34(49.3)
>10 mm	10(14.5)	14(20.3)	24(34.8)
Total	35(50.7)	34(49.2)	69(100)

Table 5: Prediction of endometrial hyperplasia/carcinoma using endometrial thickness

Endometrial thickness	Carcinoma / Hyperplasia No. of cases (%)	Non-Carcinoma / Non-Hyperplasia No. of cases (%)	Total (%)
<5 mm	0 (0)	11 (15.9)	11 (15.9)
5-10 mm	2(2.9)	32 (46.4)	34 (49.3)
>10 mm	4 (4.8)	20 (29.0)	24 (34.8)
Total	6 (8.7)	63 (91.3)	69 (100)

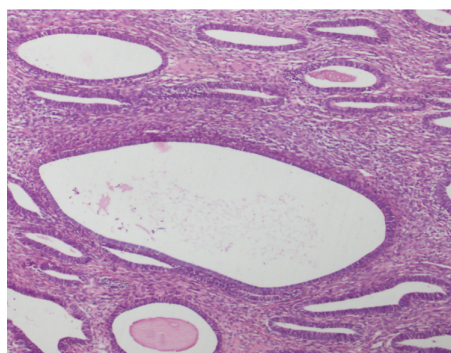


Figure 1: Disordered proliferative endometrium showing cystically dilated endometrial glands (HE stain; X100).

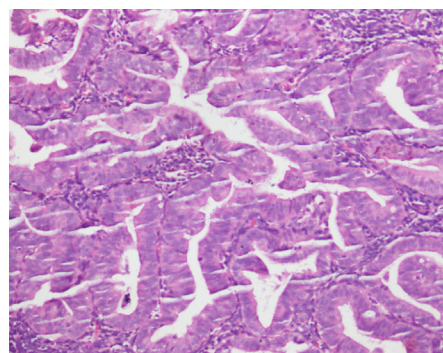


Figure 2: Atypical endometrial hyperplasia (EIN) showing crowded glands and nuclear atypia. (HE stain; X200).

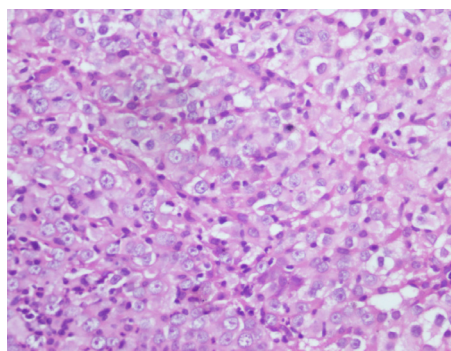


Figure 3: Endometrioid carcinoma showing solid nests and atypical glands (HE stain; X200).

revealed uterine leiomyoma in 65 cases and parauterine cyst in 15 cases.

DISCUSSION

The use of transvaginal sonography in the measurement of endometrial thickness in postmenopausal women with bleeding has been well established, with multiple articles in the literature. Our patients presented with per vaginal bleeding, discharge, abdominal pain, backache, and vulval itching, and uterine prolapse with abdominal pain being the commonest symptom. However, per vaginal bleeding is the commonest symptoms in some studies.^{11,12}

hyperplasia/carcinoma using endometrial thickness. 52 cases of non-carcinoma/non-hyperplasia had less than 5 mm of endometrial thickness and all 6 cases of endometrial carcinoma/hyperplasia had more than 5 mm of endometrial thickness. Thus endometrial carcinoma/hyperplasia can be excluded using endometrial thickness measured by TVS. However, TVS cannot differentiate endometrial hyperplasia/carcinoma from non-hyperplasia/non-carcinoma when endometrial thickness is more than 5 mm. In addition, TVS

Several authors have attempted to define an endometrial thickness cut-off value below which no pathology is found, in the hopes of using this measurement as a screening tool in post-menopausal women with abnormal uterine bleeding.¹³⁻¹⁵ In these studies, the mean endometrial thickness for patients with hyperplasia or carcinoma was greater than for those without pathology. Granberg S et al. recommended 5 mm cut-off limit of endometrial thickness for endometrial abnormality.¹⁶ We have used 5 mm as cut-off

value to discriminate normal from abnormal endometrium or hyperplasia/carcinoma from non-hyperplasia / non-carcinoma group.

The maximum numbers of cases (91.3%) were diagnosed as non-hyperplasia/non-carcinoma histopathologically. None of the cases with less than 5 mm endometrial thickness had diagnosis of hyperplasia or carcinoma. 8.7% cases having more than 5 mm endometrial thickness were diagnosed as either hyperplasia or carcinoma. A case of endometrial carcinoma had 20 mm thick endometrium in this study. Similarly in a study of Bano I et al., 75% cases with endometrial thickness of 20 mm were diagnosed as endometrial carcinoma.¹⁷ Thus, incidence of endometrial carcinoma is high when endometrium was more than 20 mm thick.

Bano I et al. used 4 mm of endometrial thickness as cut-off value and found 91% sensitivity and 94% positive predictive value for detecting abnormal endometrium.¹⁷ In this study, using 5 mm cut-off value the sensitivity and positive predictive value were 91.2% and 53.4% respectively. We found 100% sensitivity and 100% negative predictive value of TVS in detecting carcinoma or hyperplasia, which is similar to the study of Bano I et al. Another study reported 100% sensitivity, 61% specificity, 39% positive predictive value and 100% negative predictive value.¹⁸ Thus, endometrial thickness can be used as a reliable method for excluding malignancy in post-menopausal women with less than 5 mm thick endometrium, but it cannot differentiate between benign and malignant endometrium when endometrium is more than 5 mm thick. Similarly the predictability of endometrial thickness is high to discriminate normal & abnormal endometrium. In this study, the sensitivity, specificity, positive predictive value and negative predictive value of TVS in discriminating normal and abnormal endometrium were 91.2%, 22.9%, 53.4% and 72.7%.

TVS is equally useful to determine the size of uterus. In this study, the cut-off value of uterine size was 6 cm to predict normal and abnormal endometrium. None of the women with less than 6 cm uterus had abnormal endometrium. 84.1% post-menopausal women with abnormal endometrium had more than 6 cm uterus. So, the measurement of uterine size by TVS may also aid in discriminating normal and abnormal endometrium.

Thus, postmenopausal women with less than 6 cm uterus and less than 5 mm thick endometrium do not need any invasive surgical procedures like curettage as there is no or little possibility to have abnormal endometrium.

CONCLUSIONS

Transvaginal sonographic evaluation of endometrial thickness and uterine size is a reliable method of screening post-menopausal women. It is useful for exclusion of

endometrial pathology and 5 mm endometrial thickness threshold used conventionally helps to avoid unnecessary invasive surgical procedures.

Conflict of interest: None

REFERENCES

1. Alcazar JL, Zornova A. Transvaginal ultrasonographic measurement of endometrial thickness: an intra-observer and interobserver reproducibility study. *Radiography* 2001;7:101-4. Crossref
2. Smith-Bindman R, Kerlikowske K, Feldstein VA, Subak L, Scheidler J, Segal M, et al. Endovaginal ultrasound to exclude endometrial cancer and other endometrial abnormalities. *JAMA* 1998;280:1510-7. Crossref
3. Aleem F, Predanic M, Calame R, Moukhtar M, Pennisi J. Transvaginal color and pulsed doppler sonography of the endometrium: A possible role in reducing the number of dilatation and curettage procedures. *J Ultrasound Med* 1995;14:139-45. Crossref
4. Dijkhuizen FP, Brolmann HA, Potters AE, Bongers MY, Heinz AP. The accuracy of transvaginal ultrasonography in the diagnosis of endometrial abnormalities. *Obstet Gynecol* 1996;87:345-9. Crossref
5. Nasri MN, Shepherd JH, Setchell ME, Lowe DG, Chard T. The role of vaginal scan in measurement of endometrial thickness in postmenopausal women. *Br J Obstet Gynaecol* 1991;98:470-5. Crossref
6. Weigel M, Friese K, Strittmatter HJ, Melchert F. Measuring the thickness – is that all we have to do for sonographic assessment of endometrium in postmenopausal women? *Ultrasound Obstet Gynecol* 1995;6:97-102. Crossref
7. Lerner JP, Timor-Tritsch IE, Monteagudo A. Use of transvaginal sonography in the evaluation of endometrial hyperplasia and carcinoma. *Obstet Gynecol Surv* 1996;51:718-25. Crossref
8. Grimes D. Dilatation and curettage: A reappraisal. *Am J Obstet Gynecol* 1982;142:1-6. Crossref
9. Stovall T, Solomon S, Ling F. Endometrial sampling prior to hysterectomy. *Obstet Gynecol* 1989;73:405-9. Website
10. Davidson KG, Dubinsky TJ. Ultrasonographic evaluation of the endometrium in postmenopausal vaginal bleeding. *Radiol Clin N Am* 2003;41:769-80. Crossref
11. Dueholm M, Hjorth IMD, Secher P, Jorgensen A, Ortoft G. Reproducibility of endometrial pathologic findings obtained on hysteroscopy, transvaginal sonography, and gen infusion sonography in women with postmenopausal bleeding. *J Minim Invasive Gynecol* 2015;22:1036-44. Crossref
12. Osmer R, Volksen M, Schauer A. Vaginosonography for early detection of endometrial carcinoma? *Lancet* 1990;335:1569-71.

- Crossref
13. Grunfeld L, Walker B, Bergh PA, Sandler B, Hofmann G, Navot D. High-resolution endovaginal ultrasonography of the endometrium: a noninvasive test for endometrial adequacy. *Obstet Gynecol* 1991;78:200-4. Website
 14. Nasri M, Shepherd J, Setchell ME, Lowe DG, Chard T. Sonographic depiction of postmenopausal endometrium with transabdominal and transvaginal scanning. *Ultrasound Obstet Gynecol* 1991;1:279-83. Crossref
 15. Granberg S, Wickland M, Karlsson B, Norstrom A, Friberg LG. Endometrial thickness as measured by endovaginal ultrasonography for identifying endometrial abnormality. *Am J Obstet Gynecol* 1991;164:47-52. Crossref
 16. Bano I, Mittal G, Khalid M, Akhter N, Arshed Z. A study of endometrial pathology by transvaginal color doppler ultrasonography and its correlation with histopathology in post-menopausal women. *Indian Medical Gazette* 2013;4:134-9.
 17. Smith P, Bakes O, Heimer G, Ulmsten U. Transvaginal ultrasound for identifying endometrial abnormality. *Acta Obstet Gynecol Scand* 1991;70:591 Crossref