ORIGINAL ARTICLE

Diagnostic Accuracy of Transvaginal Ultrasonography (TVUS) in Ruling Out Endometrial Cancer in patients with Postmenopausal Bleeding

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ABSTRACT

Background: Postmenopausal bleeding is a common problem and occurs in 5% of all gynaecological patients. It has various causes including hormone imbalance, myomas, endometrial hyperplasia, polyps and cancers of the cervix and endometrium. Endometrial carcinoma is one of the commonest gynaecological cancers in postmenopausal women.
Aim: To determine the diagnostic accuracy of transvaginal ultrasonography (TVUS) using measurement of thickness of endometrium for detection of CA endometrium in patients with postmenopausal bleeding.
Study design: This was a cross-sectional (validation) study.
Setting: Obstetrics and Gynaecology Department, Islam Medical College, Sialkot.
Method: 95 patients fulfilling the inclusion criteria underwent transvaginal ultrasonography to measure endometrial thickness followed by endometrial sampling by dilatation and curettage regardless of the endometrial thickness. Histopathology results were compared with the TVUS finding.
Results: Using cut off of 4mm endometrial thickness, TVUS showed a sensitivity of 90%, specificity of 87.06%, a positive predictive value (PPV) of 45%, a negative predictive value (NPV) 98.67% and a diagnostic accuracy of 87.37%.
Conclusion:-TVUS can be used as a useful screening test for detection of endometrial abnormalities in women with postmenopausal bleeding.
Keywords: PMB, TVUS, D&C, ET, CA.

INTRODUCTION

Postmenopausal bleeding (PMB) is the bleeding from genital tract one year after the last menstruation. It accounts for 5% of all gynaecological visits[1,8].

It has different causes which include hormone imbalance, fibroids, endometrial hyperplasia, endometrial & cervical polyps and malignancy of cervix and endometrium[2]. Almost 10% of postmenopausal bleeding is due to endometrial cancer[2,3].

Vaginal and endometrial atrophy are the commonest causes of postmenopausal bleeding[3].

The main concern is CA endometrium which is associated with endometrial thickness of more than 4mm in 96% of the patients with postmenopausal bleeding[4].

Postmenopausal bleeding (PMB) is the commonest symptom of CA endometrium, hence patients who present with PMB should be evaluated earlier to detect and manage endometrial cancer at an early stage[5].

Dilatation and curettage and hysteroscopy guided biopsy of the endometrium are the gold standards, but now TVUS has become a necessary investigation in women with postmenopausal bleeding for detection of endometrial abnormalities[4,6].

TVUS is an effective tool to diagnose underlying abnormalities in patients with abnormal uterine bleeding before processing to any surgical procedure[7].

TVUS is preferred over endometrial biopsy for patients with postmenopausal bleeding because if there is sufficient local skill with resources available, TVUS is an appropriate first live investigation to identify the women at high risk of endometrial carcinoma[8].

The literature review shows that TVUS using endometrial thickness of ≤4mm as cutoff value showed sensitivity and specificity of 89%& 86% respectively and positive predictive value (PPV) of 82%, a negative predictive value (NPV) of 92% and diagnostic accuracy of 87%[9].

The sensitivity & specificity of diagnostic D n C is 87% & 100% respectively in diagnosis of CA endometrium. Several studies have compared TVUS with endometrial biopsy and have found TVUS equally effective to rule out endometrial cancer[6,8,9].

Rationale of my study is comparison of accuracy of TVUS with endometrial biopsy for diagnosis of endometrial pathology. It is a less invasive test with no complications and is painless[8].

By promoting a non-invasive procedure, which provides a rapid and accurate diagnosis, unnecessary admissions can be avoided.

The objective of the study was to determine the diagnostic accuracy of transvaginal ultrasonography (TVUS) using measurement of thickness of endometrium for detection of CA endometrium in patients with postmenopausal bleeding.

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MATERIAL AND METHODS

It was a cross sectional validation study conducted in the Department of Obstetrics and Gynaecology, Islam Medical College, Sialkot. The study was conducted on 95 patients who were postmenopausal and presented with PMB. These patients were referred to outdoor and indoor unit of Obstetrics and Gynaecology units of Islam Medical College Sialkot. Patients with PMB, one year after cessation of menstruation were included in the study. No hormonal tests were used for diagnosis of menopause. Postmenopausal patients on hormone replacement therapy and those on tamoxifen therapy for breast carcinoma were not included in this study. A written and informed consent was taken from the patients. Detailed history of the presenting complaint, age of menopause, duration and pattern of postmenopausal bleeding was recorded. Women meeting the inclusion criteria underwent transvaginal ultrasonography as an outpatient and endometrial thickness was measured by the consultant sonologist. The patients were examined in lithotomy position with a cushion under the buttocks. The probe was inserted into the vagina with a condom on it lubricated with gel. The posterior vaginal fornix and uterus were scanned in longitudinal and transverse plane. Endometrial thickness was measured at the thickest area in longitudinal plane.

All women undergoing TVUs were admitted in the Gynae ward. General physical examination (pulse, BP, temperature) and systemic examination was out. Per abdominal vaginal and speculum examination was carried out. After completing baseline investigations like blood group, Hb%, RBS, complete urine examination all the women underwent dilatation and curettage regardless of the endometrial thickness and endometrial biopsy was taken and was sent to the hospital laboratory. The whole procedure was done by me. Findings of the TVUS were kept concealed from the pathologist. Findings were recorded in the proforma.

Statistical analysis: The data was analyzed on SPSS version 10. Mean and standard deviation were calculated for the Quantitative Variable i.e. age of the patients, parity, age of menarche, and menopause. Frequency percentage was presented for Qualitative Variables i.e. TVUS findings and histopathological findings. Diagnostic accuracy of TVUS was calculated by calculating Sensitivity, Specificity, Positive predictive value (PPV), Negative predictive value (NPV) by 2×2 table as follows.

D&C

TVUS	Present	Absent
+Ve	a	b
-Ve	c	d

Sensitivity = a/a+c × 100
Specificity = d/d+b × 100
PPV = a/a+b × 100
NPV = a/c+d × 100
Diagnostic Accuracy= a+d/a+b+c+d × 100

RESULTS

All the 95 patients with PMB were admitted through OPD. After taking history detailed clinical examination and biochemical investigations were performed and findings were recorded. All the patients were subjected to TVUS and the findings were recorded and correlated with histopathological findings wherever applicable. The patients were having ages between 48 years to 80 years. In the age group 41 to 50, total patients were 6. In the age group 51 to 60, total patients were 57. In the age group 61 to 70, total patients were 25. In the age group 71 to 80, total patients were 7. The major bulk of patients comprised of the group between 51 to 70 years of age. The mean age of the patients was 59.04±6.67 (SD) years.

The minimum age of the menarche was 13.19±62(SD) years. The minimum age of menopause was found to be 40 years and the maximum was 60 years. The mean age was 52.62±2.99(SD) years.

In this study the 3 patients were nulliparous and remaining 92 were multiparous. The mean parity in the patients was 4.22 ± 2.49(SD) (range 0 to 10).

In this study the minimum endometrial thickness on transvaginal Ultrasonography was 2mm and maximum was 25mm. The mean endometrial thickness was 5.04 ± 4.75(SD) mm. On Transvaginal Ultrasonography out of total 95 patients, 20 were positive for endometrial disease which is 21.1% of the total patients. All patients underwent D & C and histopathological findings showed malignant changes in 10 patients.

These positive cases were 10.5% of total patients. Out of these 10 cases 9 were having endometrial thickness greater than 4mm on TVUS and only 1 had endometrial thickness of less than 4mm on TVUS. Out of 20 patients positive on TVUS eleven patients had benign changes. Six patients had adenomatous hyperplasia, three had endometrial polyp and two had atypical hyperplasia.

In this study mean age for women with ET ≥ 4mm on TVUS is 65.50±9.31 (SD) years and the mean age for women with ET ≥ 4mm is 58.57±5.03 (SD) years. This study showed that mean age for women with malignant changes is 67.80±7.86 (SD) years and for women with benign histological changes is 59.01 V 5.91 (SD) years.

In this study mean age of menarche for women with ET ≥ 4mm on TVUS is 13.15±0.67 (SD) years and the mean age of menarche for women with ET ≤4mm is 13.20±0.62 (SD) years. With cut off value of 4mm endometrial thickness, TVUS was having sensitivity of 90%, specificity of 87.06%, a positive predictive value (PPV) of 45%, a negative predictive value (NPV) of 98.67% and a diagnostic accuracy of 87.37%.

Table 1: Mean and standard deviation of different variables.
Descriptive Statistics

	N	Min.	Max.	Mean	Std. Deviation
Age of the patient	95	48	80	59.94	6.67
Age of menarche	95	12	14	13.19	0.62
Age of menopause	95	45	60	52.62	2.99
parity	95	0	10	4.42	2.49
Endometrial thickness (in mm) on TVUS	95	2	25	5.04	4.75
Valid N (list wise)	95				

Table 2: Frequency and percentage of negative and positive cases.
TVUS Findings

Valid	Frequency	%age	Valid%	Cumulative%
Positive	20	21.1	21.1	21.1
Negative	75	78.9	78.9	100.0
Total	95	100.0	100.0	

Table 3: Frequency and percentage of negative and positive cases on endometrial biopsy.
Histopathological finding

Valid	Frequency	%age	Valid%	Cumulative%
Positive	10	10.5	10.5	10.5
Negative	85	89.5	895	100.0
Total	95	100.0	100.0	

Table 4: Mean and std. deviation of variables according to TVUS findings.
Descriptive Statistics

TVUS findings	N	Min	Max.	Mean	Std. Deviation
Positive					
Age of patients	20	48	80	65.05	9.31
Age of menarche	20	12	14	13.15	0.67
Age of menopause	20	45	60	54.75	3.89
Parity	20	0	9	3.70	2.72
Valid N (list wise)	20				
Negative					
Age of patients	75	48	75	58.57	5.03
Age of menarche	75	12	14	13.20	0.62
Age of menopause	75	45	58	52.05	2.43
Parity	75	0	10	4.16	2.40
Valid N (list wise)	75				

Table 5: Mean and std. deviation of variables according to Histopathological findings.
Descriptive Statistics

Histopathological findings	N	Min.	Max.	Mean	Std. Deviation
Positive					
Age of patients	10	55	80	67.80	7.86
Age of menarche	10	12	14	13.10	0.74
Age of menopause	10	51	60	55.10	2.96
Parity	10	0	9	4.20	3.46
Valid N (list wise)	10				
Negative					
Age of patients	85	48	80	59.01	5.91
Age of menarche	85	12	14	13.20	0.61
Age of menopause	85	45	60	52.33	2.87
Parity	85	0	10	4.45	2.37
Valid N (list wise)	85				

Table 6: Diagnostic Accuracy of TVUS by calculating Sensitivity, Specificity, and Positive Predict value, Negative Predictive value.
TVUS findings * histopathological findings crosstabulation
Count

TVUS findings	Histopathological findings		Total
	Positive	Negative	
Positive	9	11	20
Negative	1	74	75
Total	10	85	95

	Lower – Upper 95% CIs
Sensitivity =	90%(59.58, 98.21)
Specificity =	87.06%(78.3, 92.62)
PPV =	45% (25.82, 65.79)
NPV =	98.67%(92.83, 99.76)
Diagnostic accuracy =	87.37%(79.21, 92.62)

DISCUSSION

Abnormal endometrial pathology in patients of PMB has been found in 10-15% cases but still it is said that PMB is endometrial cancer until unless proved otherwise[10].

Appropriate methods for investigation of patients with PMB have been discussed. TVUS is accepted now as a first line investigation to identify women at high risk of endometrial cancer. It is a relatively non-invasive and painless procedure. With increased endometrial thickness, the risk of malignancy increases. Patients who are using HRT, they are less likely to have malignancy as a cause of PMB[11].

Before the introduction of TVUS, patients with PMB were having diagnostic D n C. The probability of endometrial pathology is strongly reduced if endometrial thickness on TVs ≤ 4mm. Endometrial sampling is not recommended below this cut off value[12].
TVUS is an acceptable non-invasive method for early detection of endometrial abnormalities in women with PMB. The thickened endometrium during menopause is the most significant ultrasonographic finding for depicting endometrial pathology[13].

In a meta analysis Gupta et al conclude that taking threshold of ≤ 5mm means that a negative result would reduceprobability of cancer from 15% to 2.5%, which they consider acceptable. Only 4 studies were considered as best quality studies[14].

In another Meta analysis by Dijkhuezin et al, specificity was greater than 98% and sensitivity was above 99%. This was based on four high quality studies in post menopausal bleeding[15].

In a study comparing the cost effectiveness of different diagnostic options for post menopausal bleeding, Dijkhuezin et al, recommended different strategies based on the endometrial cancer. When the probability of endometrial carcinoma is below 15% TVUS followed by the endometrial biopsy in the cases of increased endometrial thickness was most cost effective, but when the prevalence rates of carcinoma are above 15.3%, endometrial biopsy is recommended[16].

In another study assessing the cost effectiveness of initial diagnostic strategies Clark et al show that TVUS using a cut off 5mm is least expensive. With both endometrial biopsy and using a cut off 4mm is the next most cost effective strategy with equal comparability[17].

In my study, endometrial thickness was measured in postmenopausal women by TVUS. Findings of TVUS were correlated with endometrial histopathology findings. This study was conducted on 95 patients with PMB. According to data in this study the mean age for women with ET ≤ 4mm on TVUS was 58.57±5.03 (SD) years and the mean age for women with ET ≥4mm was 65.05±9.31 (SD) years. This study also showed that the mean age of patients with malignant histological changes was 67.80±7.86 (SD) years and the mean age of patients with benign histological changes was 59.01±5.91 (SD) years. This is consistent with other studies[13,18].

According to data two out of nine patients with CA endometrium were nulliparous and other seven were multiparous. The mean parity of malignant cases was 4.20±3.46 (SD) and that of non malignant was 4.45±2.37 (SD). This is similar observation as compared to other studies that nulliparity or low parity is a risk factor for endometrial carcinoma and also it is observed from the data that multiparous patients with endometrial carcinoma have low parity as compared to patients with benign changes.

Low parity is also a risk factor for endometrial carcinoma, this finding is consistent with other studies[13,19]. In this study according to data, the mean age of menarche in patients with CA endometrium was 13.10 ± 0.74 (SD) years and in benign cases, it was 13.20±0.62 (SD) years. This difference was insignificant, which is consistent with other studies[20].

In my study mean age of menopause in patients with CA endometrium was 55.10±2.96 (SD) years, which indicated late age of menopause a risk factor for CA endometrium and this is consistent with other studies.(13)
In this study out of 95 patients 75 patients had ET thickness of ≤ 4mm. Amongst 20 patients 9 patients with endometrial carcinoma had ET of 17.2mm and eleven with benign changes had a ET of 7.36mm. This is consistence with other studies[13].

In this study all patients preferred TVUS. In this study, endometrial thickness was measured from the interface of the junction of the endometrium and the myometrium in sagittal plane[13]. Histopathological study was done in all patients after dilatation and curettage. The sensitivity was 90% and the specificity was 87.06%. The PPV was 45%, NPV was 98.67% and accuracy was 87.37% which is consistent with other studies[9]. No pathology was over looked when a cut off limit of ≤4 millimeters was used. So curettage could be avoided in cases with endometrial thickness ≤ 4 millimeters.

CONCLUSION

It is concluded that transvaginal ultrasonography is an efficient and acceptable first step diagnostic tool for excluding endometrial pathology in patients with postmenopausal bleeding. The findings showed by TVUS correlated with subsequent histopathological findings. The accuracy of my study at cutoff of 4 millimeters endometrial thickness was 87.37%. So in the patients with postmenopausal bleeding with endometrial thickness of less than the cutoff value, it is justified to not perform endometrial sampling. I suggest the use of TVUS in women with PMB to rule out endometrial cancer.

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