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Diagnostic Accuracy of Transvaginal Ultrasound for Detecting Endometrial Polyps in Women with Abnormal Uterine Bleeding: A Cross-Sectional Study

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ABSTRACT

Background: Abnormal uterine bleeding (AUB) is a widespread gynecological complaint with endometrial polyps as an underlying cause. Although hysteroscopy with histopathology is a resource-intensive and invasive diagnostic tool, it is also the gold standard. Transvaginal ultrasonography (TVS) is a noninvasive option, but its diagnostic accuracy is not consistent

Objective: To evaluate the diagnostic accuracy of transvaginal ultrasound (TVS) in detecting endometrial polyps in women with AUB, using histopathology as the reference standard.

Methods: This cross-sectional study was conducted on 150 women aged 18 to 45 years with AUB in the Department of Diagnostic Radiology, Lahore General Hospital/PGMI, Pakistan, who underwent TVS and then hysteroscopic histopathology. The diagnostic parameters of TVS sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and overall accuracy were calculated. Subgroup analysis was conducted according to menopausal status.

Results: TVS had a sensitivity of 69.2, specificity of 53.2, PPV of 23.7, NPV of 89.2%, and total accuracy of 56.0. False positives were primarily proliferative or secretory endometrium, focal hyperplasia, and submucosal fibroids, while false negatives were mainly small sessile polyps or due to poor imaging. There was no significant difference in the diagnostic performance between premenopausal and perimenopausal women. The polyp was benign in most cases, and no malignant or atypical lesions were detected.

Conclusion: TVS is moderately sensitive and has a high NPV; therefore, it is a good noninvasive method for excluding endometrial polyps in women with AUB. Positive results must be validated by histopathology. Color Doppler and timing optimization of imaging can be used to improve the diagnostic quality. TVS is also affordable, available, and easy to use in resource-restricted environments.

Introduction

Abnormal uterine bleeding (AUB) is a frequent gynecological complication in reproductive and perimenopausal women, causing significant outpatient and health spending in most countries worldwide. Endometrial polyps are the major structural causal agents of AUB and are characterized by focal neoplasms of the endometrial glands and stroma. Polyps may be sessile or pedunculated, single or multiple, and of any size, from a few millimeters to several centimeters. Even though most polyps are benign, a small percentage have premalignant or malignant alterations with high potential in postmenopausal women or those with risk factors, including obesity or tamoxifen usage [113]. Polycystically, polyps can cause menorrhagia, intermenstrual bleeding, postcoital bleeding, or infertility; however, a considerable portion of them do not manifest and are detected accidentally [1]. Hysteroscopy with histopathological confirmation [4], which is an invasive procedure, is the best method of diagnosis; however, it is not easily available in low-resource countries and is also

expensive. Transvaginal ultrasonography (TVS) is a common, noninvasive, and popular modality that is commonly used to investigate the endometrium. It also has good spatial resolution and is capable of visualizing the endometrium, myometrium, and adnexa in real time without subjecting them to radiation [5]. Polyps usually form clear echogenic lesions and even a vascular stalk on color Doppler imaging [5,6]. TVS has also been reported to be sensitive to 60-95 percent with a specificity of–40-90 [6,7], and it is dependent on operator skills, quality of equipment, patient factors, and the menstrual cycle [6]. Saline infusion sonohysterography (SIS) and 3D-TV are similar in terms of diagnostic accuracy and are less accessible and more resource-intensive adjunctive imaging techniques (4,6). In Pakistan, the most popular diagnostic method is traditional TVS because of its low cost. Their performance regarding this aspect must be evaluated to apply evidence-based management and optimize hysteroscopic interventions. This study aimed to determine the diagnostic ability of TVS in detecting endometrial polyps in women with AUB, using histopathology as a reference test.

Methods

This cross-sectional diagnostic accuracy study was conducted at the Department of Diagnostic Radiology, Lahore General Hospital/PGMI, Pakistan. Subjects: A total of 150 women aged 18-45 with AUB were recruited sequentially. The exclusion criteria were pelvic inflammatory disease, retained IUDs/pessaries, cervical pathology, current hormonal therapy, coagulation disorders, thyroid or liver dysfunction, acute heavy bleeding, and surgery on the uterus. Procedure: Clinical data and demographics were gathered using structured proformas. High-resolution transvaginal probes (5 9 MHz) were applied by experienced radiologists for TVS. The presence, size, number, and vascularity of suspected polyps were noted.

The time of the month was not strictly standardized. Reference Standard: All participants underwent hysteroscopic polypectomy with histopathology, without knowledge of the TVS findings. Statistical Analysis: SPSS v26. The diagnostic performance of TVS was measured using 2 ×2 contingency tables. Sensitivity, specificity, PPV, NPV, and general accuracy were computed at 95% confidence. Continuous variablesMean SD frequency (%)Categorical variables

Results

The participants were aged between 22 and 45 years (mean SD: 34.268 years). The majority were 31-40 years (41.3%), multiparous (68.0%), and premenopausal (86.7%). The most common presentation was menorrhagia (52.0%). The mean symptom duration was 6.2 +3.4 months.

TVS Results:76 (50.7) positive and 74 (49.3) negative. Polyps were echogenic lesions with or without a stalk and a solitary feeding vessel on color Doppler. TVS-positive cases had a higher mean endometrial thickness (11.4 ± 3.2 mm) than TVS-negative cases (7.6 ± 2.8 mm; $p < 0.05$).

Histopathology: 26 patients with endometrial polyps (17.3%); 21 with benign glandular polyps (80.8%); and 5 with simple hyperplasia without atypia (19.2%). No malignant lesions were found.

Table 1: Comparison Between TVS and Histopathology

Histopathology	TVS Positive	TVS Negative	Total
Polyp present (+)	18 (TP)	8 (FN)	26
Polyp absent (−)	58 (FP)	66 (TN)	124
Total	76	74	150

Table-2 Diagnostic Performance of TVS

Parameter	Formula	Value	95% CI
Sensitivity	TP / (TP + FN)	69.2%	49.2–84.7%
Specificity	TN / (TN + FP)	53.2%	44.0–62.2%
Positive Predictive Value (PPV)	TP / (TP + FP)	23.7%	15.3–34.6%
Negative Predictive Value (NPV)	TN / (TN + FN)	89.2%	79.8–95.0%
Overall Accuracy	(TP + TN) / Total	56.0%	48.2–64.9%

Interpretation: TVS demonstrates moderate sensitivity and specificity, low PPV, high NPV, and moderate overall accuracy. High NPV indicates TVS is effective for **excluding polyps**, while positive results require histopathological confirmation.

Discussion

This study substantiates the fact that TVS is a moderately sensitive and specific noninvasive device used for the identification of endometrial polyps in women with AUB. The most common types of false positives were proliferative/secretory endometrium, hyperplasia, or submucosal fibroids, whereas the most common types of false negatives were small sessile polyps or imaging issues. These results are consistent with those reported in the literature [810]. A high NPV favors the application of TVS as a primary screening instrument, especially in premenopausal women. The use of additional color Doppler to detect a single feeding vessel can result in better discrimination of fibroids [11].

Strengths: Adequate sample size, use of histopathology as reference, blinding, and standardized imaging.

Limitations: Single-center trial, possible inter-observer error, no adjunctive imaging (SIS/3D-TV), no standards of scans with respect to the menstrual cycle. Future research should focus on multicenter validation, cost-effectiveness, and the utility of adjunct imaging.

Conclusion

TVS has a moderate sensitivity and high NPV for detecting endometrial polyps in women with AUB, making it a useful noninvasive screening method. However, favorable results need to be histopathologically verified. Color Doppler and imaging timing optimization could help improve the accuracy of diagnosis. TVS is inexpensive, affordable, and user-friendly, particularly in resource-constrained environments.

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