

Original article

# Accuracy of Transvaginal Ultrasound in Diagnosing Endometrial Polyps among Infertility Patients at the National Center for Diagnosis and Treatment of Infertility – Al Jabal Al Akhdar

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Corresponding email. [ramzi.mohamed@omu.edu.ly](mailto:ramzi.mohamed@omu.edu.ly)**Keywords.**

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**ABSTRACT**

Endometrial polyps (EPs) are prevalent benign intrauterine growths associated with abnormal uterine bleeding, an increased risk of malignant transformation, & infertility. This is a prospective interventional study assessing the clinical efficacy of transvaginal ultrasound in the diagnosis of endometrial polyps. The study was conducted at the National Center for Diagnosis & Management of Infertility – AL Jabal Al Akhdar between July 2025 & December 2025, including 214 women with a history of primary or secondary infertility. Women with active pelvic infections, coagulation dysfunction, history of malignancy, severe cardiopulmonary disease, or any contraindications to anesthesia were excluded. The findings demonstrated that TVS had a sensitivity 59.42%, specifically 70.34%, a positive predictive value 48.81%, a negative predictive value was 78.46%, & overall diagnostic accuracy of 66.82%. These findings indicate that transvaginal ultrasonography has moderate sensitivity & has a high specificity for detecting endometrial polyps. Suggesting its reliability as an initial non-invasive screening modality to rule out endometrial polyps.

**Introduction**

Endometrial polyps (Eps) are common benign intrauterine lesions, formed by too much proliferation of local endometrial glands & stroma, clinically presenting as abnormal uterine bleeding, infertility, or asymptomatic incidental findings [1]. Among women experiencing infertility, the prevalence of endometrial polyps has been reported to range from 15% to 24% [2]. Although most polyps are nonthreatening, they may increase the risk of endometrial precancerous lesions (with a malignancy rate of about 2.3%), making early and precise diagnosis crucial [3]. Transvaginal ultrasound, with or without the use of contrast saline infusion or gel instillation, is recommended as the initial imaging modality for detecting endometrial polyps; however, hysteroscopy is the main standard for both definitive diagnosis & management [4-5].

Hysteroscopy provides the advantage of the direct visualization of the uterine cavity and the endometrium, permitting targeted biopsy of suspected lesions during the procedure [6-9]. Consequently, it has become the reference standard for evaluating intrauterine pathology. Nevertheless, hysteroscopy is an invasive technique, usually done under local or general anesthesia, and may be related to the discomfort of many patients. Despite technological advances, the reported diagnostic accuracy of transvaginal sonography (TVS) remains variable among different studies [10]. The aim of our research was to assess the diagnostic performance of transvaginal sonography to discover whether the number of required hysteroscopic procedures could be decreased.

**Methods**

This prospective interventional study assessed the clinical effectiveness of transvaginal ultrasound in revealing endometrial polyps. This study was conducted at the National Center for Diagnosis & Management of Infertility, Al Jabal Al Akhdar, in the period between July 2025 and December 2025, and included 214 women with either primary or secondary infertility. Women with active pelvic infections, coagulation dysfunction, history of malignancy, severe cardiopulmonary disease, or any contraindications to anesthesia were excluded. A thorough medical history was obtained from participants, followed by a detailed clinical examination. Eligible women were adequately informed about the nature & objectives of the study, and written informed consent was obtained before the commencement of any study-related procedures.

**Transvaginal ultrasonographic examination**

The equipment used was the Consona N6 with a 7.5 MHz probe. Before examination, patients were instructed to empty their bladder & were placed in the lithotomy position. The probe was wrapped with sterile coupling gel and gently inserted into the vagina. A systematic scan of the uterine body, endometrial cavity, and bilateral adnexal regions was performed. The morphology of the endometrial cavity & thickness

of the endometrium were observed, in addition to the presence of focal endometrial thickening or polypoid echoes, polyp size, base width, clear demarcation from the endometrium, & presence of a “single feeding vessel” sign in the lesion under color Doppler mode.

### Hysteroscopic examination

The equipment used was the HSC system produced by Karl Storz, Germany (outer diameter 4.0 mm, field of view 30°), along with a cold light source and camera system. The procedure is performed under local or general anesthesia according to the anesthesiologists. Vaginoscopic approach performed, and if there is a difficulty, the cervix was dilated using a Hegar dilator up to size 7, then hysteroscopy was introduced under continuous irrigation with 0.9% normal saline. The examination included assessment of the cavity’s contour, the smoothness of the endometrial surface, and the presence of solitary or multiple polypoid lesions. Key characteristics, such as lesion size, location, pedicle width, and vascularity, were documented in detail. Therapeutic interventions, polyps' excision, targeted biopsy, or curettage for histopathological analysis, were performed as clinically indicated.

### Statistical analysis of the data

The statistical analysis of the data was done by IBM SPSS software version 27 (Armonk, NY: IBM Corp, released 2020). Categorical variables were condensed as frequencies & percentage. Quantitative data were reported as median, mean, SD, range, & inter-quartile range (IQR). Differences between the two study groups were done by chi-square test. Regarding continuous data, normality was evaluated through the Shapiro-Wilk test. Sensitivity was defined as the ability of the test to identify individuals with the disease correctly (true positives), with higher sensitivity indicating fewer false-negative results. Specificity refers to the capability of the test to reveal the populations without the disease correctly (true negatives), where higher specificity reflects fewer false (+ ve) findings. The positive predictive value represented the likelihood that the disease was present among persons with positive test results, whereas the negative predictive value indicated the possibility that the disease was absent in individuals with negative test results. Diagnostic accuracy was calculated as the rate of agreement using the formula: (true positives + true negatives) / all numbers tested × 100. The statistical significance for all analyses was considered at 5%.

### Results

The total study population included 214 patients, including 120 with 1st infertility & 94 with 2nd infertility. The primary infertility group ranged from 19 to 43 years, whereas the age range in the secondary infertility group was 23 to 44 years. The mean value and SD of age were higher among patients with secondary infertility (35.23 ± 4.73 years) than among those with primary infertility (33.84 ± 4.66 years). This difference was also reflected in the median values, which were 37.0 years in the secondary infertility group, and 33 years in the primary infertility group was 33 years. The difference in age between the 2 groups was significantly higher in 2ry infertility group than the 1stry infertility group (U = 4748.50, p = 0.046). BMI ranged from 18.0 to 46. kg/m<sup>2</sup> in the primary infertility group & from 18.0 - 47.0 kg/m<sup>2</sup> in the 2ry infertility group. The mean value and SD BMI were 30.60 ± 4.58 kg/m<sup>2</sup> in patients with secondary infertility, compared to 29.42 ± 4.80 kg/m<sup>2</sup> in those with primary infertility. Median BMI values further supported this finding (30.5 vs. 29.0 kg/m<sup>2</sup>, respectively). With respect to BMI, patients with secondary infertility also showed higher BMI values compared to those with primary infertility (U = 4641.50, p = .026).

**Table 1. Comparison between the 2 studied groups regard Age and BMI**

Variables	Total (n = 214)	Type of infertility		U	p
		Primary (n = 120)	Secondary (n = 94)		
<b>Age (years)</b>					
Min. – Max.	19– 44	19 – 43	23 – 44	4748. 50	0.046*
Mean ± SD.	34.45 ± 4.73	33.84 ± 4.66	35.23 ± 4.73		
Median (IQR)	35.0 (31.0 – 38.0)	33.0 (31.0 – 38.0)	37.0 (31.0 – 39.0)		
<b>BM1 (kg/m<sup>2</sup>)</b>					
Min. – Max.	18.0 – 47.0	18.0 – 46.0	18.0 – 47.0	4641. 50	0.026*
Mean ± SD.	29.93 ± 4.73	29.42 ± 4.80	30.60 ± 4.58		
Median (IQR)	30.0 (27.0 – 33.0)	29.0 (25.50 – 32.0)	30.50 (28.0 – 33.0)		

1QR: Inter-quartile range; SD: Standard deviation ; U: Mann-Whitney test; p: p-value for evaluating the 2 groups; \*: Statistically significant at p ≤ 0.05

Regarding transvaginal ultrasound findings, endometrial polyps were detected in 84 (39.3%) participants. Patients with primary infertility showed a higher prevalence of endometrial polyps on ultrasound compared to those with secondary infertility (47.5% vs. 28.7%, respectively). Conversely, the absence of endometrial polyps was more common among patients with secondary infertility (71.3%) than among those with primary infertility (52.5%). The observed difference between the two groups was statistically significant ( $\chi^2 = 7.794$ ,  $p = 0.005$ ). Based on hysteroscopic findings, endometrial polyps were detected in 69 participants (32.2%). The occurrence of polyps was higher among women with primary infertility compared with those experiencing secondary infertility (37.5% vs. 25.5, respectively), but the difference did not reach statistical significance ( $\chi^2 = 3.456$ ,  $p = .063$ ). Similarly, the absence of endometrial polyps was a little more common in the 2nd infertility group (74.5%) compared to the 1st infertility group (62.5%).

**Table (2). Comparison of endometrial polyp identification between the 2 groups**

Variables	Total (n = 214)	Type of infertility		$\chi^2$	p
		Primary (n = 120)	Secondary (n = 94)		
<b>Transvaginal ultrasound finding</b>					
No endometrial polyp	130 (60.7%)	63 (52.5%)	67 (71.3%)	7.794*	0.005*
Endometrial polyp	84 (39.3%)	57 (47.5%)	27 (28.7%)		
<b>Finding at hysteroscopy</b>					
No endometrial polyp	145 (67.8%)	75 (62.5%)	70 (74.5%)	3.456	0.063
Endometrial polyp	69 (32.2%)	45 (37.5%)	24 (25.5%)		

$\chi^2$ : Chi-Square Test; p: p value for comparing between the two studied groups; \*: mean statistically significant when  $p \leq 0.05$

(Table 3) demonstrates the level of agreement between transvaginal ultrasound (TVUS) & hysteroscopy in revealing the endometrial polyps among the studied population of 214 patients, with hysteroscopy considered the reference (gold standard) diagnostic method. Among the 145 patients in whom hysteroscopy revealed no evidence of endometrial polyps, transvaginal ultrasound correctly identified 102 cases as negative (true negatives), while 43 cases were incorrectly classified as having polyps (false positives). Among the 69 patients with endometrial polyps confirmed by hysteroscopy, TVUS correctly detected 41 cases (true positives), whereas 28 cases were missed (false negatives). Based on these findings, transvaginal ultrasound showed a sensitivity (59.42%), specificity (70.34%), (+ve) predictive value was (48.81%), & (-ve) predictive value was (78.46%). The overall diagnostic accuracy of TVUS in identifying endometrial polyps was (66.82%). Furthermore, there is a highly statistically significant relationship among transvaginal ultrasound findings & hysteroscopic findings ( $\chi^2 = 17.371$ ,  $p < 0.001$ ), confirming that TVUS findings showed meaningful agreement with hysteroscopy.

**Table (3). Agreement (sensitivity, specificity, and accuracy) for finding at hysteroscopy (n = 214)**

Variables	Finding at hysteroscopy		Sensitivity	Specificity	PPV	NPV	Accuracy
	No endometrial polyp (n = 145)	Endometrial polyp (n = 69)					
<b>Transvaginal ultrasound finding</b>							
No endometrial polyp	102	28	59.42	70.34	48.81	78.46	66.82
Endometrial polyp	43	41					
$\chi^2=$ , p	17.371*, $p < 0.001^*$						

$\chi^2$ : Chi-square test; p: p-value for the relationship between different categories; \*: Statistically significant at  $P \leq 0.05$

## Discussion

The research assessed the diagnostic performance of transvaginal ultrasonography for identifying endometrial polyps among women who had infertility, with the expectation that recent technological advancements would enhance TVS sensitivity. Hysteroscopy was the reference (gold standard) method, providing direct visualization of the uterine cavity & is known for its high diagnostic reliability [7,11-15]. The study conducted at the National Center for Diagnosis & Treatment of Infertility – AL Jabal AlAkhdar, included 214 patients, of whom 120 had 1st infertility, and 94 had 2nd infertility. Findings demonstrated that TVS had a sensitivity 59.42%, specificity 70.34%, (+ve) predictive value was 48.81%, (-ve) predictive value (NPV) was 78.46%, & overall diagnostic accuracy of 66.82%.

These results indicate that transvaginal ultrasonography has moderate sensitivity and high specificity for diagnosing endometrial polyps. Recommending its reliability as an initial noninvasive screening modality to rule out endometrial polyps. Babacan et al. found similar results, with sensitivity 54.9%, specificity of 84

.9%, PPV 76%, and NPV 68.3% [16]. Vitner et al. reported 44.8% sensitivity, 81.8% specificity, 48.1% PPV, and 79.7% NPV [17]. Grmbiezis et al reported a lower sensitivity 41.86% & a specificity of 83.64% [18]. Higher sensitivity observed by Yanshan et al. as he observed a sensitivity 85.5%, specifically 72.2%, PPV 91.4%, NPV 59.1% & accuracy 82.5% [19]. Salim et al. found sensitivity of 91%, specificity 90%, PPV 86%, and NPV 90% [20]. Several factors may explain the variability in diagnostic accuracy across studies. The timing of the examination within the menstrual cycle plays an important role.

The early proliferative phase is considered optimal because the endometrium is thinner and more uniform, allowing clearer delineation of focal lesions, whereas secretory-phase thickening may obscure smaller polyps or mimic hyperplasia, thereby reducing accuracy [21]. Lesion size also influences detection: small or sessile polyps less than 5 mm in diameter may escape visualization, as seen in some false negative cases of this study. Operator expertise and image resolution are other determinants of experienced performance; sonologists or less suboptimal machine settings may contribute to over- or under-diagnosis [22]. Several methods are available for detecting endometrial polyps, including 3D transvaginal sonography, 3D saline infusion sonohysterography (SIS), and gel instillation. Further research on these techniques may lead to the development of improved and effective diagnostic approaches.

## Conclusion

Transvaginal Ultrasound (TVS) is a good initial screening tool for endometrial polyps, especially for ruling them out (high negative predictive value), but its accuracy for definitive diagnosis is limited, showing moderate sensitivity and high specificity and a low positive predictive value, meaning many positive results need confirmation via hysteroscopy with biopsy to avoid over-diagnosis and unnecessary treatment.

**Conflict of interest.** Nil

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