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# Comparative Study between Diagnostic Accuracy of Hysteroscopy and 3D Ultrasound in Patient with Premenopausal Uterine Bleeding; Cost Effectiveness - Safety and Diagnostic Accuracy

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## Abstract

**Background:** *Hysteroscopy and transvaginal ultrasonography (TVS) may be used to evaluate the uterine cavity. Premenopausal uterine hemorrhage may be caused by abnormalities of the uterine cavity, such as myomas and septum. Therefore, excluding intrauterine disease is critical before treating any unusual bleeding.*

**Objective:** *To assess the diagnostic accuracy of 3D transvaginal ultrasound in identifying endometrial lesions compared to hysteroscopy in premenopausal women.*

**Patients and Methods:** *One hundred women participated in this clinical investigation to compare diagnosis accuracy. Diagnostic hysteroscopy and two – and three-dimensional ultrasonography were used to assess all of the women. Dilation and curettage were performed on patients exhibiting abnormalities in their research, and the specimen was submitted to histology to confirm the diagnosis.*

**Results:** *3D U/S was more accurate in all lesions than hysteroscopy: 86.8%, 76.3%, and 88.9% vs. 94.0%, 90.3%, and 93.3%, respectively.*

**Conclusion:** *It is recommended that diagnostic hysteroscopy be done consistently in situations of abnormal bleeding since it is the most accurate way for assessing cases of premenopausal uterine bleeding, with a greater cost and extremely little risk of consequences.*

**Keywords:** Hysteroscopy; Ultrasound; Bleeding

## 1. Introduction

Premenopausal women often have abnormal uterine bleeding, which may have several reasons. However, Doctors familiar with menstruation physiology may handle the issue with assurance. For the diagnosis of intrauterine anomalies such as retained intrauterine cysts (IUCD), infertility, recurrent abortion, and irregular uterine bleeding, hysteroscopy is an essential procedure. It has taken the position of curettage and dilatation as a blind method with a high failure rate in diagnosis.<sup>1</sup>

The most frequent reason for endometrial biopsy is endometrial biopsy, particularly in postmenopausal or older women. Five-year survival rates for endometrial cancer diagnosed early with endometrial biopsy range from 75% to 80%. By providing coronal pictures that are

better than those obtained from 2D ultrasound and work in conjunction with saline infusion sonohysterography (SIS), 3D ultrasound enhances the utility of pelvic sonography.<sup>2</sup>

Modifications of cystoscopes with fiberoptic tubes for uterine cavity distention are called modern hysteroscopes. Office hysteroscopy requires proper office safety procedures, but many doctors do not have the tools or personnel necessary to do it in their offices.<sup>3</sup>

Predicting which difficult surgical hysteroscopic treatments are safer to perform in an operating room or which diagnostic procedures from severe cervical stenosis may provide challenges is crucial.<sup>4</sup>

This study aimed to compare the diagnostic accuracy of 3D transvaginal ultrasound in identifying endometrial lesions to hysteroscopy in premenopausal women.

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2. Patients and methods

From August 2022 to August 2023, the outpatient gynecological clinic, obstetrics and gynecology department, Al-Hussien and Sayed Galal Hospitals, Faculty of Medicine, Al Azhar University, hosted this clinical experiment comparing diagnosis accuracy.

After giving their permission, 100 women who complained of premenopausal bleeding were included in the research. At the outpatient clinic, three-dimensional ultrasonography (Voluson S 6 3D system (country of origin USA) with an S -VDW 5-8 probe, which is an electronic sector transducer with a frequency of 5-8 MHz) was used to look for any adnexal masses. Under general anesthesia, all patients had diagnostic hysteroscopy performed by a single, skilled operator blind to the ultrasonography results. Dilation and curettage were performed on patients exhibiting abnormalities in their research, and the specimen was submitted to histology for confirmation of the diagnosis.

STATISTICAL ANALYSIS

The collected data was assessed using SPSS Inc.'s statistical program for social sciences, version 23.0 (Chicago, Illinois, USA). For the quantitative data, ranges and mean± standard deviation were shown. Numbers and percentages were also used to display quantitative information.

3. Results

Table 1: Age and parity descriptive among the study group

AGE (YEARS)	
RANGE	41-50
MEAN±SD	44.71±6.12
PARITY	
MEDIN (IQR)	3 (2-4)

This table shows that the ranged of age “years” was 41 to 50 with mean 44.71±6.12; and median of parity was 3 (2-4).

Table 2. Clinical Bleeding Patterns among the study group

BLEEDING	NO.	%
MENORRHAGIA	36	36.0%
METRORRHAGIA	29	29.0%
MENOMETRORRHAGIA	35	35.0%
TOTAL	100	100.0%

This table shows that the 36 patients (36%) were menorrhagia, 35 patients (35%) were menometrorrhagia and 29 patients (29%) were metrorrhagia among clinical bleeding patterns.

Table 3. Uterine Lesions as detected by Pathology.

LESION	NO.	%
ADENOMYOSIS	9	9.0%
FIBROID	28	28.0%

HYPERPLASIA	15	15.0%
POLYP	18	18.0%
NORMAL	30	30.0%
TOTAL	100	100.0%

This table shows that the 9 patients (9.0%) were Adenomyosis, 28 patients (28.0%) were Fibroid, 15 patients (15.0%) were hyperplasia, 18 patients (18.0%) were Polyp and 30patients (30.0%) were Normal lesion by pathology.

Table 4. Uterine Lesions as detected by Hysteroscopy

LESION	NO.	%
ADENOMYOSIS	0	0.0%
FIBROID SUBMUCOUS	24	24.0%
ENDOMETRIAL THICKNESS >12	14	14.0%
POLYP	18	18.0%
NORMAL	44	44.0%
TOTAL	100	100.0%

This table shows that the 24 patients (24.0%) were Fibroid, 14 patients (14.0%) were Endometrial thickness>12, 18 patients (18.0%) were Polyp and 44 patients (44.0%) were Normal lesion by Hysteroscopy.

Table 5. Comparison between 3D-US and Hysteroscopy in diagnosis of all lesions

ALL LESIONS	SENS.%	SPEC.%	PPV%	NPV%	ACCURACY%
3D-US	86.8%	76.3%	74.2%	93.5%	88.9%
HYSTEROSCOPY	94.0%	90.3%	84.2%	97.1%	93.3%

3D ultrasound has lower sensitivity, specificity, and accuracy than hysteroscopy in instances of all lesions.

Table 6. Comparison between 3D-US and Hysteroscopy according to Cost

COST	3D-US (N=100)	HYSTEROSCOPY (N=100)	TEST VALUE	P-VALUE	SIG
“LE”	72.50±5.02	565.00±0.00	9.582	0.000	HS
RANGE	65-80	565-565			

This table shows highly statistically significant higher mean value of cost “LE” in hysteroscopy was 565.00±0.00 comparing to 3D-US was 72.50±5.02, with p-value (p<0.001).

Table 7. Comparison between 3D-US and Hysteroscopy according to safety for complications

SAFETY FOR COMPLICATIONS	3D-US (N=100)	HYSTEROSCOPY (N=100)
INFECTION	0 (0%)	0 (0%)
BLEEDING	0 (0%)	0 (0%)
INFLAMMATORY ILLNESS OF THE PELVIS	0 (0%)	0 (0%)
RARE CASES OF UTERINE TEARING OR CERVIX DAMAGE	0 (0%)	0 (0%)
CONSEQUENCES FROM USING GAS OR LIQUID TO ENLARGE THE UTERUS	0 (0%)	0 (0%)

This table shows that there is no complications in hysteroscopy and 3D-US among all patients.

#### Case presentation



Case 1: A female patient 41 years old, presented with premenopausal bleeding due to endometrial polyp.



Case 2: A female patient 39 years old, presented with premenopausal bleeding due to leiomyoma.



Case 3: A female patient 38 years old, presented with premenopausal bleeding due to adenomyosis



Case 4: A female patient 38 years old, presented with premenopausal bleeding due to endometrial hyperplasia

#### 4. Discussion

In our study, we found that regarding uterine Lesions as detected by Pathology, nine patients (9.0%) were Adenomyosis, 28 patients (28.0%) were Fibroid, 15 patients (15.0%) were hyperplasia, 18 patients (18.0%) were Polyp and 30 patients (30.0%) were Normal lesions by pathology.

Our results were consistent with El-khaya et al. 5, who reported that regarding uterine Lesions as detected by Pathology, there were 5 (10%) patients with Adenomyosis, (24%) patients were Fibroid, 15 patients (24%) were hyperplasia, (10%) patients were Polyp and (22%) patients were typical lesion by pathology.

Also, our results were consistent with those of Haemila et al. 6, who reported that nine adenomatous polyps and two fibroid polyps were detected by pathology in uterine lesions.

In our study, we found that regarding uterine Lesions as detected by Hysteroscopy, 24 patients (24.0%) were Fibroid, 14 patients (14.0%) were Endometrial thickness >12, 18 patients (18.0%) were Polyp and 44 patients (44.0%) were Normal lesion by Hysteroscopy.

Our results were consistent with Ahmed et al. 7, who reported that Hysteroscopy detected Adenomyosis in 0 cases (0%), Fibroids in 32 cases (32%), hyperplasia in 19 cases (19%), polyps in 17 cases (17%), and no pathology in 32 cases (32%).

Also, our results were consistent with those of Komy et al. 8, who reported that Hysteroscopy detected uterine lesions in all studied patients. There was Fibroid in 35 patients (35%), endometrial thickness in 20 patients (20%), and Polyp in 30 patients (30%), while there were 15 patients (15%) revealed no uterine lesions (regular)

Our study showed that a highly statistically significant higher mean value of cost "LE" in Hysteroscopy was 565.00±0.00 compared to 3D-US, which was 72.50±5.02, with a p-value (p<0.001).

3D ultrasound has lower sensitivity, specificity, and accuracy than Hysteroscopy in instances of all lesions.

In 2018, research by Mohammad et al. 9 compared 3D TVUS with Hysteroscopy, and 3D TVUS had an 80% sensitivity and 100% specificity for detecting endometrial polyps. 5

According to different research done by Sun et al. 10 in 2018, endometrial polyps were the most prevalent cause of AUB, accounting for 16.2% of cases.

Vitale et al. 11 concurred with us and said that Hysteroscopy is a crucial technique for doing a focused biopsy and diagnosing an intrauterine disease with AUB.

In other instances, Hysteroscopy, with a 71% sensitivity and 100% specificity, was more successful in identifying endometrial polyps. According to Mukhopadhyay et al., 12 biopsies support this rate.

In the 13 studies by Babacan et al. comparing 2D TVUS with Hysteroscopy, endometrial polyps smaller than 1 cm were seen in around half of the 285 patients.

Vitner et al. 14, however, found no statistically significant difference in the identification of an endometrial polyp when the two methods were compared.

#### 4. Conclusion

Diagnostic hysteroscopy was more accurate in detecting all endometrial abnormalities in premenopausal women than 3D transvaginal ultrasound. The only lesion that could not be

evaluated with diagnostic hysteroscopy was adenomyosis. The cost of diagnostic hysteroscopy was greater even though none of the patients had problems with hysteroscopy or 3D-US.

### Disclosure

The authors have no financial interest to declare in relation to the content of this article.

### Authorship

All authors have a substantial contribution to the article

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### Conflicts of interest

There are no conflicts of interest.

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