

Full length Research Paper

# Comparative Study between Three Dimensional Ultrasonography and Office Hysteroscopy in Women with Abnormal Uterine Bleeding

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Abstract

To compare between the diagnostic accuracy of 3D ultrasound and office hysteroscopy in detection of intracavitary uterine abnormalities in women with abnormal uterine bleeding

In this study sixty female patients presented with abnormal uterine bleeding and their age ranged between 35 and 45 years old were assessed by 3-D ultrasound for assessment of the endometrial cavity and the data obtained were compared with the results of diagnostic hysteroscopy. Hysteroscopy was successfully performed in all subjects. Hysteroscopy diagnosed pathological findings in 27 of 60 cases (31.8%). There were 8 endometrial polyps, 3 submucous myomas, 9 interstitial myomas and 1 endometrial mass. Three-dimensional transvaginal ultrasound in comparison with hysteroscopy had 97.57% diagnostic accuracy, 88.11% sensitivity, 99.17% specificity, 94.6% positive predictive value, and 98.02% negative predictive value. The positive and negative likelihood ratios were 8.01 and 0.3, respectively. 3D-TVS successfully detected every case of submucous myoma and uterine anomaly. 3-D ultrasound is a very safe, well tolerated and effective modality for evaluation of intracavitary uterine abnormalities and is an accurate alternative technique for hysteroscopy among the premenopausal women that suffers from abnormal uterine bleeding (AUB).

**Keywords:** Ultrasound; three-dimensional; hysteroscopy; uterus; bleeding.

Introduction

Evaluation of the uterine cavity is mandatory when studying women with abnormal uterine bleeding. Likewise, assessment of the endometrium is an essential step in the management of women with diagnosed abnormal uterine bleeding as abnormalities in uterine cavity are thought to be the basis of large number of cases of abnormal uterine bleeding. Indeed, uterine cavity pathologies such as fibroids, polyps and Mullerian anomalies can cause severe abnormal uterine bleeding. Thus, their detection and treatment are important in order to attain therapeutic success (1). The diagnosis and treatment of endometrial polyps will be familiar to most gynecologists. However, the etiology and natural history of these focal intrauterine lesions are yet to be elucidated. This lack of clarity is also true with regard to their clinical significance; whilst endometrial polyps are highly prevalent in all types of abnormal uterine bleeding (AUB), they are also commonly found in women without AUB. These controversies will be discussed along with current thoughts on the diagnosis and treatment of endometrial polyps. Criteria for diagnosis of uterine polyps vary according to the test used, but optimal testing is not yet solidified. Recent data from randomized trials evaluating new and established surgical technologies as well as comparing treatment protocols and settings will be examined. Three-dimensional ultrasound offers new viewing window by allowing evaluation through a volume data set acquired from the pelvis (2). In addition, by 3D ultrasound more precise anatomical sections for exploring the endometrial cavity; Hysteroscopy was one of the very earliest approaches to the direct study of the uterine cavity (3). The direct or magnified observation of the uterine cavity by hysteroscopy may offer a more precise diagnosis, a better ground for therapy or verification of results as compared to other methods such as hystero-graphy. Although still hysteroscopy could be considered an invasive diagnostic procedure yet in all studies it is considered as the gold standard for evaluation of the uterine cavity (4).

The aim of the present study is to evaluate the accuracy of three-dimensional ultrasonography in diagnosis of uterine abnormalities compared to a gold standard (hysteroscopy). Diagnostic hysteroscopy is not widely performed in the office setting, one of reasons being the discomfort or pain produced by the procedure. Patient compliance and visualization quality were proved in multicenter randomized controlled trial- to be strongly related to: instrument diameter, anatomical difficulties determined by patient's parity and experience of the surgeon (4). Mini-hysteroscopy compared with conventional hysteroscopy was associated with less pain, less failure rate and better visualization, probably due to the less-traumatic passage through the cervical canal and the internal cervical os (4,5).

Three-dimensional (3D) sonographic imaging offers some potential advantages over conventional two-dimensional (2D) techniques. The 3D image offers the true coronal view of the uterus, which is not routinely available in 2D imaging. In gynecologic applications, the internal structural details are more important than the surface rendering, except in the diagnosis of

mullerian anomalies (6). The aim of the study was to assess the diagnostic accuracy of three-dimensional ultrasonography in comparison with office hysteroscopy for the evaluation of uterine cavity lesions or abnormalities in women with abnormal uterine bleeding. The findings from both outpatient procedures were compared to conventional or operative hysteroscopy and/or histopathological examination as a gold standard

### Materials and methods

In the present study, 60 patients were included from those attending the Obstetrics & Gynecology outpatient clinic new Damietta hospital, Al-Azhar University. All premenopausal and postmenopausal women with abnormal uterine bleeding who were suspected of having intrauterine abnormalities were eligible for this study. Intrauterine abnormalities were suspected whenever the total endometrial thickness exceeded 13 mm for premenopausal women and 7 mm for postmenopausal women, the echogenicity of the endometrium was for all patients' full history taking with special attention to the premenopausal condition as regards onset, course, duration, possible etiology and complications. Also, complete general and local examination to detect the size of the uterus, its mobility and the presence of any cervical or adnexal masses.

The office Hysteroscopy was performed using a 3.7mm diagnostic single-flow office hysteroscope sheath based with a 2.9mm optic. The vaginoscopic approach (without speculum or tenaculum) was used in all cases to avoid patient discomfort or pain. Distention of the uterine cavity was accomplished with continuous infusion of saline. A study was judged adequate only when the entire uterine cavity and both tubal ostia are visualized during the procedure. Once the cavity was entered, a panoramic view of the uterine cavity to exclude uterine malformations or a deformed cavity. Once the telescope was introduced in the cavity, examination was done systematically, first the fundus, anterior, posterior & lateral walls of the uterus ending by visualization of the uterotubal junctions.

Regarding the 3D ultrasonography, the uterine cavity was assessed by obtaining a mid-coronal render image. Assessment of mullerian anomalies was done. imaging for the uterus in a midcoronal plane, a rendered 3D ultrasound image of a coronal section of the uterus. It is now widely considered the most accurate plane for having measurements.

**Statistical methods:** Data was statistically represented in terms of range mean standard deviation ( $\pm$  SD) & percentages. Comparisons was done using Student t test comparing parametric data. For comparing non-parametric data, Chi Square ( $\chi^2$ ) test was performed. A probability value (*P* value) less than 0.05 was considered significant. Accuracy was represented using the terms of sensitivity, specificity, positive predictive value, negative predictive value and overall accuracy. All statistical calculations were done using computer programs Microsoft Excel version 2007 (Microsoft Corporation, NY, USA) and Arcus quickstat version I.

### Results

The present study included 60 patients complaining of abnormal premenopausal uterine bleeding with age of  $44.7 \pm 4.1$ . The most common bleeding pattern was menorrhagia (60%) followed by menometrorrhagia (22.8%) then metrorrhagia (31.7%) then polymenorrhoea (2.8%). Three-dimensional ultrasound detected 15 myomas (20%), 8 polyps (11.43%) and an endometrial mass, it was able to differentiate these myomas as 9 interstitial (14.29%) and 3 submucous (5.71%) in relation to the endometrial encroachment (Table 1). Hysteroscopy detected 6 myomas (8.57%) (all submucous), 12 polyps (15.72%) and one endometrial mass (1.43%). Three-dimensional US localization is comparable to hysteroscopy as shown by a sensitivity of 88.11, specificity of 99.17, positive predictive value of 94.16 and negative predictive value of 98.02, accuracy of 97.57.

**Table (1):** Characters of bleeding in studied females

Characteristics	N (%) (N=60)
<b>Menopause state</b>	
Premenopausal	55(91.7)
Postmenopausal	5(8.3)
<b>Condition</b>	
Metrorrhagia	19 (31.7)
Menorrhagia	36 (60.0)
Postmenopausal bleeding	5(8.3)
<b>Abnormality on TVS</b>	
TET > 7mm (postmenopausal)	5(8.3)
TED > 13 mm (premenopausal)	8(13.3)
Irregular endometrium	16(26.7)
Cavity not strip-like	31(51.7)
<b>Final diagnosis</b>	
Fibroid	15(25.0)
Polyp	12(20.0)
Normal	33 (55.0)

*TET indicates total endometrial thickness*

**Table (2):** Comparison between three-dimensional (3D) ultrasonography and hysteroscopy in detecting and differentiating between uterine abnormalities

	3D TVS	Hysteroscopy
<b>Sensitivity</b>	88.11%	78.22%
<b>Specificity</b>	99.17%	96.33%
<b>Positive predictive value (PPV)</b>	94.68%	78.22%
<b>Negative predictive value (NPV)</b>	98.02%	96.33%
<b>Diagnostic accuracy</b>	97.57%	93.71%

### Discussion

Hysteroscopy is an important method for the diagnosis of intrauterine pathology in several gynecologic complaints including abnormal uterine bleeding. Sensitivity and specificity of hysteroscopy are high in a large series of hysteroscopies performed in postmenopausal patients (98.2%) (5). The gold standard of evaluating the uterine cavity for intracavitary lesions (polyps and myomas) is the direct visualization by hysteroscopy; however, it is minimally invasive and is usually done under anesthesia (11,12). Furthermore, concomitant laparoscopy with hysteroscopy is needed as a gold standard in diagnosing Müllerian anomalies (13,14). Saline infusion sonography (SIS) was introduced to replace hysteroscopy for accurate diagnosis of intracavitary lesions. However, it is still minimally invasive procedure and associated with pain and/or discomfort. On the other hand, pelvic MRI was considered as a non-invasive technique to replace combined hysteroscopy laparoscopy to diagnose Müllerian anomalies (15,16,17). However, MRI is expensive and not easily available (17,18). Also, the recently wide use of 3D TVS with the advantage of having privilege of coronal view, accuracy and pain free, has revolutionized its place for evaluating uterine cavity and to be a good alternative to the previous gold standards (combined hysteroscopy with laparoscopy or the MRI) (18,19). The comparison of these 2 recently widely used techniques is still lacking. So, the aim with this study was to assess the diagnostic accuracy of 3D TVS in comparison with office hysteroscopy for the evaluation of uterine cavity lesions or abnormalities. Accuracy of 3D ultrasonography for diagnosis were 98.3, 99.2, 93.9 and 97.6 respectively with confidence interval (CI) of (95.6–100), (98.4–100), (97.6–100), (84.2–100), (94.3–100) respectively. Furthermore, many previous studies concluded that pelvic magnetic resonance imaging (MRI), saline infusion sonography (SIS) as well as hysterosalpingo-contrast sonography are not superior or more accurate to 3D ultrasonography (25,17,7). Three-dimensional (3D) transvaginal ultrasound has been commercially available. This technique allows detailed evaluation of pelvic organs by collecting a series of sequential ultrasound images and converting them into an ultrasound volume. This information is digitally stored as a dataset, which may then be analyzed on line. The dataset is reconstructed in such a way as to allow visualization of an organ from any chosen angle and in any arbitrary plane (12). This study showed good overall agreement between diagnostic hysteroscopy and 3D transvaginal ultrasound in the diagnosis of uterine abnormalities. 3D US detected, 8 polyps (11.43%) and an endometrial mass. it was able to differentiate these myomas as 9 interstitial (14.29%) and 3 submucous (5.71%). Hysteroscopy detected 6 submucous myomas (8.57%), 11 polyps (15.71%) which by pathology had been differentiated to 9 adenomatous polyps and 2 fibroid polyps.



Fig (1)



Fig (2)



Fig (3)



Fig (4)

### Conclusion

Three-dimensional ultrasound can be used in diagnosing uterine focal lesions with results comparable to hysteroscopy. 3-D ultrasound is a very safe, well tolerated and effective modality for evaluation of intracavitary uterine abnormalities and is an accurate alternative technique for hysteroscopy among the premenopausal women that suffers from abnormal uterine bleeding (AUB).

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