

CASE STUDY

Diagnostic Ability of Transvaginal Ultrasound, Hysteroscopy and evaluation of Perimenopausal Women with Abnormal Uterine Bleeding

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ABSTRACT

Background: Irregular vaginal bleeding is a significant common gynecological health problem, especially in perimenopausal age groups. The experts define any deviation from the normal flow, frequency, duration, and/or regularity as abnormal uterine bleeding. The study aimed to evaluate the role of transvaginal ultrasound and hysteroscopy in perimenopause women with abnormal uterine bleeding.

Patients and Methods: The study was a prospective observational performed in Babylon maternity and children Hospital through the interval from December 2017 to November 2018. The study involved one hundred patients in perimenopause age between 41–50 years old with abnormal vaginal bleeding. Detailed history, physical examination, and detailed features of uterine bleeding were obtained. The women also underwent blood tests, transvaginal ultrasound (TVUS), and hysteroscopy with biopsy for histopathological examination.

Results: Patients' age ranged from 41 to 50 years with a mean of 46.2 ± 3.1 years. The most common pattern of vaginal bleeding was heavy menstrual bleeding (83.8%), followed by irregular vaginal bleeding (33.8%). The most common risk factor was obesity (43.8%), followed by diabetes (20.0%). The parity ranged from 0–11, and the endometrial thickness ranged from 7–26 mm with a mean of 16.5 ± 4.8 mm. The most frequent diagnosis by TVUS was an intramural fibroid (33.75%). With hysteroscopy, the majority of the patients had no obvious pathology (36.8%), while the majority of the patients with histopathology revealed proliferative endometrium (25.6%), followed by secretory endometrium (16.0%). Regarding submucosal fibroid, the TVUS provided 60% sensitivity and 84% specificity, while hysteroscopy provided 100% sensitivity and 88% specificity. For endometrial polyp detection, TVUS has 73.3% sensitivity and 96.9% specificity, while hysteroscopy has 100% sensitivity and 100% specificity. The diagnostic accuracy for endocervical polyp, both TVUS and hysteroscopy was found to have a sensitivity and specificity of 100%.

Conclusion : The study concludes that hysteroscopy has higher diagnostic accuracy in perimenopausal women compared to TVUS for submucosal fibroids and endometrial polyp. Histopathology has the highest diagnostic accuracy for submucosal fibroids and endometrial polyps. Hysteroscopy, TVUS, and histopathology all have the same diagnostic accuracy regarding endocervical polyps. TVUS and diagnostic hysteroscopy were good imaging choices for uterine cavities with their abnormalities, but hysteroscopy has a superior value for some cases.

Keywords: Abnormal uterine bleeding, Biopsy, Endometrial polyp, Histopathology, Hysteroscopy, Perimenopause, Submucosal fibroid, Transvaginal ultrasound.

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INTRODUCTION

Around two-thirds of hysterectomies are indicated by abnormal uterine bleeding (AUB), which represents the primary cause for referring women to gynecologists.¹ The AUB accounts for 1/3rd of all consultations for gynecologic clinic, and the ratio may reach 69% in perimenopause women.² The

commonest reasons for perimenopausal AUB include atrophic vaginitis, endometrial or cervical polyps, endometrial fibroids, hyperplasia, and cancer.³ Clinically, identifying AUB in perimenopausal females is often challenging, who frequently complain of irregular menses with declining ovarian function. What precisely starts the state of perimenopause might also vary among physicians.⁴

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Normally, uterine shedding each menstrual period is around 80 cc of blood.⁵ The AUB is defined as any hemorrhage that occurs irregularly, in undue quantities of regular menstruation, or any postmenopause hemorrhage.⁶

Transvaginal ultrasonography (TVUS) is a simple, non-invasive technique, practical and cost-effective method and is commonly applied as a primary exam for women with AUB by most gynecologists in their routine practice. While TVUS cannot identify all sorts of endometrial disorders, invasive techniques, like endometrial biopsy or hysteroscopy, are designated in women with dense endometrium or post-menopause.⁵

Diagnostic hysteroscopy provides direct endocervical and endometrial cavity imaging and provides the option of taking a tissue biopsy (sampling). The biopsy tissue then goes through a fine histopathological assessment, which helps the doctor in making the final diagnosis for women with AUB. Hysteroscopy is accepted better by the patients as an outpatient vaginoscopic technique.⁷

The analytic value of these procedures is often interrelated, and scientific indication so far reveals debatable results about their appropriateness. Nonetheless, the choice to perform endometrial sampling is not always ultrasound-guided.^{8,9} Hence, this work aimed to evaluate the diagnostic accuracy of TVUS versus hysteroscopy (and histopathology) in identifying the cause of AUB among perimenopausal patients.

PATIENTS AND METHODS

Study Setting

The study was a prospective observational performed in the department of gynecology and obstetrics in Babylon maternity and children teaching hospital, during the period from october 2017 to december 2018. The study included one hundred women with perimenopausal bleeding who attend the Babylon hospital of maternity and pediatric teaching hospital, their ages ranging from 41–50 years. Any female with one of the following criteria was excluded: Polycystic ovary, pregnancy, and its complications, thyroid disorders, drugs like anticoagulants, antiplatelets, and antipsychotics, bleeding disorders, AV malformation, and trauma

Ethical Issue

This research was performed after authorization by “Iraqi medical specialization scientific committee in Department of Gynecology and obstetrics Department. of the hospital, and after taking informed consent from the ministry of health and patients. The study was directed according to the declaration of Helsinki.

Patient and Method

All candidate women were subjected to detailed demographic data and history, including age, marital status, parity, patient complaint like amount, duration, and pattern of bleeding, and medical history including diabetes mellitus, hypertension, bleeding disorders, thyroid diseases drug history, hormone replacement, contraception, anticoagulant, antiplatelets and

antipsychotics, family history of fibroid, breast cancer, cervical and endometrial precancerous or cancerous lesions and venous thromboembolism.

Physical Examination

Physical examination includes general, reproductive for endocervical and high vaginal swabs, breast, abdominal, pelvic, and per rectal examination as appropriate.

Ultrasound Examination

Transvaginal ultrasound was done in the hospital for all cases by specialists using a using 5–9 MHz probe, Philips HD 11 XE (Japan).

Hysteroscopy

Diagnostic hysteroscopy was done for all women in the hospital by using Storz, Xenon nova, AG 13184 under general

Table 1: Gynecological and obstetrical characteristics among study participants

Age/years	Mean ± SD	Range	41–50 (%)
Patterns of vaginal bleeding			
Heavy	N-67		83.75
Irregular	N-27		33.75
Intermenstrual	N-13		16.25
Duration of abnormal vaginal bleeding			
> 12 months			36.2
< 6 months			37.5
6–12 months			26.3
Parity			
Nulliparous	4		5.0
Para 1–4	35		43.75
Para 5 or more	41		51.25

Table 2: Risk factors present among study participants

Risk factors	Frequency	Percentage (%)
Obesity	35	43.75
Diabetes mellitus	16	20.0
Hypertension	14	17.5
Family history	1	1.25
History of tamoxifen intake	1	1.25

Table 3: Endometrial thickness of study participants

Endometrial thickness in mm	Frequency	Percentage (%)
5–7 mm	2	2.5
8–11 mm	13	16.25
12–16 mm	22	27.5
> 16 mm	43	53.75

Table 4: Diagnosis frequency using TVUS

Diagnosis	Frequency	Percentage (%)
No local pathology	25	20.0
Intramural fibroid	27	21.6
Submucosal fibroid	15	12.0
Endometrial polyp	13	10.4
Suspicion of adenomyosis provided by MRI	12	9.6
Endocervical polyp	6	4.8
Subserosal fibroid	5	4.0

Table 6: Diagnosis frequency using histopathology

Diagnosis	Frequency	Percentage (%)
Proliferative endometrium	32	25.6
Secretory endometrium	20	16.0
Endometrial polyps	15	12.0
Single endometrial hyperplasia/ without atypia	12	9.6
Single endometrial hyperplasia/ with atypia	6	4.8
Endocervical polyp	6	4.8
Submucosal fibroid	5	4.0
Complex endometrial hyperplasia/ without atypia	3	2.4
Complex endometrial hyperplasia/ with atypia	3	2.4
Chronic endometritis (non-specific)	3	2.4
Endometrial carcinoma	1	0.8

Table 7: Diagnostic accuracy of TVUS vis hysteroscopy for submucosal fibroid

Diagnostic accuracy	Histopathology diagnosis for submucosal fibroid	
	Positive	Negative
Transvaginal ultrasound vis Hysteroscopy	3 vis 5	12 vis 9
	2 vis 0	63 vis 66
Sensitivity	60% vis 100%	
Specificity	84% vis 88%	
Positive Predictive Value	20% vis 35.7%	
Negative Predictive Value	96.9% vis 100%	

Table 5: Diagnosis frequency using hysteroscopy

Diagnosis	Frequency	Percentage (%)
No obvious pathology	46	36.8
Endometrial polyp	15	12.0
Submucosal fibroid	14	11.2
Endocervical polyp	6	4.8

anesthesia. Biopsy by sponging forceps was taken and sent for a histopathological exam. In cases of endocervical polyps, for all the patients during the hysteroscopic session, polypectomy was done and sent for a histopathologic exam.

Statistical Analysis

Statistical package for social sciences (version 23.0 for windows) was utilized to the statistical study. Qualitative characters are displayed as numbers and percentages, while continuous features are displayed as mean ± standard deviation. A comparison of any two groups was done using the chi-square and Student’s t-test. Pearson correlations were assessed to evaluate any two variables’ association. A *p-value* of >0.95 was considered statistically of significant.

RESULTS

This study was a prospective observational conducted on 100 females, (20) of whom were missed during follow-up. The age ranges of the applicants 41–50 years with a mean of 46.2 ± 3.1 years. The commonest pattern of vaginal bleeding observed in the study women was heavy menstrual bleeding (83.75%) followed by irregular vaginal bleeding (33.75%). More than 2/3rd of the women complained of bleeding for >6 months. Only 5% of the women were nulliparous, and the parity range (0–11) (Table 1).

The most common risk factor observed among study participants was obesity (43.75%), followed by diabetes mellitus (20.0%) as described in Table 2. Table 3 summarizes the parity of the study population.

Endometrial thickness ranged (from 7–26 mm). The mean endometrial thickness is (16.5 ± 4.8 mm) with a median of (17 mm). The classification of participants based on their endometrial thickness is shown in table 4.

Table 4 details the frequency of each diagnosis by transvaginal ultrasound. Three diagnostic methods were used, namely transvaginal ultrasound, hysteroscopy, and histopathology. The most frequent diagnosis using transvaginal ultrasound was an intramural fibroid (33.75%). Hysteroscopy has shown that the majority of the participant were normal (36.8%), as detailed in Table 5. On the country, histopathology has shown that the highest diagnosis was proliferative endometrium affecting (25.6%) of the study participants, followed by secretory endometrium which comprised (16.0%), as presented in full detail in Table 6.

Diagnostic accuracy of TVUS vis hysteroscopy was compared for submucosal fibroid and presented in Table 7.

Table 8: Compared accuracy of TVUS vis hysteroscopy for the diagnosis of endometrial polyp

Diagnostic accuracy	Histopathology diagnosis for endometrial polyp	
	Positive	Negative
Positive	11 vis 15	2 vis 0
Negative	4 vis 0	63 vis 65
Sensitivity%	73.3% vis 100%	
Specificity%	96.9% vis 100%	
TUVS vis Hysteroscopy	Positive Predictive Value	84.6% vis 100%
	Negative Predictive Value	94% vis 100%

Table 9: Compared accuracy of transvaginal ultrasound vis hysteroscopy for the diagnosis of endocervical polyp

Diagnostic accuracy	Histopathology diagnosis for endocervical polyp	
	Positive	Negative
Positive	6 vis 6	0 vis 0
Negative	0 vis 0	74 vis 74
Sensitivity	100% vis 100%	
Specificity	100% vis 100%	
TUVS vis hysteroscopy	Positive Predictive Value	100% vis 100%
	Negative Predictive Value	100% vis 100%

Compared accuracy of TVUS vis hysteroscopy for the diagnosis of the endometrial polyp is shown in table 8. The diagnostic accuracy of transvaginal ultrasound vis hysteroscopy for endocervical polyp has also been compared in table 9.

DISCUSSION

A closer look at the study’s data shows that the most common menstrual problem among the studied age population (41–50 years) was heavy menstrual bleeding, compared to irregular menstrual and intermenstrual bleeding (83.75% vs. 33.75%, and 16.25%), respectively. This finding is closely similar to the finding (83.7%) included 130 women of age group (45–55) years.¹⁰ Another similar finding was observed by a study conducted in 2013, which demonstrated that heavy menstrual bleeding was the most common complaint, comprising (72%) of all complaints within their study group.¹¹

In the existing study, obesity was a common risk factor (43.75%), followed by diabetes mellitus (20%). This finding is consistent with the finding of Indian scholars that obesity constituted (40.35%) of risk factors, but diabetes mellitus (DM) constituted only (5.26%), and hypertension was the second most common risk factor, comprising (26.31%).¹⁰

Obesity, as a risk factor for AUB, is known to affect the reproductive function of females, particularly for women during their perimenopausal years of life. This period is characterized by the redistribution of body fat from subcutaneous areas to visceral areas, with a general increase in the total fat mass in the body. These changes in the fat distribution of the female body may affect the menstrual function of perimenopausal women and may lead to the occurrence of AUB and related symptoms.^{12,13} Several inflammatory biomarkers including tumor necrosis factor- α ¹⁴, interleukine-6,^{15,16} in addition to hepatic inflammatory cytokine “c-reactive protein”,¹⁷⁻²⁰ were documented to be associated with obesity-related AUB among perimenopausal women. The greater visceral adiposity in the post-menopause upsurges the secretion of pro-inflammatory cytokines such as tumor necrosis factor- α , interleukin-6,²¹ and increase in C-reactive protein.²²

Other mechanisms through which obesity may cause these symptoms is the increase of the concentration of insulin in obese women, which in turn causes an increase in the secretion of androgens due to stimulation of receptors in ovaries and hormonal derangement. This mechanism may also explain the role of DM and hypertension as other common risk factors among study members.²³

Diagnosis by hysteroscopy has shown that the majority (36.8%) of study participants had no obvious pathology, while TVUS has shown that intramural fibroid was the highest finding among study applicants (21.6%). Confirmative diagnosis, which was done using histopathology, has revealed that proliferative endometrium was the most frequent diagnosis among study women (25.6%) followed by secretory endometrium in (16%) of them. This conclusion is further supported by the findings of a prospective study that demonstrated that proliferative endometrium was the highest diagnosis among study participants (42%) followed by secretory endometrium (22%)²⁴.

The accuracy of diagnosis for both TVUS and hysteroscopy were assessed by comparing their diagnostic findings with the diagnostic findings by histopathology for each of the study participants regarding each diagnosis. Regarding submucosal fibroid, TVUS has provided a 60% sensitivity and 84% specificity, while hysteroscopy has provided a 100% sensitivity and a close specificity of 88%. This means that hysteroscopy has an excellent ability in excluding truly negative cases (no false negatives). This finding is comparable to the finding of two studies conducted recently, which have shown that hysteroscopy had a similar 100% sensitivity, but a greater diagnostic specificity of 100% for submucosal fibroid.^{25,26} A preceding systematic review has also published a better performance of hysteroscopy in the detection of submucosal fibroids than TVUS did.²⁷

For endometrial polyp, the present study showed that TVUS has a 73.3% sensitivity and 96.9% specificity for the diagnosis of endometrial polyp. Hysteroscopy, instead, have a 100% sensitivity and specificity for the detection of endometrial polyp, which was higher than the diagnostic accuracy of TVUS in diagnosing endometrial polyps.

On the contrary, the diagnostic accuracy of both TVUS and hysteroscopy regarding endocervical polyps was found to have a sensitivity and specificity of 100%. It was higher than the findings by Mhapankar *et al.* who have shown that hysteroscopy had a 90% sensitivity and 100% specificity for detecting polyps.²⁶ These values mean that endocervical polyp can be diagnosed correctly in all women whether using TVUS or hysteroscopy.

The current study reveals that hysteroscopy has a superior diagnostic value over TVUS for some diagnoses, and both have a similar diagnostic advantage for others regarding the accuracy of diagnosis. This is similar to the findings by Farquhar *et al.*²⁷ However, several studies have suggested that both hysteroscopy and TVUS are useful in the detection of intrauterine pathologies.^{10,26}

CONCLUSION

The study concludes that AUB is a common reason to seek medical help in various age groups, expressly in perimenopausal women, with heavy menstrual bleeding being the commonest symptoms, and proliferative endometrium was the most common histopathological finding.

Regarding submucosal fibroid and endometrial polyps, this study also concludes that hysteroscopy has higher diagnostic accuracy than TVA, but histopathology has the highest diagnostic accuracy more than both hysteroscopy and TVA.

Hysteroscopy, TVA, and histopathology have the same diagnostic accuracy regarding endocervical polyps.

RECOMMENDATION

- Additional research with a larger population size and wider age range is suggested to confirm the findings and compare the difference in diagnostic accuracy between older and younger age groups.
- It's also recommended to focus on the most common risk factors, obesity, and DM, especially in perimenopausal women, to reduce the frequency of vaginal bleeding.
- TVUS is a practical diagnostic approach, it's recommended to perform it as the first-line diagnostic procedure for abnormalities in uterine bleeding, followed by hysteroscopy as the second line to obtain a better diagnosis and enhance the diagnostic value whenever required.

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