

Study of Endometrial Spiral Arteries by Transvaginal Color Doppler Ultrasonography in Assessment of Patients with Dysfunctional Uterine Bleeding

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Abstract

Background: Abnormal Uterine Bleeding (AUB) is a common problem. Abnormal uterine bleeding includes both dysfunctional uterine bleeding and bleeding from structural causes. Dysfunctional Bleeding (DUB) can be anovulatory, which is characterized by irregular bleeding, or ovulatory, which is characterized by heavy but regular periods (i.e., menorrhagia). In the past, D & C was considered as the gold standard to exclude endometrial pathology. Transvaginal Sonography (TVS) is relatively cheap, needs no anesthesia and being non-invasive, it can be the first diagnostic step in evaluation of DUB as it measures endometrial thickness and exclude organic causes. Over recent years, Color Doppler Sonography (CDS) have been started to be used to predict endometrial pathologies. CDS, a noninvasive and simple tool, is useful in distinguishing endometrial lesions, helps to decide what is necessary for invasive tests and plans the invasive method to be chosen.

Aim of Study: To investigate the diagnostic value of blood flow measurements in spiral artery by transvaginal Color Doppler Sonography (CDS) in predicting different endometrial pathologies in patients having dysfunctional uterine bleeding.

Patients and Methods: Fifty patients aged between 20 & 39 years presenting with dysfunctional uterine bleeding and requiring endometrial assessment were included in this prospective observational study. Endometrial thickness was recorded. Pulsatility Index (PI) and Resistive Index (RI) of the spiral artery were measured by transvaginal CDS. Endometrial sampling was performed for all subjects. Sonographic and histopathologic findings were compared.

Results: The histopathological diagnoses were as follows; 22 cases (44%) secretory endometrium, 18 cases (36%) proliferative endometrium, 5 cases (10%) mixed proliferative and secretory endometrium, 5 cases (10%) endometrial hyperplasia. There was statistically significant difference between spiral artery RI & PI and histopathological results.

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Key Words: Abnormal Uterine Bleeding (AUB) – Dysfunctional Bleeding (DUB) – Pulsatility Index (PI) – Resistive Index (RI).

Introduction

ABNORMAL Uterine Bleeding (AUB) is a common problem in gynecological practice, accounting for 15% of office visits & 25% of gynecological operation [1]. AUB has been defined by FIGO as bleeding from the uterine corpus that is abnormal in volume, regularity, and/or timing, and has been present for the majority of the past 6 months [2]. Dysfunctional Uterine Bleeding (DUB) is defined as abnormal bleeding from uterus in absence of organic disease of the genital tract and its management can be complex [3].

In the past, D & C was considered as the gold standard to differentiate different endometrial pathologies. This procedure has two main drawbacks: First, it is an invasive procedure and has to be done under suitable anesthesia; second, it may miss lesions such as polyps or endometrial carcinoma in not less than 10% of cases [4].

Trans-Vaginal Sonography (TVS) is relatively cheap, needs no anesthesia and being non-invasive, it can be the first diagnostic step in evaluation of DUB as it measures endometrial thickness and exclude organic causes [5]. Over recent years, Color Doppler Sonography (CDS) have been started to be used to predict endometrial pathologies to decide what is necessary for invasive tests and plans the invasive method to be chosen [6].

Medical treatment is the first-line therapy in order to decrease blood loss. It includes hormonal therapy regimes such as Oral Contraceptive Pills (OCP), progestin given during luteal phase or in

an extended regimen, Levonorgestrel Intrauterine Device (L-IUD), and Gn-RH agonist. There are also nonhormonal medical therapies: NSAIDs and tranexamic acid. Endometrial ablation and hysterectomy are the two surgical options for DUB [7,8].

Patients and Methods

This prospective study was conducted in Department of Obstetrics & Gynecology Tanta University Hospitals, from period of November 2016 to May 2017. Fifty patients aged 20 to 39 years with Body Mass Index (BMI) less than 30kg/m^2 presented with Dysfunctional Uterine Bleeding (DUB).

This study aim at evaluation of the diagnostic value of blood flow measurements on Spiral arteries by Trans Vaginal Color Doppler Ultrasonography in prediction of the different endometrial pathologies in patients having Dysfunctional uterine bleeding.

Exclusion criteria were pregnancy, structure uterine pathology such as myoma, adenomyosis and polyps, genital tumor, blood disease affecting coagulation profile as leukemia and thrombocytopenia, metabolic disorders as hepatic disease, diabetes mellitus, thyroid dysfunction & hypertension. Intrauterine device use and use of drugs affecting uterine vasculature such as hormonal therapy, oral contraceptives or tamoxifen and drugs affecting coagulation as aspirin, heparin & oral anti-coagulant during the previous 3 months.

The study was approved by Ethical Committee at Faculty of Medicine Tanta University. All patients gave oral and written informed consent prior to the examination. The patients were examined prospectively by standard B-mode TVS and CDS same day of D & C biopsy. Histopathologic examination was performed in the Pathology Department, Faculty of Medicine, Tanta University. All ultrasound scans were performed by the same examiner to avoid inter observer variability. All women were examined firstly using conventional gray-scale TVS with a 6.5-MHz transvaginal probe in the lithotomy position with an empty bladder. The uterus was thoroughly assessed in coronal and sagittal planes using a Samsung H 60 machine. Endometrial double layer thickness was noted. Endometrial double layer width is measured at the thickest portion of the longitudinal section. Then, vascularization of the uterus is visualized with color Doppler technique. Blood flow velocity waveforms were evaluated in the spiral arteries at the sub endometrial region that is within 1mm of the myometrial-endometrial contour. The results of

the examinations were compared with the histologic diagnosis of the endometrial specimen. The primary outcome measures were spiral artery Pulsatility Index (PI) and spiral artery Resistive Index (RI).

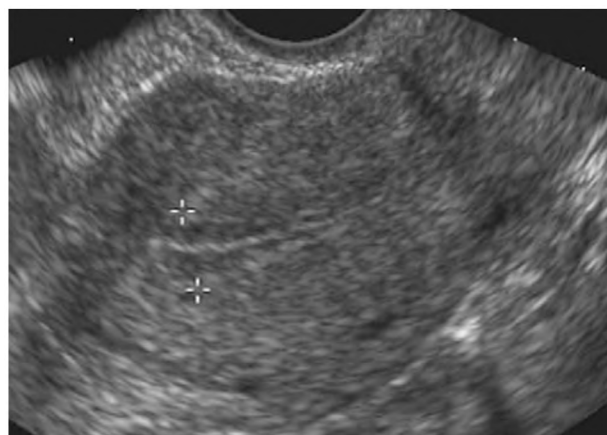


Fig. (1): Measurement of endometrial thickness

Results

This prospective study was conducted on 50 cases presented with Dysfunctional Uterine Bleeding. Mean age, parity of the participants' were 31.54 ± 5.6068 and 3.22 ± 2.16 respectively. Table (1) summarizes the histopathological diagnoses of the patients with mean endometrial thickness by gray scale ultrasonography.

Table (1): Histopathological diagnoses of all patients & mean endometrial thickness.

Histological diagnoses (D & C biopsy)	N	%	Mean endometrial thickness in mm
Secretory endometrium	22	44	10.68 ± 2.34
Proliferative endometrium	18	36	6.06 ± 1.43
Mixed endometrium	5	10	10.80 ± 0.84
Hyperplasia without atypia	5	10	20.80 ± 5.26

There were significant correlations between spiral artery PI and RI and different endometrial histologies. Tables (2,3) summarize the comparison of the spiral artery Doppler indices between different endometrial histologies.

Table (2): Comparison of the Pulsatility Indices (PI) of spiral artery between different endometrial histopathologies.

Endometrial histology	Spiral artery PI Mean \pm SD	p-value
Secretory endometrium	1.10 ± 0.14	0.001
Proliferative endometrium	1.10 ± 0.06	
Mixed endometrium	1.12 ± 0.01	
Hyperplasia without atypia	1.36 ± 0.03	

Table (3): Comparison of the spiral artery resistance indices between different endometrial histopathologies.

Endometrial histology	Spiral artery PI Mean \pm SD	<i>p</i> -value
Secretory endometrium	0.55 \pm 0.02	0.003
Proliferative endometrium	0.53 \pm 0.02	
Mixed endometrium	0.54 \pm 0.04	
Hyperplasia without atypia	0.71 \pm 0.03	

In patients with endometrial hyperplasia without atypia spiral artery PI was found to be significantly higher than other groups ($p=0.001$). Spiral artery RI was also higher in patients with hyperplasia without atypia group than in other groups ($p=0.003$).

Discussion

Histopathological examination of the endometrium is gold standard in the diagnosis of endometrial pathologies. However, with the advance of high resolution ultrasound, studies on noninvasive evaluation of the uterine cavity have dramatically increased. Many studies showed thicker endometrium on grayscale sonography in neoplastic endometrial lesions. However endometrial thickening on TVS is a nonspecific finding, therefore secondary tests are usually required to reduce false positive results. Color Doppler ultrasonography of endometrial spiral arteries can be used to increase the diagnostic value of gray-scale TVS. In this study we compared the Doppler indices of endometrial spiral arteries with the final histologic diagnoses.

This study shows that there is statistically significant relationship between different histological diagnoses and endometrial thickness by gray scale ultrasonography ($p=0.065$) and Doppler indices of endometrial spiral arteries ($p<0.003$).

Bhattacharjee S et al., [9] revealed that there was significant relationship between Doppler study and different endometrial biopsies. Both studies were consistent in number of enrolled patients (50), most of histopathological results were normal endometrium (secretory, proliferative), accuracy of Doppler in predicting different endometrial histologies. However, both studies differ in age group, pelvic pathology wasn't excluded in Bhattacharjee S et al., who also performed Doppler study on uterine arteries and spiral arteries.

S.K. Kucur et al., [10] investigated the diagnostic value of blood flow measurements in spiral artery by transvaginal color Doppler Sonography (CDS) in predicting endometrial pathologies. The results were consistent with this study as regard accuracy of Doppler study on spiral arteries in predicting

endometrial histologies. However, both studies differ in number of enrolled patients and their age group so histopathological results were also different including atrophic endometrium and endometrial carcinoma.

Dragojevic et al., [11] investigated the role of transvaginal color Doppler sonography in evaluation of abnormal uterine bleeding. There was good correlation between histopathological results and Doppler findings. However, both studies differ in number of enrolled cases and age group.

Arslan et al., [12] investigated the role of transvaginal color Doppler ultrasonography for the prediction of precancerous endometrial lesions. They concluded that transvaginal ultrasonography and Doppler ultrasonography cannot replace the invasive procedures.

Conclusion:

The use of transvaginal color Doppler ultrasonography can help in predicting different endometrium types of Dysfunctional Uterine Bleeding, and this may result in reduction of the number of cases needing endometrial biopsy.

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Conflicts of interest:

No conflicts of interest declared.

Authors' contributions:

All authors had equal role in design, work, statistical analysis and manuscript writing. All authors have approved the final article work.

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دراسة شرايين بطانة الرحم اللولبية بالموجات فوق الصوتية بالدوبلر الملون عن طريق المهبل في تقييم مرضى النزيف الرحمي الغير وظيفي

يعتبر النزيف المهبلي من أكثر المشكلات التي تعاني منها السيدات أثناء حياتها. وينقسم إلى نزيف عضوي والذي قد يكون نتيجة أورام ليفية أو سرطانية أو أمراض بالدم كخلل بالصفائح الدموية أو وسائل منع الحمل أو نتيجة نزيف غير وظيفي ويحتاج التشخيص إلى وسيلة سهلة وبسيطة وهذا ما يتوفر في المجس المهبلي والذي زادت دقته وأهميته بعد استخدام الدوبلر الملون مقارنة بالكحت وعينة بطانة الرحم.

هدف الدراسة: تقييم القيمة التشخيصية لقياس تدفق الدم في الشرايين الرحمية اللولبية بالموجات فوق الصوتية بالدوبلر الملون عن طريق المهبل في التنبؤ بمختلف الأنواع النسيجية في مرضى النزيف الرحمي الغير وظيفي.

طرق البحث: أجريت الدراسة على خمسين من السيدات اللاتي تعانين من نزيف رحمي غير وظيفي بقسم التوليد وأمراض النساء جامعة طنطا. حيث إستند إختيار المرضى على معايير الإنتقاء والإقصاء. خضعت جميع المريضات إلى: التاريخ المرضي الكامل، الفحص الإكلينيكي الشامل، تم عمل سونار مهبلي بالدوبلر الملون لقياس سمك بطانة الرحم ومعاملات تدفق الدم في الشرايين الرحمية اللولبية ثم خضعت المريضات لعمل كحت وعينة بطانة الرحم ثم تم مقارنة النتائج إحصائيا.

النتائج: تم إيجاد علاقة إحصائية بين نتائج عينة كحت بطانة الرحم ونتائج معاملات تدفق الدم في الشرايين الرحمية اللولبية وكذلك سمك بطانة الرحم.

الإستنتاج: يمكن إستخدام الموجات فوق الصوتية بالدوبلر الملون عن طريق المهبل في التنبؤ بمختلف الأنواع النسيجية في مرضى النزيف الرحمي الغير وظيفي مما قد يساعد في تقليل إستخدام عملية كحت وعينة الرحم.

التوصيات: يوصى بإجراء دراسات أكثر على مدى أوسع لتفعيل إستخدام هذه الطريقة في التشخيص.