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COLOR DOPPLER TRANSVAGINAL ULTRASOUND FOR DETECTING INTRAUTERINE DISORDERS IN PATIENTS WITH ABNORMAL UTERINE BLEEDING

KOLOR DOPLER TRANSVAGINALNI ULTRAZVUK U OTKRIVANJU PROMJENA MATERIŠTA U BOLESNICA S ABNORMALNIM KRVARENJIMA MATERNICE

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Original paper

Key words: intrauterine pathology, abnormal uterine bleeding, color Doppler transvaginal ultrasonography, hysteroscopy

Summary. ***Purpose.*** To evaluate the role of colour Doppler transvaginal ultrasonography (CDTU) in detection of intrauterine pathology in those patients with abnormal uterine bleeding. ***Material and methods.*** 272 patients with abnormal uterine bleeding were evaluated by color Doppler transvaginal ultrasonography searching for intrauterine pathology. All patients underwent hysterocopic studies to evaluate ultrasonographic findings. Ultrasonographic variables considered were: endometrial thickness, gray-scale and color Doppler sonographic findings, resistence index and pulsatility index. ***Results.*** CDTU showed intrauterine abnormalities in 142 patients (52.2%) being the polyps (82 cases) and myomas (41 cases) the most frequent. Hysteroscopy revealed abnormalities in 149 women, 125 of them showing alterations in CDTU. The sensitivity is of 83.9% (CI: 76.8–89.2), the specificity of 86.2% (CI: 78.5–91.5), the predictive positive value of 88.0% (CI: 81.3–92.7) and the predictive negative value of 81.5% (CI: 73.6–87.6). The sensitivity of CDTU for the diagnosis of polyp was 72.8% (CI: 61.6–81.9) and for the diagnosis of myoma 85.7% (CI: 70.8–94.1). ***Conclusion.*** CDTU can be used to discriminate women with abnormal uterine bleeding that should undergone to hysteroscopy for a definitive diagnosis.

Izvorni članak

Ključne riječi: intrauterina patologija, krvarenja maternice, kolor dopler, transvaginalni ultrazvuk, histeroskopija

Sažetak. ***Cilj istraživanja.*** Vrednovati ulogu kolor dopler transvaginalnog ultrazvuka (CDTU) u otkrivanju intrauterine patologije u bolesnica s abnormalnim maternicnim krvarenjem. ***Materijal i metode.*** 272 bolesnice s abnormalnim maternicnim krvarenjem pregledane su pomoću CDTU tražeći patološke promjene materišta. Svima bolesnicama je učinjena i histeroskopija te uspoređena s CDTU. Ultrazvučne varijable su bile: debljina sluznice, ultrazvučni nalaz na sivoj skali i kolor dopleru, indeks otpora (RI) i pulzatilnosti (PI). ***Rezultati.*** CDTU je pokazao abnormalni nalaz materišta u 142 bolesnice (52,2%): polip je nađen najčešće (u 82) i zatim miom (u 41). Histeroskopski je nađen abnormalni nalaz u 149 žena, u 125 njih su bile i abnormalnosti CDTU-om. Osjetljivost CDTU-a iznosi 83,9% (CI: 76,8–89,2), specifičnost 86,2% (CI: 78,5–91,5), pozitivna prediktivna vrijednost 88,0% (CI: 81,3–92,7) i negativna prediktivna vrijednost 81,5% (CI: 73,6–87,6). Osjetljivost CDTU za dijagnostiku polipa je iznosila 72,8% (CI: 61,6–81,9), a za dijagnostiku mioma 85,7% (CI: 70,8–94,1). ***Zaključak.*** CDTU može u žena s abnormalnim krvarenjem razabrati one kojima je za konačnu dijagnozu potrebna histeroskopija.

Introduction

Abnormal uterine bleeding (metrorrhagia or menorrhagia – AUB) is a frequent gynecologic symptom that can appear due to many etiologic causes, producing chronic anemia, but the most important is endometrial carcinoma. Thus makes that AUB yields to distress, and this pathology should be disclosed.

Color Doppler transvaginal ultrasonography (CDTU) of the endometrium has become an important part of the evaluation of women presenting AUB. It is noninvasive, low in cost procedure that does not cause patient discomfort.[1] In patients with AUB ultrasound-based triage has become widely accepted.[2–10] The aim of this study is to evaluate the diagnostic value of CDTU in the diagnosis of intrauterine pathologic disorders.

Material and methods

From 1st June 2003 to 15th September 2003 a prospective observational study was undertaken at the Gynaecological Ultrasound Unit in 272 consecutive patients with AUB. Those pregnant patients were disclosed. All women were studied with color Doppler transvaginal ultrasonography and hysteroscopy. Sonographic examinations were done with real-time ultrasound scanner

(Power Vision 6000, SSA-370 A/E2 or Aplio SSA-700A; Toshiba, Tokyo, Japan) using a MultiHertz endovaginal probe with a field of view of 150° and color Doppler capability.

The variables considered were: age, gray-scale and color Doppler sonographic findings in the cavity. The uterus was completely assessed longitudinally and transversely. The endometrial thickness was measured at the thickest part in the longitudinal plane, including both endometrial layers. According to the Consensus Conference statement[10] a cut-off value of >5 mm was considered abnormal in postmenopausal women. In premenopausal and postmenopausal women under hormone therapy endometrial thickness was measured between day 5 and day 8 after the last patient intake and, when present, after the end of the menstrual-like bleeding. Regular and nodular hyperechoic areas within the endometrial layer, usually deforming the line indicating uterine cavity or cystic spaces within an abnormally thickened endometrium were considered suggestive of polyps. Endometrial cancer was suspected in the presence of a heterogeneous endometrium with an irregular interface between endometrium and myometrium. A thickened, homogeneous or heterogeneous, but well-defined endometrial stripe was considered an endometrial abnormality suggesting endometrial hypertrophy. Iso – or hypoechogenic regular nodules, partial or completely within the cavity, were considered suggestive of myoma.

The presence or absence of flow was considered and the values of resistance index (RI) and the pulsatility index (PI) were taken when it was possible. The presence of a vascular stalk in a hyperechogenic nodule with CDTU was considered as suggestive of endometrial polyp. When an iso or hypo-echogenic intracavitary nodule displayed a vascular ring it was considered as a myoma. If scattered vessels were seen in a thickened endometrium with a well defined interface between endometrium and myometrium the diagnosis of endometrial hypertrophy was done. The cavity was considered as normal when no endometrial thickeness or lesions occupying this space either were seen in the gray scale and no vascularization was seen in Doppler color study.

Diagnostic hysteroscopy is performed as an office procedure in our Department since 1983. From1997 it has turned out into a vaginohysteroscopy thanks to 5-mm continuous-flow endoscopes which distent both the vagina and the uterine cavity with saline. Neither speculum, cervical tentaculum or oral premedication are routinely used. Major indications gather abnormal uterine bleeding, fertility disorders or abnormalities in imaging techniques.

The gold standard was defined as the presence or absence of an endometrial abnormality at hysteroscopy within 3 months after CDTU.

For statistical analysis percentages, mean and standard deviations were used. Sensitivity, specificity, positive and negative predictive value of CDTU for detecting intrauterine abnormalities were also calculated.

Results

The study group was composed by 272 patients complaining dysfunctional uterine bleeding, having CDTU and hysteroscopic examination.

The mean age of the patients was 44±10.6 year (23–73), 59 being menopausal.

CDTU showed no pathologic alterations in 130 (47.8%) patients *(Table 1)* whereas in 142 (52.2%) women revealed intrauterine pathology such as polyps in 82 (57.7%), myomas in 41 (28.9%), hypertrophy in 16 (11.13%), and neoplasia in three (2.1%). Hysteroscopy was normal in 123 (45.2%) patients and abnormal in 149 (54.8%) whose diagnosis were: polyps in 81 (54.4%), submucous myomas in 42 (28.2%), hyperplasia in 21 (14.1%), synechia in four (2.7%) and neoplasia in one (0.7%). In 125 of 149 patients with hysteroscopic abnormalities CDTU detected intrauterine alterations, being the sensitivity of 83.9% (CI: 76.8–89.2), the specificity of 86.2% (CI: 78.5–91.5), the predictive positive value of 88.0% (CI: 81.3–92.7) and the predictive negative value of 81.5% (CI: 73.6–87.6).

The sensitivity in diagnosis of polyp between CDTU and hysteroscopy was of 72.8% (CI: 61.6–81.9; 59 of 81) with a specificity of 88.5% (CI: 82.3–92.1), predictive positive value of 72.0% (CI: 60.8–81.0) and predictive negative value of 88.4% (CI: 82.8–92.4). In the 23 cases with false positive diagnosis of polyp by CDTU, hysteroscopy was normal in 12, hysteroscopy diagnosed hyperplasia in nine, neoplasia in one and synechia in one. The sensitivity in the diagnosis of myoma *(Fig. 1)* was of 85.7% (CI: 70.8–94.1; 36 of 42). In 5 cases with false positive CDTU diagnosis of myoma, hysteroscopy was normal in two and revealed a polyp in three patients.

The 59 polyps diagnosed by CDTU verified by hysteroscopy showed a mean size measured by ultrasound

Table 1. Relationship between diagnose by CDTU and hysteroscopy
Tablica 1. Odnos dijagnoza postavljenih kolor dopler transvaginalnim ultrazvukom i histeroskopijom

CDTU	Hysteroscopy						
	Normal	Polyp	Myoma	Hyperplasia	Synechia	Neoplasia	Total
Normal	106	11	6	4	3	0	130
Polyp	12	59	0	9	1	1	82
Myoma	2	3	36	0	0	0	41
Hypertrophy	2	7	0	7	0	0	16
Neoplasia	1	1	0	1	0	0	3
Total	123	81	42	21	4	1	272

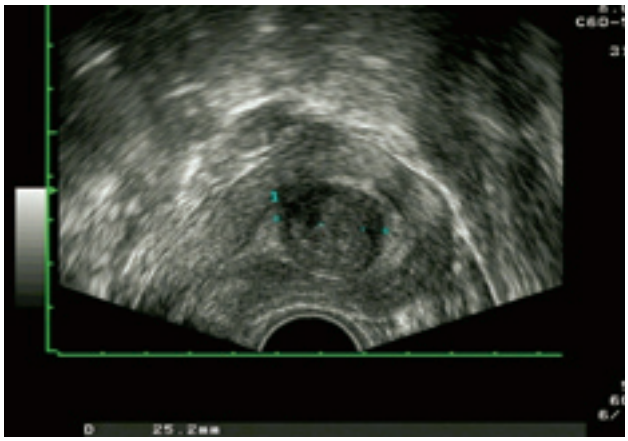

Figure 1. Transvaginal sagittal sonogram of uterus. The precise localization of a submucous myoma with respect to the endometrial cavity can be seen

Slika 1. Transvaginalni sagitalni sonogram maternice. Vidi se točna lokalizacija submukoznog mioma u materištu

of 13.0±7.9 mm (ranging from 5 to 64 mm). Twenty six (44%) of these cases showed flow on color Doppler *(Fig 2)*. with a mean pulsatility index of 1.29±0.93 and a mean resistance index of 0.64±0.11.

CDTU was not useful in diagnosis of neoplasia thus the three patients diagnosed showed respectively a polyp, hyperplasia and normal cavity by hysteroscopy.

Discussion

In addition to endometrial carcinoma there are several causes of AUB and many of them can be detected by CDTU such as the pathology related to pregnancy as is the ectopic pregnancy. CDTU is also an efficiency procedure to detect endometrial polyps, the most frequent pathology found in those patients with AUB. Ultrasonographic diagnosis of polyp can be done mainly when the vascular pedicle is demonstrated by high resolution color Doppler.[11] The use of more sensitive color Doppler like

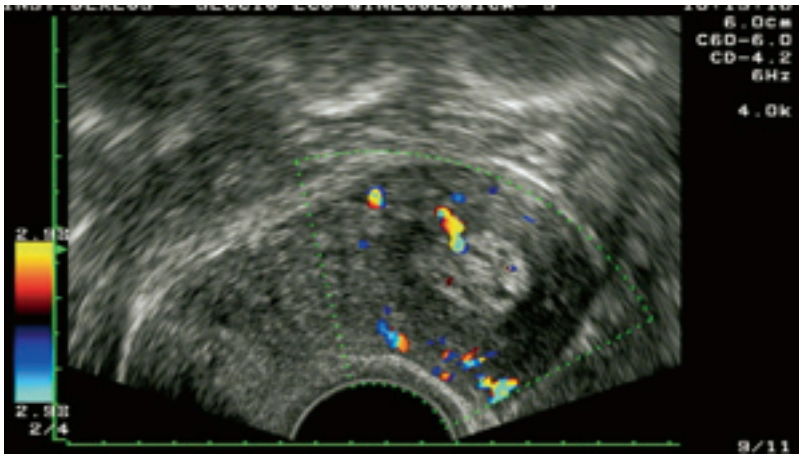

Figure 2. Color Doppler transvaginal sonography. Longitudinal scan shows an hiperechogenic nodule within the cavity. Color Doppler display a pedicle artery. The hysteroscopic study demonstrated an endometrial polyp

Slika 2. Kolor dopler transvaginalna sonografija. Uzdužni presjek pokazuje unutar materišta hiperehogeni čvor. Kolor dopler otkriva arteriju peteljke. Histeroskopski pregled je pokazao endometralni polip

a power Doppler[12] or power Doppler three-dimensional ultrasound[13] will probably improve the visualization of vascular pedicle in endometrial polyps. Endometrial polyp also can be differentiated from submucosal myoma according the vascularization pattern.[14] Some authors[15] suggest that CDTU can detect malignancy in endometrial polyps but others found that nor flow impedancy (pulsatility index and resistence index) neither lesion size can predict malignancy.[16] Even hysteroscopy and saline contrast sonohysterography cannot reliably differentiate atypical from benign endometrial polyps,[17] our results show that CDTU is useful in the diagnosis of endometrial polyps. Only in 11 patients CDTU was normal and hysteroscopy revealed the presence of a polyp.

In patients with abnormal uterine bleeding it has been shown that endometrial thickness as measured with transvaginal sonography has a high sensitivity but a poor specificity.[7] Saline contrast hysterosonography is accurate in the evaluation of the uterine cavity in pre- and postmenopausal women with abnormal uterine bleeding.[18]

The cost of saline contrast is higher than transvaginal sonography, it needs extra time to counsel the patient, prepare the material and perform the procedure. Side effects include pelvic pain, vasovagal symptoms, nausea and vomiting, infection, although very rare, and dissemination of malignant cells in the peritoneal cavity.[19,20] Physicians who perform or supervise diagnostic saline infusion sonohysterography should have training, experience, and demonstrated competence in gynecologic ultrasonography and saline infusion sonohysterography.[21]

The highest accuracy of hysteroscopy was reported in diagnosing endometrial polyps, whereas the worst result was in estimating hyperplasia. Therefore, since the incidence of focal lesions in patients with abnormal uterine bleeding is high, it seems that the most beneficial approach is to proceed with hysteroscopy complemented by endometrial biopsy.[22]

Our results, mainly in the diagnosis of intracavitary myomas show a good concordance between CDTU and hysteroscopy. Farquhar et al.[23] in his revision concluded that ultrasonography, sonohysterography and hysteroscopy were moderately accurate in detecting intrauterine pathology, but sonohysterography and hysteroscopy performed better than transvaginal ultrasound in detecting

submucous myomas. Other authors[24] found that differential diagnosis for abnormal uterine bleeding in premenopausal and postmenopausal patients is well evaluated with ultrasound, and ultrasound techniques have greatly facilitated evaluation of pelvic disease.

The scanty cases of endometrial cancer makes that CDTU shows a low diagnostic efficiency in our serie compared with.[2,3,6,7,26]

According to our results CDTU, although is an operator dependent technique, has a good capacity to detect intrauterine pathology. Some authors have demonstrated that many of the discordances can be due to the interobserver variability, perhaps some strategies to avoid this problem should be taken.[25] In this way 3D ultrasonography can play an important role in the future.[13]

Even the discordances CDTU can provide information about the texture of endometrium, so that one can distinguish bleeding due to endometrial hyperplasia, polyps or myomas. CDTU can thus be used to distinguish those patients that may be followed from those in whom ultrasound detected findings makes that hysteroscopy and/or biopsy is required. In conclusion our data show that CDTU can be used to select women with abnormal uterine bleeding who would further benefit from the use of hysteroscopy to make a definite diagnosis.

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