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Diagnostic value of transvaginal color Doppler ultrasound on endometrial lesions

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Summary

Objective: To discuss the diagnostic value of transvaginal color Doppler ultrasound on endometrial lesions. *Materials and Methods:* The study included 126 cases diagnosed with endometrial lesions by transvaginal color Doppler ultrasound that were examined by hysteroscopy, biopsy, and curettage pathology, and compared with pathology. *Results:* The transvaginal color Doppler ultrasound diagnosis corresponded to 92.6% (117 of 126 cases) of the pathology diagnosis. *Conclusions:* Transvaginal color Doppler ultrasound has important diagnostic value in the case of endometrial lesions, has a high rate of detection and diagnostic on endometrial lesions, and is the best method for diagnosis of endometrial lesions.

Key words: Transvaginal ultrasound; Color Doppler flow imaging; Endometrial lesions.

Introduction

Endometrial lesion is a common gynecological disease, including uterine endometrial hyperplasia, uterine endometrial polyps, uterine mucosa myoma, and endometrial cancer. It mainly presents as irregular menstrual cycle, abnormal menstruation, irregular vaginal bleeding, and vaginal bleeding after menopause [1-4]. Endometrial hyperplasia is the pre-cancerous lesion of the endometrium, and has various subgroups with different rates of progression to cancer. In fact, the progression rate may vary from 2% to 22%. Endometrial sampling through office biopsy is the first choice for the diagnosis of these endometrial pathologies [5-7]. Using a combination of other diagnostic methods (DyC, saline infusion sonography, hysteroscopy) may achieve a diagnostic accuracy rate of 100% [8-10]. The most favorable non-invasive method used to increase the diagnostic accuracy of invasive procedures is the measurement of endometrial thickness by transvaginal ultrasonography (TVUS) [11-13]. However, the specificity of TVUS alone in the assessment of the endometrium is not reliable enough to obviate endometrial biopsy in the diagnosis of an endometrial pathology [14].

Several investigators have recently suggested that color Doppler measurements of uterine and myometrial arteries should be used to improve the sensitivity of TVUS in the detection of endometrial pathologies [15-18]. The objective of this study was to evaluate the diagnostic value of blood flow measurements in endometrial and uterine vessels by transvaginal color Doppler ultrasonography in the detection of the neoplastic endometrial pathologies in women with abnormal uterine bleeding.

Materials and Methods

The study period was carried out from February 2011 to February 2015 and included 126 cases with endometrial disease confirmed by transvaginal color Doppler ultrasound. Age range was from 22 to 67 years and out of 126 patients, 102 had varying degrees of irregular menstrual cycle, menstrual volume and irregular vaginal bleeding, and the remaining 24 patients had asymptomatic examinations.

An ultrasonic diagnostic apparatus with a probe frequency of 3.5 ~ 8MHz was utilized. Subjects after emptying their bladder were placed in lithotomy position, while elevating the hip, if necessary. The female condom probe cover was placed and inserted in the vaginal fornix in order to perform a vaginal ultrasound multi-section with multi-angle scanning, to observe the following: uterine size, morphology, endometrial thickness, shape, echo, whether the base was continuous, muscular boundary conditions, whether there was abnormal intrauterine echo, the size, border, and shape of abnormal echo and its relationship with uterine muscle wall, double attachment zone situation etc. Through color Doppler flow imaging (CDFI) assessed blood flow of abnormal intrauterine echo, muscle blood flow signals within the measurement of blood flow resistance index (RI) and proliferative endometrium thickness > 12 mm or postmenopausal endometrial thickness > five mm; if an uneven or abnormal endometrial echo was found, intrauterine endoscopy included biopsy and curettage, pathological examination of the removed material, ultrasound diagnostic hysteroscopy, and pathology results were then analyzed.

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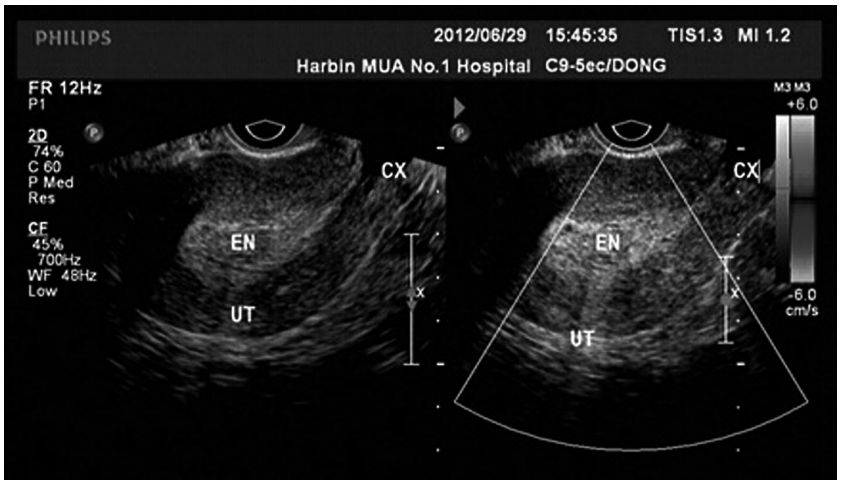

Figure 1. — Endometrial hyperplasia by transvaginal ultrasound and color Doppler flow imaging.

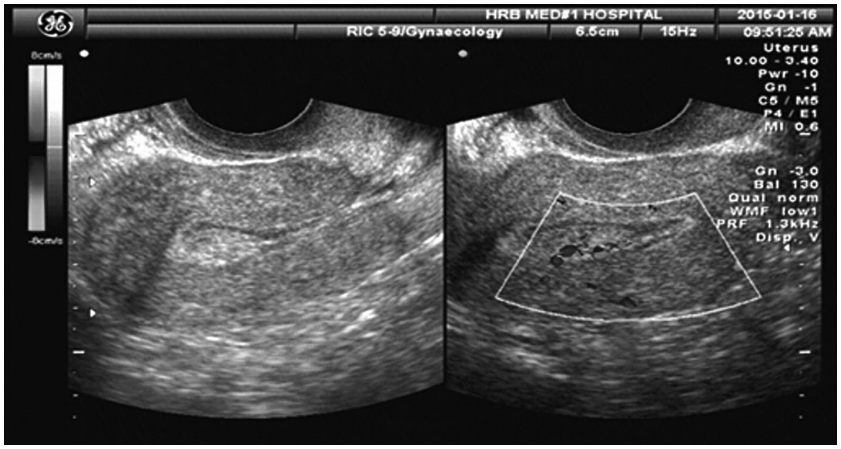

Figure 2. — Endometrial polyps by transvaginal ultrasound and color Doppler flow imaging.

Results

There were 126 patients of which 117 cases were consistent with hysteroscopy and pathological diagnosis, including diagnosis of endometrial hyperplasia in 90.4% (66/73) of cases. Diagnosis of endometrial polyps was made in 95.3% (41/43) of cases. Diagnosis of uterine fibroids mucosa was made in 100% (6/6) of cases, and diagnosis of endometrial cancer was made in 100% (4/4) of cases.

Discussion

Endometrial lesions are a common disease in obstetrics and gynecology and the incidence gradually increased in recent years; the most common are endometrial hyperplasia, endometrial polyps, submucosal uterine fibroids, and endometrial cancer. Clinical manifestations include irregular menstrual cycle, menstrual volume, irregular vaginal bleeding, postmenopausal bleeding, and infertility, which all have a serious impact on women's health and lives. With advances in ultrasound technology, endometrial lesion detection rate has greatly increased.

The endometria of women of childbearing age is regulated by ovarian periodic change, which will present different sonographic features. Transvaginal ultrasound, with high resolution, is close to the pelvic organs and can exclude endometrial carcinoma in patients with endometrial thickness of three to four mm [19, 20], which is an irreplaceable examination method for diagnosis of endometrial hyperplasia and endometrial cancer.

Transvaginal color Doppler ultrasound can identify endometrial polyps and endometrial cancer [21]. This process dispense with bladder filling, and it is not affected by obesity, abdominal wall tension, intestinal gas, and other factors, and the periodic change of endometrial lesions can be clearly displayed. In addition, endometrium of patients with small lesions can be clearly observed. Endometrial transvaginal ultrasound is also painless, non-invasive, and repeatable, which is also a safe and reliable method for diagnosis of endometrial lesions [22, 23].

The sonographic features of normal endometrial in the proliferating phase is affected by estrogen, in which the functional layer appears as hypoechoic and the basal layer

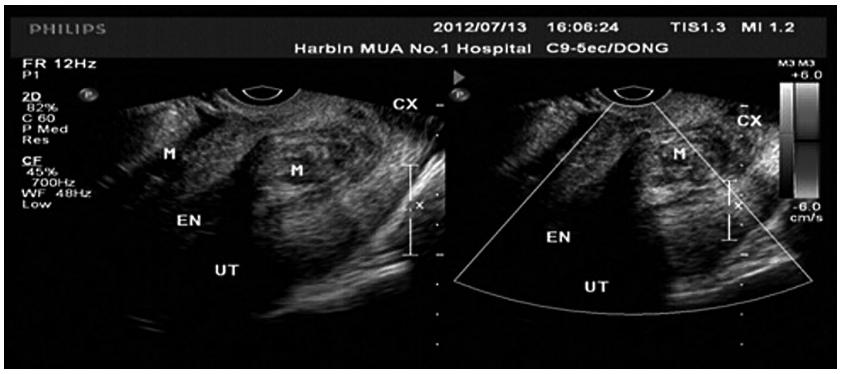

Figure 3. — Submucosal uterine fibroids by transvaginal ultrasound and color Doppler flow imaging.

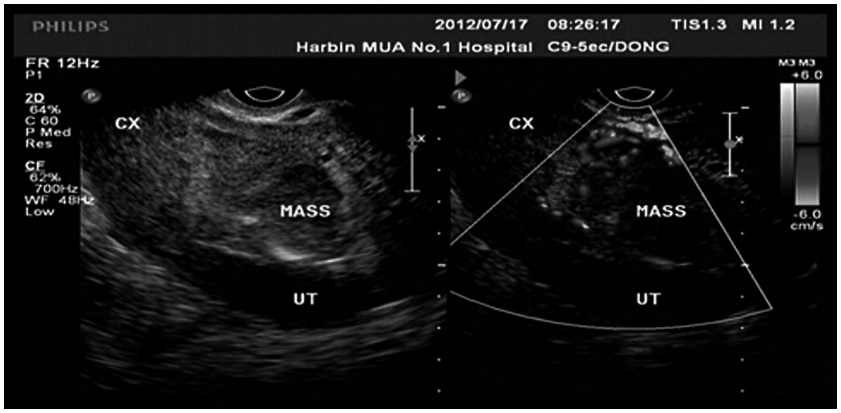

Figure 4. — Endometrial cancer by transvaginal ultrasound and color Doppler flow imaging.

as hyperechoic, and the structure is shown by three wires. In secretory phase, endometrium is affected by progesterone and gradually presents as hyperechoic from the basal layer to the functional layer.

Sonographic features of endometrial lesions by transvaginal color Doppler ultrasound included the following characteristics: (1) in endometrial hyperplasia: sonographic features include an endometrial thickness of > 12 mm for pre-menopausal women or > five mm for post-menopausal women, show an uneven hyperecho, scattered with little echoless formed by expanded gland, and it has a clear demarcation with the uterine muscle wall. Color Doppler flow imaging shows no flow signals or star spotting flow signals in the focus (Figure 1); (2) endometrial polyps: the best time for ultrasonography is three to seven days after menstruation. Transvaginal ultrasound shows that endometrial echo is uneven and has a local strong reflex, with one or more drop-shaped or uncoated envelope hyperecho visible in the endometrium; color Doppler flow imaging show spots or short strip flow signal (Figure 2) in polyp pedicle; (3) uterine submucous myoma: there is a small hypoecho from myometrium and protrudes into endometrium, has a capsule, internal uneven echo, rear echo attenuation, deformation of the endometrium is detected, or there can be a small hypoecho with clear boundary in external os of cervical, that may be round, oval or wedge-shape, showing pedicle connected with the uterine muscle wall; color Doppler flow imaging and doppler signals could be detected in the basilar part of the tumor (Figure 3). (4) Endometrial cancer: uneven thickening of endometrial occurs, can be slightly hyperechoic, have an equal echo or hybrid echo, can be accompanied with effusion of intrauterine muscle wall and cervical invasion can be in late stage endometrial cancer. Color Doppler flow imaging shows rich low resistance flow signals in and around the tumor. RI value is generally < 0.4 (Figure 4).

Transvaginal ultrasound is a non-invasive and high resolution diagnostic technique, which includes simple and intuitive observation and high diagnostic accuracy. It is possible to observe detailed and accurate morphological characteristics of the lesion and is sensitive to show blood flow, which can be used to assess the uterus, accessory diseases, and is especially the preferred method of examination of endometrial disease. It has clinical significance which can improve the diagnostic rate of endometrial lesions [24-32]. It plays an important role in guiding clinicians to make treatment decision.

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