

UTERINE ARTERIOVENOUS MALFORMATION: GRAY-SCALE AND DOPPLER SONOGRAPHY FINDINGS WITH CT ANGIOGRAPHY CORRELATION

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Uterine arteriovenous malformations (AVMs) are rare but potentially life-threatening lesions. Uterine AVM is usually first suspected at examination with gray-scale ultrasonography (US). The gray-scale US appearance of an AVM is non-specific and therefore requires Doppler sonography for a correct diagnosis. Although digital subtraction angiography is still the gold standard, CT or magnetic resonance angiography can successfully be used to demonstrate the exact feeding and draining vessels in a non-invasive manner. This paper presents gray-scale and Doppler sonography findings with CT angiography correlation of a congenital uterine AVM.

Key Words: Uterus, AVM, Color Doppler Ultrasonography, CT Angiography

UTERİN ARTERIOVENÖZ MALFORMASYON: GRI SKALA, DOPPLER ULTRASON BULGULARI VE BT ANJİYOGRAFI İLE KORELASYONU

Uterin arteriovenöz malformasyonlar (AVM) nadir ancak hayatı tehdit edebilen lezyonlardır. Genellikle ilk olarak gri skala ultrason tetkiki sırasında farkedilirler. AVM'lerin gri skala ultrason bulguları özgül olmayıp, doğru tanı için Doppler incelemesi gereklidir. Dijital substraksiyon anjiyografisi AVM tanısında günümüzde altın standart olma özelliğini korumakla birlikte, BT veya manyetik rezonans anjiyografi teknikleri de lezyonun besleyici arter ve drenaj venlerinin non invazif bir şekilde gösterilmesi için kullanılabilir. Bu yazıda konjenital bir uterin AVM olgusu, gri skala ve Doppler ultrason bulguları ve BT anjiyografi korelasyonu ile sunulmaktadır.

Anahtar Kelimeler: Uterus, AVM, Renkli Doppler Ultrasonografi, BT Anjiyografi.

Arteriovenous malformations (AVMs) are generally congenital in origin and most frequently located in the central nervous system. Uterine AVMs are rare but potentially life-threatening lesions that should be suspected in women with unexplained vaginal bleeding. They can be congenital in origin but generally develop secondary to pelvic surgery, trauma, gestation, gestational trophoblastic disease (GTD), exposure to diethylstilbesterol, and endometrial and cervical malignancies. Doppler sonography combined with CT angiography (CTA) or magnetic resonance angiography (MRA) can successfully be used in diagnosing uterine AVM. In this paper a patient with congenital uterine AVM and its imaging findings are presented.

CASE REPORT

A 58-year-old nulliparous postmenopausal woman with a past history of habitual abortus presented with intermittent vaginal bleeding. She had no history of pelvic surgery or trauma. Physical examination and laboratory tests, including serum β -HCG levels, failed to reveal any pathologic findings. Gray-scale ultrasound (US) showed multiple serpiginous anechoic structures within the myometrium, occupying the uterine fundus and corpus, protruding into the endometrial cavity and extending to the right parametrium and right inguinal fossa. Color Doppler US revealed vascular flow and color aliasing in these anechoic structures (Fig. 1). Spectral analysis showed a vascular flow pattern of high velocity (peak systolic velocity: 120 cm/sec) and low resistance (RI: 0.52 PI: 1.13). CTA performed with a helical scanner capable of a 1 second gantry rotation time confirmed the localization of the nidus in the myometrium, and showed the feeding artery originating from the right internal iliac artery and a drainage vein connecting to the right main femoral vein (Fig. 2). In the light of these findings the diagnosis of congenital uterine AVM was established and the patient was referred for appropriate treatment and follow-up.

DISCUSSION

Vaginal bleeding in postmenopausal woman is an important symptomatology that might be caused by a broad spectrum of etiological entities. Among these various clinical settings, uterine AVM is a rare and generally overlooked cause (1,2). An AVM is a distinct disease entity composed of a tangle of vessels that possess the histological characteristics of both arteries and veins, lacking an intervening capillary network. Traditionally, uterine AVMs have been classified as congenital or acquired (3). Congenital uterine AVMs arise from an abnormality in the embryologic development of primitive vascular structures, which results in multiple abnormal communications between arteries and veins. Acquired uterine AVMs are really multiple small arteriovenous fistulas

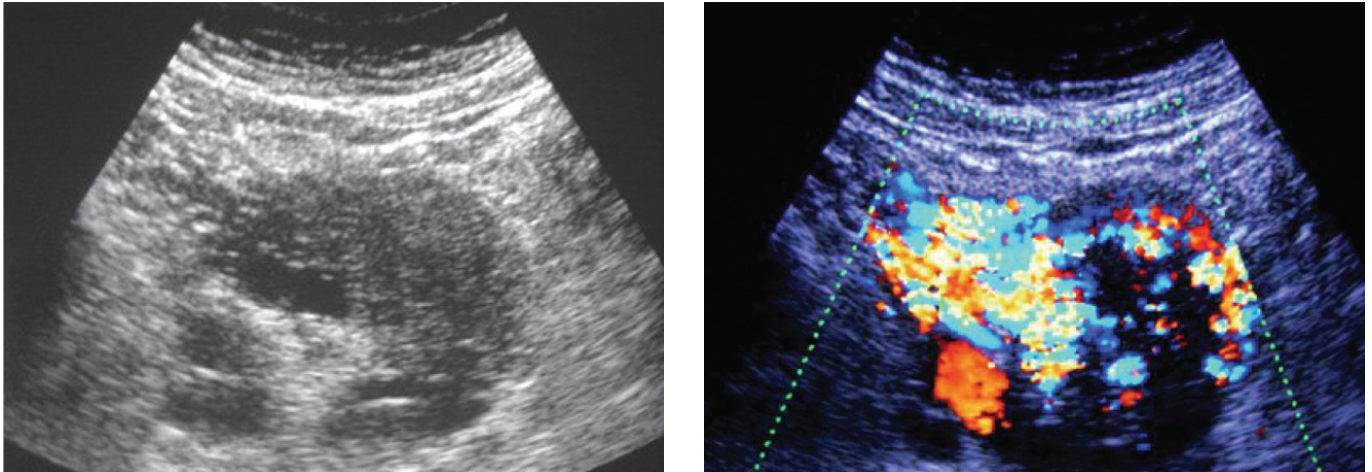


Figure 1. Gray-scale US (a) shows anechoic structures within the myometrium, occupying the uterine fundus and corpus, and extending to the right parametrium and right inguinal fossa. Color Doppler US (b) revealed intense juxtaped signals and color aliasing indicating vessels of varying orientation with different flow directions.

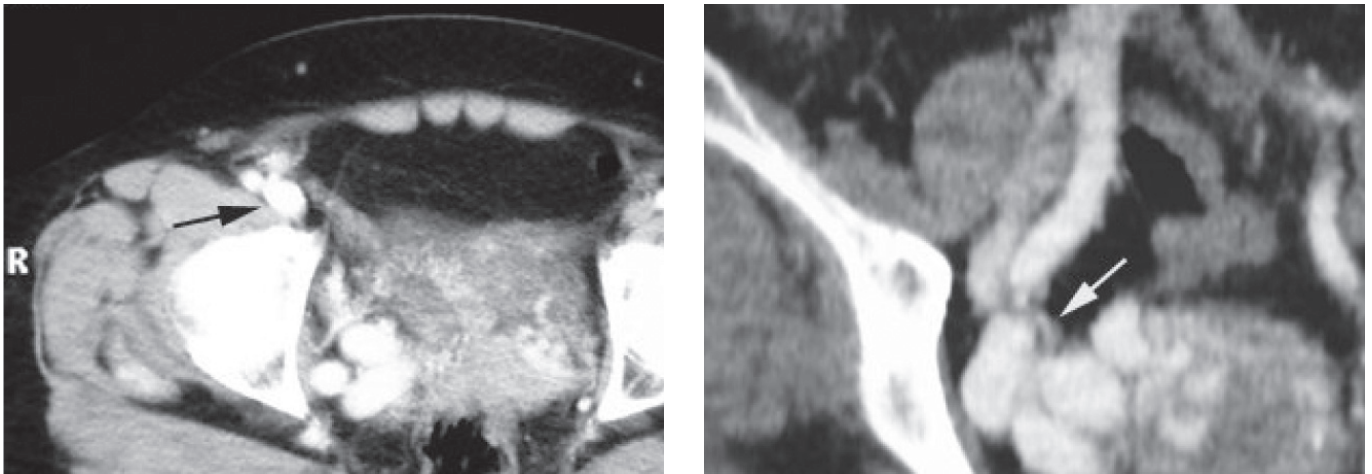


Figure 2. Contrast enhanced CT image in the axial plane (a) shows serpiginous vascular structures occupying the uterus. Note the early presence of contrast medium in the right main femoral vein (black arrow) compared to the left, due to the drainage of the AVM. On the CTA image reformatted in the coronal plane (b), the feeding artery (white arrow) originating from the right internal iliac artery can readily be distinguished.

(AVFs) between intramural arterial branches and the myometrial venous plexus and appear as a vascular tangle, mimicking congenital AVMs. An acquired AVM may potentially belong to an AVF. An acquired AVF is an abnormal direct passage between an artery and an adjoining vein without a network of abnormal vessels, potentially arising outside the uterus. Uterine AVM is not restricted to the postmenopausal period and has been reported in women aged 18-72 (1-5). This is especially true in patients with a history of infection, curettage, therapeutic abortion, pelvic surgery, endometrial carcinoma, or GTD. Uterine bleeding is thought to occur when vessels of the AVM are exposed to sloughing of the endometrium iatrogenically during D&C or during menses. The pattern of bleeding is intermittent and torrential. The presenting symptom of vaginal bleeding can be life threatening in 30% of patients and may require transfusion (3). When big enough, due to its mass effect, a uterine AVM can eventually cause lower extremity edema, palpable thrill and cardiac insufficiency.

Uterine AVM is usually first suspected upon examination

with gray-scale US. The gray-scale sonographic appearance of AVM can be variable and non-specific, with the most common finding being multiple tubular anechoic spaces within the myometrium, lacking any mass effect and resulting in a 'spongy' myometrial echo texture. Other sonographic presentations can be in the form of a subtle myometrial inhomogeneity, a focal intramural mass mimicking a leiomyoma or an endometrial mass resembling an endometrial polyp. Therefore, the diagnosis of uterine AVM can not be confidently made with these non-specific gray-scale US findings alone and color Doppler US is required (5). Doppler US exhibits intense juxtaposed signals and color aliasing indicating vessels of varying orientation with different flow directions. Spectral analysis depicts a flow pattern of low-resistance and high peak systolic velocity. Magnetic resonance imaging findings of AVM are an enlarged uterus with multiple serpiginous flow-related signal void areas. Contrast enhanced CTA or MRA can easily delineate the feeding arteries and draining veins of the AVM. Although digital subtraction angiography (DSA) is still the gold standard, Doppler sonography combined with CTA or MRA

can successfully be used in diagnosing uterine AVM (5,6). Considering the invasive nature of the technique, DSA can be reserved for those patients undergoing surgical or imaging guided treatment. In the above presented case, the diagnosis of uterine AVM was obvious with Doppler findings combined with conventional US, and the demonstration of the feeding and draining vessels by CTA made DSA unnecessary.

The differential diagnosis of a uterine AVM includes fluid-filled intestinal loops, multilocular ovarian cysts, hydrosalpinx, pelvic varicosities, GTD and retained products of conception (1,5,7). On color Doppler US, a few or no vascular signals can be detected in ovarian cysts, hydrosalpinx or intestinal loop. Pelvic varicosities can easily be differentiated by the depiction of prominent parametrial vessels with normal venous spectral waveforms. Retained products of gestation appear as an endometrial-based mass that shows uterine Doppler US findings similar to an AVM. The gray-scale and Doppler US appearance of GTD may also overlap with that of an AVM. The main differentiating point is positive β -HCG values in both GTD and retention of gestational products. However, it should be also kept in mind that uterine AVM can coexist with GTD.

In conclusion, uterine AVMs are rare but potentially life threatening lesions that should be suspected in women experiencing unexplained vaginal bleeding, with anechoic structures detected in the uterus at US. Doppler US combined with CTA can be successfully used in the non-invasive diagnosis and accurate delineation of the feeder and drainer vessels of an AVM.

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