Uterine arteriovenous malformation - Value of color Doppler sonography and MRI

Solomon B. Adebayo, FRCR, Oludare A. Demuren, FRCR, Danny O. Ogbeide, FRCGP.

ABSTRACT

Uterine arteriovenous malformation is an uncommon condition which may present with abdominal pain, urinary symptoms, cardiac failure or vaginal bleeding. We report the case of a 36 year old Saudi lady who had near catastrophic bleeding following curettage at an earlier presentation, before the advent of color Doppler sonography. Color Doppler ultrasound and Magnetic Resonance Imaging features of this condition are described, and we highlight the importance of appropriate imaging of the pelvis before curettage is performed.

Keywords: Arteriovenous malformation, color Doppler sonography, magnetic resonance imaging, vaginal bleeding.

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Uterine arteriovenous malformations (AVMs) consist of a vascular plexus of arteries and veins without intervening capillary network. They are rare lesions involving the myometrium and occasionally the endometrium. They usually occur in women of childbearing age with multiple childbirths, and are extremely rare in nulliparous women. Most cases present with vaginal bleeding, but diagnosis is critical as dilatation and curettage (D&C) may lead to life threatening hemorrhage.

Case Report. A 38 year old Saudi female, gravida 5, para 4+1, presented to the hospital in November 1980 with a history of longstanding pelvic pain and periods lasting 4 to 10 days. On clinical examination, the abdomen was normal but the uterus was bulky and irregular. Diagnosis of left ovarian mass and probable uterine fibroid was made. The patient defaulted from follow-up, and reappeared 2 years later with history of persisting heavy vaginal bleeding. Clinically the uterus was about 14 weeks gestation size and non-tender. Static grey-scale ultrasound (US) suggested the presence of hydatidiform mole but urinary human chorionic gonadotrophin titre was negative. She subsequently had D&C, which was followed by immediate torrential hemorrhage necessitating resuscitative measures and rapid blood transfusion. Bleeding was controlled as emergency hysterectomy was being contemplated. The patient was lost to follow-up. She presented again to the Primary Care Clinic in 1998, with history of longstanding recurrent loin pain. Following negative urine analysis, renal US was requested. Renal US was normal but the uterus was bulky with round and serpiginous transonic areas on grey scale sonography (Figure 1a). Color Doppler sonography (CDS) revealed multiple serpiginous vessels with intense colour flow pattern and adjacent red and blue signals suggesting flow reversal, and intervening white and yellow signals giving rise to a mosaic pattern (Figure 1b). Spectral analysis indicated a low resistance flow pattern with Resistive Index (RI) of 0.31. The peak systolic velocity was 49.8cm/sec. T1 and T2 weighted conventional spin echo MR images revealed a bulky uterus with multiple flow voids within the...
myometrium and adnexa representing AVM giving rise to a ‘caput medusa’ appearance (Figure 2). Single slice gradient echo images with 30 degrees flip angle demonstrated flow related enhancement of the vascular malformation (Figure 3).

Discussion. Uterine AVMs are rare abnormalities involving the myometrium and occasionally the endometrium. They may be congenital but most cases are acquired. The etiology is not entirely clear, but procedures such as curettage and uterine surgery have been implicated. Pelvic AVMs are characterized by the slow growth with a period of latency before becoming symptomatic. They may present at any age but are typically seen in young women of childbearing age. Effects may be local or systemic, including vaginal bleeding, abdominal pain, urinary symptoms and high output congestive heart failure. However, obvious systemic cardiovascular effects are usually not seen. Whenever a pulsatile pelvic mass is detected on vaginal examination, it is imperative that a thorough work-up is carried out to exclude pelvic AVM before curettage is performed as this can result in catastrophic hemorrhage, which was almost the case in our patient. Clinical awareness of this entity is essential in the differential diagnosis of post menopausal bleeding in the presence of a pulsatile pelvic mass. Ultrasound is the most commonly performed imaging examination for the evaluation of abnormal vaginal bleeding. In the normal situation, grey scale US may show vessels or tubular structures around the periphery of the myometrium but rarely within the myometrium or in the endometrial canal. Color Doppler sonography shows a normal peripheral myometrial signal from intramural spiral arteries with mean peak systolic velocity (PSV) of 23cm/sec (range 9 - 44cm/sec) and a mean Resistive Index (RI) of 0.73 (range 0.59 - 0.86). Normal endometrial colour signals are only rarely encountered. On grey scale US, AVMs may be non-specific, seen as multiple serpigenous, anechoic structures within the pelvis which may be confused with multi loculated ovarian cysts, fluid-filled bowel loops and hydrosalpinx. Color Doppler sonography is diagnostic, showing abundant flow within the

![Figure 2 - T1 axial MR image revealing multiple flow voids within and around the uterus.](image)

![Figure 3 - Coronal gradient echo MR image (flip Angle = 30 degrees) showing flow related enhancement in the AVM.](image)
anechoic structures with a florid mosaic pattern, more extensive than the grey scale picture. Spectral reveals high velocity, low resistance arterial flow, with high velocity venous flow often indistinguishable from the arterial flow.1,2

Ovarian and broad ligament varices give rise to pelvic congestion or pelvic pain syndrome, which usually affects young multiparous women.7,8 Pelvic varices may mimic AVMs because of similar patient age and parity, and the presence of pelvic pain in both. Whilst transfemoral venography will provide the definitive diagnosis, pelvic ultrasound is a valuable non-invasive diagnostic tool.7 Grey scale US reveals multiple dilated vessels lying within the broad ligament of the uterus, with enlargement of the vessels in standing position or by Valsalva manoeuvre. It is important to scan patients in the erect position if no abnormal vessels are seen during supine scanning.8 Characteristic low velocity, non-pulsatile venous waveform is demonstrated on Doppler US. In uterine AVMs, conventional T1 and T2 weighted spin echo images generally show a bulky uterus or a focal uterine mass with disruption of the junctional zones, serpiginous flow related signal voids, and prominent parametrial vessels.2 Gradient echo MR images show flow related enhancement.

In conclusion, we have reported a case of AVM with near catastrophic hemorrhage following D&C, emphasizing the need for exclusion of this entity before D&C is performed in cases of pelvic mass or vaginal bleeding. The diagnosis of AVM has traditionally been made with angiography,1,2 but CDS and MRI now afford rapid, non-invasive means of making the diagnosis. Angiography is however useful where the patient is symptomatic, as it affords the opportunity for embolic therapy which may be sufficient, or may be used pre-operatively.

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References