Radiology Case of the Month

Diagnosis and Treatment of an Acquired Uterine Arteriovenous Malformation in a 26-Year-Old Woman Presenting with Vaginal Bleeding

Andrew Marshall, MD; Montu Patel, MD; Navid Eghbalieh MD; Mandy Weidenhaft, MD; Cynthia Hanemann, MD; Harold Neitzschman, MD

Introduction

Arteriovenous malformations (AVMs) are a rare source of potentially life-threatening uterine bleeding, and should be suspected in patients presenting with metromenorrhagia. Histologically, AVMs are characterized as having both arterial and venous tissues without an intervening capillary network. The etiology may be either congenital or acquired secondary to prior uterine surgery or uterine malignancy. Congenital lesions are thought to result from arrested vascular development and contain a nidus of multiple feeding arteries anastomosed to multiple draining veins. In contrast, acquired lesions contain small fistulas between a single feeding artery and draining vein.

While angiography is considered the gold standard for diagnosing AVMs, its limitations include exposure to contrast and radiation and the inability to accurately detect the degree of pelvic extension. As a result, ultrasound (US) with color Doppler is the imaging modality of choice in suspected AVM and can be confirmed noninvasively with magnetic resonance imaging (MRI). Angiography remains the preferred method of imaging when there is a high index of suspicion of AVM in a patient who may potentially undergo embolization as treatment.

Historically, the definitive treatment for AVMs has been either hysterectomy or uterine artery ligation. However, embolotherapy has become a well-recognized alternative to surgery since the first reported case in 1982. One of the advantages of embolotherapy is the preservation of reproductive structures. Currently, treatment for AVMs is based on the patient’s desire to maintain fertility.

The objective of this study was (1) to describe the diagnostic features of an AVM on Doppler ultrasound in a patient who presented with vaginal bleeding and (2) discuss the treatment and outcome of this patient using uterine artery embolization.

Case Report

This patient is a 26-year-old female, Gravida/Para: G4 P2-0-2-2 (pregnant 4 times, two live births, no pre-term births, 2 miscarriages and 2 living children) with a significant obstetric history.
The patient’s first two pregnancies resulted in full-term spontaneous vaginal deliveries. The second two pregnancies were electively terminated with dilation and curettage, the most recent approximately 3 months before her current admission.

On her current admission the patient complained of heavy vaginal bleeding of acute onset. Her last menstrual period (LMP) was two weeks prior. She denied any associated symptoms. Family history was negative for bleeding disorders. She admitted to being sexually active and denied any history of sexually transmitted infections.

On physical exam her blood pressure was measured as 108/69 with a pulse of 99. A pelvic exam revealed a uterus of 8-10 weeks size with blood present in the vaginal canal without active bleeding from the cervical os. A urine pregnancy test returned negative and a CBC revealed a hemoglobin of 13.6 and 279,000 platelets.

A gray-scale pelvic ultrasound was ordered and illustrated a uterine intramural mass with multiple hypoechoic foci located in the anterior fundal wall (Figure 1). A diagnosis of uterine AVM was confirmed with Doppler ultrasound demonstrated vascularity in the mass (Figure 2) and waveform revealed a low resistance pattern consistent with a high diastolic flow (Figure 3).

The decision was made to treat the patient’s AVM with embolization. Angiography obtained prior to the embolization illustrates a large uterine AVM supplied by both uterine arteries with early draining veins (Figure 4). Selective angiographic imaging revealed a capillary like complex prior to the presence of veins without AV fistula (Figure 5). 70-900 micron embospheres were administered into both left and right uterine arteries followed by a small amount of gelfoam. Post-angiography showed minimal flow in the AVM via the right uterine artery (Figure 6) without significant enhancement in the late phase of contrast (Figure 7).

DISCUSSION

We present a case of uterine AVM in a 26-year-old woman that most likely occurred secondary to multiple dilation and curettage procedures. Since 1926, reported cases of uterine AVMs number only in the 100’s and it is important to contribute to the growing amount of clinical data so that evidenced based medicine will guide diagnosis and treatment.7

In this case the diagnosis of uterine AVM was made on Doppler ultrasound imaging demonstrating a vascular intramural mass. This procedure supports current research showing color Doppler can be used quickly and efficiently to non-invasively diagnose AVM with results comparable to more time consuming modalities such as MRI.3 However, one of the limitations noted in the previously mentioned study was the inability to completely eliminate other causes of arteriovenous shunting which can occur, specifically in gestational trophoblastic disease (GTD). Although the patient in this study presented with an enlarged uterus, her negative B-HCG ruled out GTD. Therefore, in patients suspected of having AVMs, a B-HCG should be measured to improve the specificity of Doppler imaging.

The management in this case involved bilateral embolization, rather than hysterectomy, for the treatment of the uterine AVM. Embolization can be preferable to hysterectomy as it has few-
er complications and can preserve fertility. In this case it, after embolization of both blood supplies of the AVM, it was noted that minimal flow remained to the AVM from the right uterine artery. It is unclear at this time what amount of residual flow to the AVM will still allow for spontaneous closure. This case demonstrates that complete embolization without any residual flow is not necessary for resolution of the AVM.

One of the peculiarities in this case was the characteristics of the AVM. Acquired AVMs, suspected in this patient secondary to dilation and curettage for elective abortion, generally present with multiple small AV fistulas between arterial branches and their normal anatomical venous plexus. They are typically supplied by one uterine artery and, as opposed to congenital lesions, acquired AVMs do not normally present with a tuft of capillaries. Our case illustrated a strong suspicion for an acquired AVM based on the patient’s history, however, it was supplied bilaterally by both uterine arteries and angiography revealed a capillary like complex (Figure 5). This diagnosis may suggest that treatment should be guided by the severity of the lesion as opposed to the specific etiology.

**CONCLUSION**

This case demonstrates using bilateral uterine artery embolization to successfully treat a symptomatic uterine AVM. It supports a growing amount of research that shows embolization is both a safe and effective treatment modality. Furthermore, this case supports the statement that patients presenting with symptomatic AVM may be managed aggressively using this technique with fewer adverse effects than traditional therapies and with the added benefit preserving fertility.

Figure 3A & 3B: Frontal angiographic image of a selective left internal iliac catheter injection post-embolization does not demonstrate the previously seen hypertrophied left uterine artery and suggests successful embolization.
REFERENCES


Drs. Marshall, Patel, and Eghbalieh are residents, Dr. Weidenhaft is an Associate Program Director, Dr. Hanemann is an Associate Clinical Professor and Dr. Neitzschman is a professor of Radiology and the Chairman of the Department of Radiology, all affiliated with the Tulane University Health Sciences Center in New Orleans, Louisiana. Donald Olivares is the Digital Imaging Specialist and Graphic Designer for the Department of Radiology at Tulane University Health Sciences Center in New Orleans, Louisiana.