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DIAGNOSIS OF ACQUIRED UTERINE ARTERIOVENOUS MALFORMATION BY DOPPLER ULTRASOUND

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☐ **Abstract—Background: Acquired uterine arteriovenous malformation (AVM) is a rare cause of postpartum vaginal bleeding and can often be confused with retained products of conception (RPOC). Certain findings on ultrasound (US) increase the likelihood for AVM, such as hypoechoic areas in the myometrium and high velocity, multidirectional blood flow. Recognizing these changes on bedside US can cue the physician to send the patient for further studying and lead to the correct diagnosis. Case Report: A 31-year-old, multigravida, multiparous female presented 5 weeks post–cesarean section with heavy, intermittent vaginal bleeding. Patient had multiple previous visits for similar bleeding, including an evaluation for RPOC. Upon current presentation, the patient underwent an US in the emergency department with color and pulse wave Doppler. US revealed a hypoechoic area within the myometrium, with high velocity, bidirectional blood flow, raising the clinical suspicion for uterine AVM. Following confirmatory studies, the patient underwent successful embolization of the AVM. Why Should an Emergency Physician Be Aware of This?: The proper diagnosis of AVM is crucial, because the primary treatment modality for the alternative diagnosis of RPOC (i.e., dilation and curettage) can worsen vaginal bleeding and lead to shock or death, and is therefore contraindicated for uterine AVM. US is a quick bedside tool that can be used for rapid diagnosis of uterine AVM.**

☐ **Keywords—arteriovenous malformation; diagnosis; postpartum bleeding; ultrasound; vaginal bleeding**

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INTRODUCTION

Acquired uterine arteriovenous malformation (AVM) is a rare cause of postpartum vaginal bleeding, representing 1% to 2% of all genital and intraperitoneal hemorrhages, and as such should be considered in any postpartum female that presents complaining of vaginal bleeding, particularly if the patient has undergone instrumentation of the uterus (1–7). There have been >100 case reports of acquired AVM, but the true incidence is unknown (8). Patients typically present with symptoms of intermittent, heavy vaginal bleeding occurring days to weeks after delivery (9). Imaging is the diagnostic tool of choice, with Doppler ultrasound (US) being the typical first modality used, followed by computed tomography (CT). Although retained products of conception (RPOC) and AVM may both have echogenic material within the endometrium, hypoechoic areas within the myometrium with demonstrated vascular flow are more indicative of AVM, with an even higher likelihood if those same areas feature high velocity, multidirectional blood flow (10–14). If AVM is suspected via US, the patient should undergo CT angiography and ultimately arteriography for definitive diagnosis and possible embolization (15,16). We present a rare case of acquired uterine AVM post–cesarean section (C/S) diagnosed first with Doppler US, then confirmed with CT angiography and arteriography, and ultimately treated with embolization.

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CASE REPORT

A 31-year-old, multigravida, multiparous female presented 5 weeks post-C/S with heavy, intermittent vaginal bleeding. Five weeks earlier, the patient had an uneventful delivery via C/S. Operative reports from that time noted an intact placenta and an empty uterus. Of note, she had previously visited the ED twice with similar complaints since her C/S. During the initial visit, she presented with stable vital signs, was found to have normal blood work, and was ultimately discharged home with appropriate follow-up. On the second visit, the patient presented hypotensive, underwent dilation and curettage (D&C) for presumed RPOC, and was admitted to the hospital. No imaging was performed at that time because the patient was unstable and went straight to the operating room. The pathology report showed endometrium and myometrium tissue, but no chorionic villi, decreasing the likelihood of RPOC. After D&C and receiving multiple blood transfusions, her vital signs stabilized, the vaginal bleeding stopped, and she was discharged home.

Upon current presentation, the patient underwent an US in the ED with color and pulse wave Doppler. US revealed a hypoechoic area within the myometrium (Figure 1A), with high velocity, bidirectional blood flow (Figures 1B, 2A, and 2B), raising the clinical suspicion for uterine AVM. CT angiography of the pelvis revealed a large, single communicating AVM off of the left uterine artery. Arteriography confirmed the AVM and the patient underwent embolization via placement of a coil in the left uterine artery by interventional radiology. After embolization, vaginal bleeding ceased and patient was ultimately discharged home 2 days later. Follow-up with interventional radiology and obstetrics 2 weeks later noted that the coil was in the proper position and continued resolution of vaginal bleeding.

DISCUSSION

Uterine AVM is a rare, potentially deadly cause of vaginal bleeding. There are 2 different types of uterine AVM; the most common is the acquired version, which is typically caused by instrumentation of the uterus. The second is the congenital version, which is more rare (4). Both are the result of an abnormal communication between arteries and veins without a capillary bed between. The congenital version tends to be a nest of small arteries communicating with veins, while the acquired version is generally a single large artery communicating with a single large vein (4). In the postpartum patient, this abnormal communication can lead to the typical presenting symptoms of intermittent, heavy vaginal bleeding, refractory to usual postpartum bleeding treatment. The most common etiology of acquired uterine AVM is either D&C or C/S (4).

The proper diagnosis of acquired AVM in the ED is difficult, because more common causes of postpartum vaginal bleeding are usually considered before AVM. Time between delivery and the onset of vaginal bleeding is an important clue regarding the etiology of the bleeding; the most common cause, uterine atony, usually occurs immediately postpartum. Other causes of postpartum bleeding generally occur later and include RPOC, AVM, gestational trophoblastic disease, and choriocarcinoma. The diagnosis of gestational

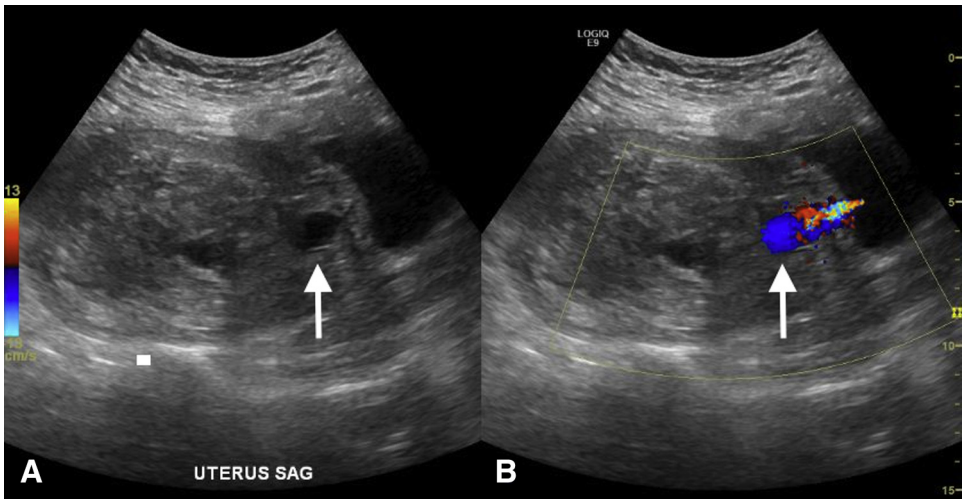

Figure 1. Transabdominal ultrasound of the uterus. (A) Note the prominent hypoechoic area in the myometrium (arrow). (B) Application of color Doppler to hypoechoic area identified in Figure 1A notes red and blue coloration, which is indicative of bidirectional blood flow (arrow).