Arteriovenous malformation identification after conservative management of placenta percreta with uterine artery embolization and adjunctive therapy

James T. Barber Jr, DO; Terry B. Tressler, DO; Gregory S. Willis, DO; Francis J. Martinez, DO; David B. Peisner, MD; Jay D. Goodman, MD; Claudia D. Taboada, DO

Placenta percreta is a complication of pregnancy with significant morbidity and mortality rates. Conservative management may be considered when fertility preservation is desired or to possibly reduce morbidity when there is invasion of pelvic structures. We present 3 cases of antenatally diagnosed placenta percreta that were managed conservatively. A finding after the operation included the identification of arteriovenous malformations.

Key words: arteriovenous malformation, chemotherapy, embolization, placenta percreta

One of the most serious complications of abnormal placentation can be placenta percreta. Placental percreta is an uncommon but life-threatening complication that is caused by trophoblastic invasion into the uterine serosa beyond the normal boundary established by the fibrinoid layer. Complications can include premature and/or incomplete placental separation, neonatal death, excessive hemorrhage, and involvement of adjacent organs. It can involve the bladder, bowel, and blood vessels. A significant risk of maternal death (5-7%) has been associated with placenta percreta as a result of excessive hemorrhage, infection, and adjacent organ involvement.[1,2]

As the cesarean delivery rate continues to increase in the United States, which currently is estimated at 32%,[3] the incidence of abnormal placentation and associated complications can be expected to increase accordingly. The increased morbidity associated with cesarean hysterectomy has prompted an increase in conservative management approaches. Variations in treatment protocols have included hypogastric artery ligation, uterine artery embolization (UAE), B-Lynch compression sutures, recombinant activated factor VII, and chemotherapy with methotrexate.[4-8] Conservative management is not without risks. Reports of infection, septic shock, disseminated intravascular coagulation, and maternal death have been documented, often with the need for additional surgery that includes delayed hysterectomy.[8,9]

An arteriovenous malformation (AVM) is an abnormal connection that develops between high-pressure arteries and low-pressure veins. Although there have been documented cases of AVM formations in gestational trophoblastic disease,[10] we present the first series of documented cases of AVM after conservative management of placenta percreta. A PubMed search (keywords: *placenta percreta, arteriovenous malformation, conservative treatment, chemotherapy*) failed to identify any other reports. This study was approved by the Pinnacle Health Hospital Institutional Review Board.

Case Reports

Case 1

A 31-year-old woman who had been pregnant 14 times with 8 viable births with a history of 5 previous cesarean section deliveries and a complete placenta previa was admitted at 17 weeks gestation with vaginal bleeding. A placenta percreta was diagnosed by second trimester ultrasound and magnetic resonance imaging (MRI). Invasion of the anterior abdominal wall and involvement of the bladder and lateral left lower quadrant bowel loops was suspected. The patient had ruptured membranes at 18 weeks gestation. The patient was delivered by cesarean section at 28 weeks 3 days under general anesthesia for abdominal pain and bleeding. The abdomen was entered through a high vertical incision and a fundal incision on the uterus that avoided the placenta. A viable infant was delivered with an estimated blood loss (EBL) of 200 mL. An interventional radiologist performed bilateral UAE with Gelfoam (Pfizer, New York, NY) and coils after delivery. On postoperative day 3, adjunctive therapy with etoposide was given at a dosage of 200 mg/day intravenously for 5 days. Beta–human chorionic gonadotropin (hCG) levels declined from 13,655 to 69 mIU/mL over 7 weeks. The postoperative course was uncomplicated.

The patient had abdominal pain at 8 weeks after the delivery. A computed tomography angiography (CTA) revealed a large complex vascular mass that involved the uterus and bladder (Figure 1). Three-dimensional images identified a 25-mm dilated left ovarian vein that was consistent with the development of an AVM. The patient elected definitive therapy and underwent a supracervical hysterectomy with cystotomy and repair. Extensive hemorrhage was noted at

From Pinnacle Hospital, Department of Obstetrics and Gynecology, Sections of Maternal Fetal Medicine, Gynecologic Oncology, Department of Radiology, Section of Interventional Radiology, Harrisburg, PA.

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FIGURE 1
Contrast-enhanced computed tomography angiography of the abdomen and pelvis

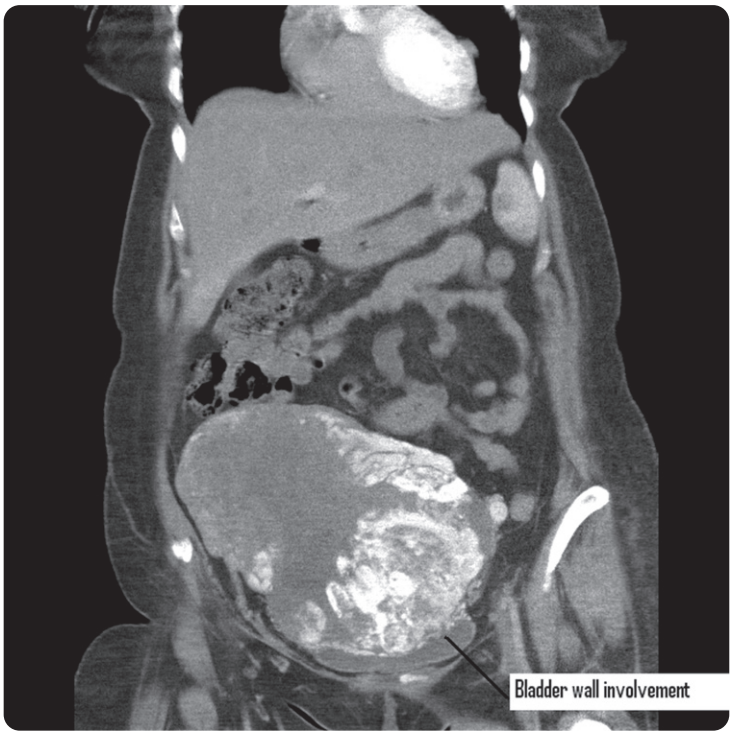

Image shows extensive vascular changes within the placental mass and uterus 7 weeks after conservative therapy (placenta in situ, uterine artery embolization after cesarean delivery, chemotherapy) for placenta percreta. Bladder involvement is clearly identified (*black line*).

Barber. AVM after conservative management of placenta percreta. Am J Obstet Gynecol 2011.

FIGURE 2
Ultrasonography with color flow Doppler imaging

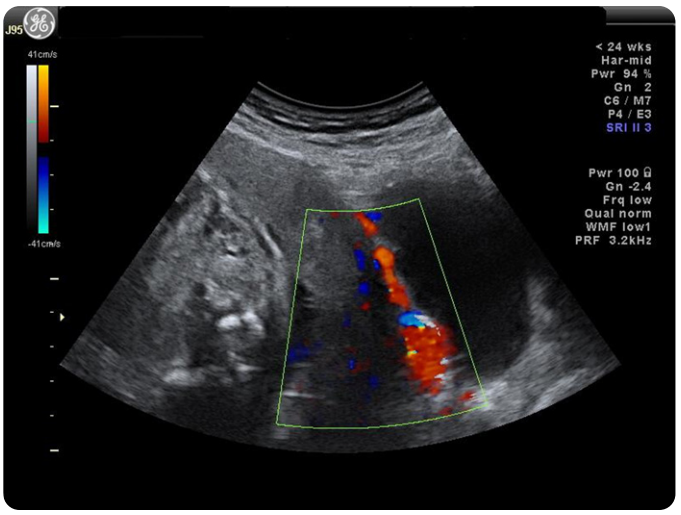

Image shows vascular involvement of the anterior lower uterine segment and bladder that is consistent with the postoperative diagnosis of placenta percreta.

Barber. AVM after conservative management of placenta percreta. Am J Obstet Gynecol 2011.

the time of surgery that required 4 units of packed red blood cells (PRBC), 2 units of fresh frozen plasma, and 1 unit of platelets intraoperatively. Intraoperative hemoglobin was 5.5 g/dL before transfusions. An enlarged left ovarian vein was identified as part of the AVM and was ligated. The EBL was 3600 mL. After the operation, the patient required 3 units of PRBC and 2 units of fresh frozen plasma. The patient was discharged on postoperative day 5 with a Foley catheter.

Case 2

A 34-year-old woman who had been pregnant 4 times with 2 viable births with a complete placenta previa and a uterine septum was admitted at 24 weeks' gestation with vaginal bleeding. The patient had a history of 2 vaginal deliveries at term, both with postpartum hemorrhage. Her second delivery required a curettage with a blood transfusion. Ultrasound imaging demonstrated a loss of the myometrial interface and increased vascularity on color Doppler blood flow around the urinary bladder (Figure 2). MRI at 30 weeks gestation revealed a placenta increta with extensive pelvic vascular enlargement with bladder indentations by numerous vessels. The patient remained hospitalized until elective delivery by cesarean section at 34 weeks' gestation. A posterior-fundal incision was performed on the uterus that avoided the placenta. A viable infant was delivered with an EBL of 800 mL. Postoperative bilateral UAE with hydrogel beads and coils was performed. Etoposide therapy was given, as previously described. The postoperative course was uncomplicated. Beta-hCG levels declined from 13,655 to 69 mIU/mL by 10 weeks.

The patient had abdominal pain and fever at 11 weeks after delivery. A CTA scan demonstrated marked enlargement of the uterus with considerable peripheral enhancement; a duplicated right ovarian vein was identified in the retroperitoneal space that drained into the inferior vena cava. A dilated left ovarian vein was seen draining into the left renal vein (Figure 3). Air fluid levels were identified throughout the uterus with a right hydroureteronephrosis. Ureteroly-