The Journal of Emergency Medicine, Vol. 56, No. 3, pp. 327–331, 2019

0736-4679/$ - see front matter

https://doi.org/10.1016/j.jemermed.2018.12.016

Clinical Communications: OB/GYN

UTERINE ARTERY PSEUDOANEURYSM: A LIFE-THREATENING CAUSE OF VAGINAL BLEEDING IN THE EMERGENCY DEPARTMENT

Lindsey Jennings, MD, MPH, Brad Presley, MD, RDMS, and Diann Krywko, MD

Department of Emergency Medicine, Medical University of South Carolina, Charleston, South Carolina
Reprint Address: Lindsey Jennings, MD, MPH, Department of Emergency Medicine, Medical University of South Carolina, 169 Ashley Avenue, MSC 300, Charleston, SC 29425

☐ **Abstract—Background: Vaginal bleeding is a common presenting complaint in the emergency department (ED); life-threatening hemorrhage is rare. Uterine artery pseudoaneurysm (UAP) is an uncommon but potentially life-threatening cause of vaginal bleeding that is most likely to present primarily to EDs, given its delayed postpartum or postoperative presentation. Case Report: A 25-year-old female gravida two, para one, who was 19 days post dilation and evacuation for an elective termination of a pregnancy at 20 weeks, presented to the ED with profuse vaginal bleeding. She was hypotensive and tachycardic at presentation, requiring resuscitation with 0.9% normal saline and transfusions of packed red blood cells. Transvaginal ultrasound completed in the ED demonstrated a pulsatile mass in the cervix with internal "ying-yang" flow on Doppler images, suggestive of a uterine artery pseudoaneurysm within the cervix. The patient underwent emergent uterine artery embolization with resolution of bleeding and improvement in her hemodynamic status. Why Should an Emergency Physician Be Aware of This?: UAP is an uncommon cause of vaginal bleeding, but UAP rupture can be life-threatening. UAP is an important differential diagnosis for vaginal bleeding, particularly in the postpartum or postoperative setting. Delaying diagnosis may worsen bleeding in the setting of a ruptured UAP if treatment is pursued for alternative diagnosis; for example, treating retained products of conception with a dilation and curettage. Being aware of UAP and how to diagnose it will allow early proper treatment and more favorable patient outcomes.** © **2018 Elsevier Inc. All rights reserved.**

☐ **Keywords—uterine artery pseudoaneurysm; vaginal bleeding; vaginal hemorrhage; postpartum hemorrhage**

INTRODUCTION

Vaginal bleeding is a common presenting complaint in the emergency department (ED); life-threatening hemorrhage is rare. Uterine artery pseudoaneurysm (UAP) is an uncommon but potentially life-threatening cause of vaginal bleeding that is most likely to present primarily to EDs, given its delayed postpartum or postoperative presentation (1). We present a case of delayed postpartum vaginal bleeding and discuss the epidemiology, pathophysiology, diagnosis, and management of uterine artery pseudoaneurysms in the ED setting.

CASE REPORT

A 25-year-old female gravida two, para one, who was 19 days post dilation and evacuation for an elective termination of a pregnancy at 20 weeks, presented to the ED with profuse vaginal bleeding. A volunteer was assisting the patient through the hospital to the ED when she syncopized. A nearby surgical resident brought her to the ED. She was sitting in blood, minimally responsive, pale, and had thready pulses. Initial ED blood pressure readings were unable to be obtained, despite multiple

RECEIVED: 4 September 2018; FINAL SUBMISSION RECEIVED: 2 November 2018;
ACCEPTED: 8 December 2018

automatic and manual attempts, though the patient had weak radial pulses. Initial heart rate was 120 beats/min. After a 1-L 0.9% normal saline bolus, the patient's mental status improved and blood pressure measured 100/60 mm Hg. The patient was able to report only mild spotting present initially after the procedure. She had presented to another ED for vaginal bleeding 1 week before this visit. She was admitted, received 2 U packed red blood cells (PRBCs) for acute blood loss anemia, and was treated for endometritis with i.v. antibiotics. She had increasing vaginal bleeding during the previous 12 h and had six to seven syncopal events on the day of arrival. She denied fevers, chills, and abdominal pain.

On pelvic examination, several large blood clots in the vaginal vault with brisk vaginal bleeding were noted. No lacerations were present. Initial laboratory evaluation revealed a negative pregnancy test and hemoglobin of 10.6 g/dL (range 12.0–16.0 g/dL). Resuscitation continued with 2 U uncrossmatched PRBCs, an ultrasound was ordered, and an emergent gynecology consult was requested.

The transvaginal ultrasound completed in the ED demonstrated a 1.3 × 0.8 × 1.2-cm pulsatile mass in the cervix with internal "yin-yang" flow on Doppler images, suggestive of a uterine artery pseudoaneurysm within the cervix (Figure 1). The yin-yang sign refers to the appearance of the bidirectional, swirling blood flow within the pseudoaneurysm on color Doppler ultrasound. Blood moving towards the probe appears red and blood moving away from the probe is blue, creating a picture similar to the Chinese symbol. The ultrasound additionally showed a heterogeneous fluid collection around the right adnexa, suggestive of blood products (Figure 2). The patient continued to be hemodynamically unstable and had intermittent episodes of hypotension and tachycardia. Two additional units of PRBCs were administered, totaling 4 U. The patient was taken to interventional radiology (IR) for an emergent uterine artery embolization (Figure 3). Repeat hemoglobin 2 h after ED arrival was 5.1 g/dL. Following successful embolization, she was admitted to the surgical intensive care unit for 24 h, subsequently transferred to the floor, and discharged 2 days post procedure with minimal bleeding and no episodes of hemodynamic instability. Of note, the patient provided consent for her case to be shared in a case report format for medical education purposes.

DISCUSSION

Epidemiology and Pathophysiology of UAP

UAP is an uncommon cause of vaginal bleeding, with the majority of information on this entity limited to case reports. The incidence of UAP in ED settings is unknown. However, it is a life-threatening cause of vaginal bleeding that requires ED knowledge of its existence with prompt recognition and treatment.

UAPs are typically the result of traumatic injury to the uterine artery wall. Injury can result in shearing of the arterial wall, allowing arterial blood to accumulate between the layers of the vessel wall. If this accumulated blood continues to communicate with the artery and is surrounded by adventitia (the outer most vessel wall

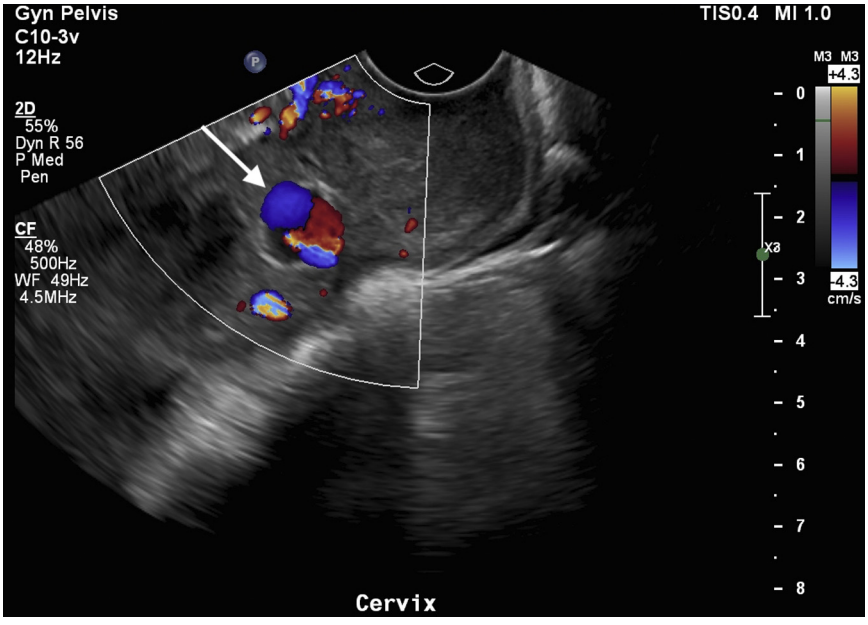

Figure 1. Transvaginal ultrasound with arrow denoting the pulsatile mass in the cervix with "yin-yang" flow on Doppler, suggestive of a uterine artery pseudoaneurysm.

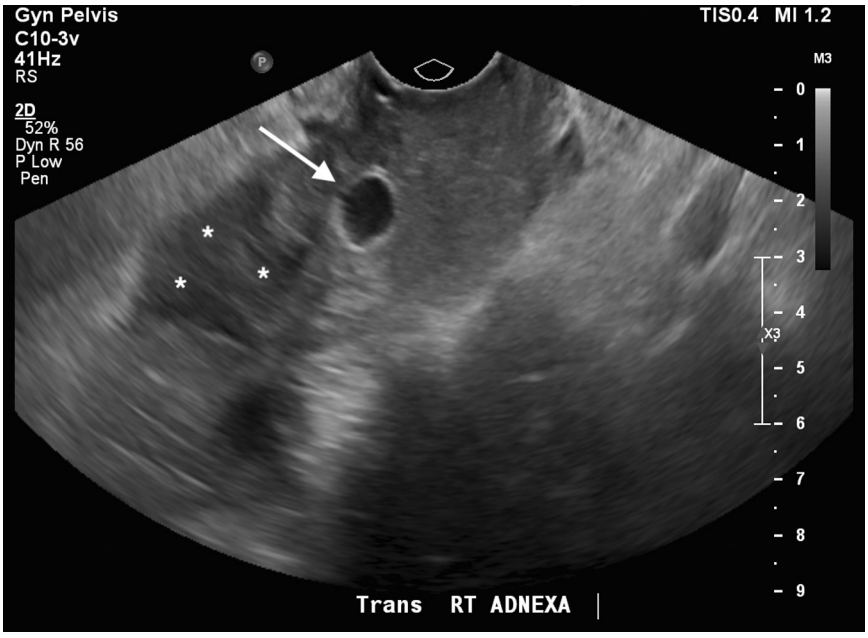

Figure 2. Transvaginal ultrasound with * denoting heterogeneous fluid collection near the right adnexa consistent with blood products and arrow pointing to the pseudoaneurysm.

layer), a pseudoaneurysm forms (2–5). True aneurysms have a three-layered wall, which differentiates them from pseudoaneurysms (1). Extraluminal turbulent flow within the pseudoaneurysm can lead to enlargement and possibly even pseudoaneurysm rupture, if unrecognized.

UAPs are typically discovered after vaginal deliveries, cesarean section deliveries, and pregnancy terminations. It was previously believed that UAP was seen only after traumatic deliveries or pregnancy terminations; however, more recent studies suggest that approximately half of the cases occur after non-traumatic deliveries or pregnancy terminations (2). A review of the literature revealed only 22 case reports of UAP, with 10 (45.5%) case reports of UAP after a cesarean section, 2 (9.1%) case reports related to spontaneous or elective abortion, 6 (27.3%) case reports postoperatively, and 4 (18.2%) case reports after an uncomplicated or complicated spontaneous vaginal delivery (1,3,5–25). A case report at one institution looking at all UAP cases during a 6-year period found that 4 of 22 (18.2%) cases were preceded by a cesarean section, 7 of 22 (31.8%) were preceded by spontaneous or induced abortion, 10 of 22 (45.5%) were preceded by spontaneous vaginal delivery with or without complication, and 1 without any preceding factors (2).

Figure 3. Angiography with long arrow pointing at the pseudoaneurysm and the short arrow denoting the uterine artery.

Diagnosis of UAP

UAPs have been diagnosed prior to rupture on routine postoperative screening ultrasounds (1,2). However, due to the length of time it takes for the pseudoaneurysm to enlarge and rupture, UAPs typically present as delayed postpartum or postoperative hemorrhage. The length of time between the inciting event to UAP rupture ranged in case reports anywhere from 3 h to 99 days (6,13). The differential for delayed postpartum or postoperative hemorrhage also includes retained products of conception and endometritis, both of which are more commonly the cause of postpartum or postoperative hemorrhage. It is important to make the diagnosis of UAP in this setting, as treatment for retained products

may include dilation and curettage (D&C), which may lead to further injury and UAP rupture (5,26).

The diagnosis of UAP can be made by ultrasound, computed tomography (CT), or angiography. On gray-scale ultrasound, a UAP is seen as a pulsatile hypoechoic mass attached to an artery. Color Doppler ultrasound demonstrates turbulent arterial flow with a to-and-fro or yin-and-yang pattern that results from blood flow into the pseudoaneurysm during systole and backward flow during diastole (26,27). A UAP can be seen on CT as a round pelvic mass that shows similar enhancement as arteries during the arterial phase. Active extravasation may also be seen on CT, and three-dimensional reconstruction may better identify the neck of the pseudoaneurysm (20). Angiography is the diagnostic gold standard and, similar to CT, allows for identification of active extravasation.

Management of Ruptured UAP

The initial management of a ruptured UAP is the same as for any acute blood loss mechanism. Gaining large-bore i.v. access and starting crystalloid and blood product administration are key to resuscitation (5,7). Vaginal packing or intravaginal balloons from Foley catheters or Sengstaken-Blakemore tubes can also be used to tamponade bleeding until definitive treatment can be achieved (28,29).

Uterine artery embolization is typically the preferred method of management, as it a safe and effective way to treat UAP (20). Erickson et al. examined the safety of uterine artery embolization for patients with postpartum hemorrhage from multiple causes (3 of the 20 had UAP) and all achieved hemostasis without complications (30). A similar study performed by Kim et al. looked at outcomes from arterial embolization for postpartum hemorrhage for ruptured pseudoaneurysm (31). Adequate hemostasis was obtained in 93% of patients, there were no complications, and 9 of the 29 women went on to have a normal subsequent pregnancy with healthy babies delivered at term (31). Additionally, several case reports of UAP report the use of IR embolization without complication (12). Dohan et al. examined 20 cases of pelvic pseudoaneurysms treated by arterial embolization and all were treated after one to two embolization sessions without any complications or need for further surgery (32). In one case report, embolization was used during pregnancy at 27 weeks and allowed the pregnancy to continue to term, while providing complete hemostasis and without ill effect to the fetus (33). There is also a low risk of infectious complications with uterine artery embolization (34). Emergent hysterectomy can also be considered in patients too unstable for embolization or when embolization fails.

WHY SHOULD AN EMERGENCY PHYSICIAN BE AWARE OF THIS?

UAP is an uncommon cause of vaginal bleeding, but UAP rupture can be life-threatening. UAP is an important differential diagnosis for vaginal bleeding, particularly in the postpartum or postoperative setting. Delaying diagnosis may worsen bleeding in the setting of a ruptured UAP if treatment is pursued for alternative diagnosis; for example, treating retained products of conception with a D&C. Being aware of UAP and how to diagnose it will allow early proper treatment and more favorable patient outcomes.

REFERENCES

1. Kuwata T, Matsbubara S, Kaneko Y, et al. Asymptomatic uterine artery pseudoaneurysm after cesarean section. J Obstet Gynaecol Res 2010;36:405–10.
2. Baba Y, Matsubara S, Kuwata T, et al. Uterine artery pseudoaneurysm: not a rare condition occurring after non-traumatic delivery or non-traumatic abortion. Arch Gynecol Obstet 2014;290:435–40.
3. Wald DA. Postpartum hemorrhage resulting from uterine artery pseudoaneurysm. J Emerg Med 2003;25:57–60.
4. Weber GW, Jang J, Gustavson S, et al. Contemporary management of postcatheterization pseudoaneurysms. Circulation 2007;115:2666–74.
5. Bhatt A, Odujebe O, Bhatt S, et al. Uterine artery pseudoaneurysm rupture: a life-threatening presentation of vaginal bleeding. Ann Emerg Med 2010;55:460–3.
6. Isono Q, Tsutsumi R, Wada-Hiraike O, et al. Uterine artery pseudoaneurysm after cesarean section: case report and literature review. J Minim Invasive Gynecol 2010;17:687–91.
7. Yun SY, Lee DH, Cho KH, et al. Delayed postpartum hemorrhage resulting from uterine artery pseudoanerusym rupture. J Emerg Med 2011;42:e11–4.
8. Eason DE, Tank RA. Avoidable morbidity in a patient with pseudoaneurysm of the uterine artery after cesarean section. J Clin Ultrasound 2006;34:407–11.
9. Yi SW, Ahn JH. Secondary postpartum hemorrhage due to a pseudoanerusym rupture at the fundal area of the uterus: a case treated with selective uterine arterial embolization. Fertil Steril 2010;93:2048–9.
10. Nanjudan P, Rohilla M, Raveendran A, et al. Pseudoanerusym of the uterine artery: a rare cause of secondary postpartum hemorrhage, managed with uterine artery embolisation. J Clin Imag Sci 2011;1:14.
11. Kovo M, Behar DH, Friedman V, et al. Pelvic arterial pseudoaneurysm- a rare complication of Cesarean section: diagnosis and novel treatment. Ultrasound Obstet Gynecol 2007;30:783–5.
12. Henrich W, Fuchs I, Luttkis A, et al. Pseudoanerusym of the uterine artery after cesarean delivery. J Ultrasound Med 2002;21:1431–4.
13. Descargues G, Douvrin D, Gravier A, et al. False aneurysm of the uterine pedicle: an uncommon cause of post-partum haemorrhage after caesarean section treated with selective arterial embolization. Eur J Obstet Gynecol Reprod Biol 2001;97:26–9.
14. Matsubara S, Takahashi Y, Usui R, et al. Uterine artery pseudoanerusym manifesting as postpartum hemorrhage afer uneventful second-trimester pregnancy termination. J Obstet Gynaecol Res 2010;36:856–60.
15. Padavala SM, Ahluwalia A. Post-abortal bleeding due to uterine artery pseudoaneurysm. Case Rep Obstet Gynecol 2004;24:834–5.
16. Higon MA, Somingo S, Basuset C, et al. Hemorrhage after myomectomy resulting from pseudoaneurysm of the uterine artery. Fertil Steril 2007;87:417.e5–8.

17. Asai A, Asada H, Furuya M, et al. Pseudoaneurysm of the uterine artery after laparoscopic myomectomy. Fertil Steril 2009;91: 929e1–3.
18. Takeda A, Kato K, Mori M, et al. Late massive uterine hemorrhage caused by ruptured uterine artery pseudoaneurysm after laparoscopic-assisted myomectomy. J Minim Invasive Gynecol 2008;15:212–6.
19. Takeda A, Koyama K, Imoto A, et al. Early diagnosis and endovascular management of uterine artery pseudoaneurysm after laparoscopic-assisted myomectomy. Feril Steril 2009;92:1487–91.
20. Lee WK, Roche CJ, Suddalwar VA, et al. Pseudoanerusym of the uterine artery after abdominal hysterectomy: radiologic diagnosis ad management. Am J Obstet Gynecol 2001;185:1269–72.
21. Langer JE, Cope C. Ultrasound diagnosis of uterine artery pseudoaneurysm after hysterectomy. J Ultrasound Med 1999;18:711–4.
22. McGonegle SJ, Dziedzic TS, Thomas J, et al. Pseudoaneurysm of the uterine artery after an uncomplicated spontaneous vaginal delivery. J Ultrasound Med 2006;25:1593–7.
23. Nagayama C, Gibo M, Nitta H, et al. Rupture of pseduoanerusym after vaginal delivery successfully treated by selective arterial embolization. Arch Gynecol Obstet 2011;283:37–40.
24. Cooper BC, Hocking-Brown M, Sorosky JI, et al. Pseudoaneurysm of the uterine artery requiring bilateral uterine artery embolization. J Perinatol 2004;24:560–2.
25. Zimon AE, Hwang JK, Principe DL, et al. Pseudoaneurysm of the uterine artery. Obstet Gynecol 1999;94:827–30.
26. Kwon JH, Kim GS. Obstetric iatrogenic artery injuries of the uterus: diagnosis with us and treatment with transcatheter arterial embolization. Radiographics 2002;22:35–46.
27. Polat P, Suma S, Kantarcy M, et al. Color Doppler US in the evaluation of uterine vascular abnormalities. Radiographics 2002;22:47–53.
28. Georgiou C. Balloon tamponade in the management of postpartum haemorrhage: a review. BJOG 2009;116:748–57.
29. Schlicher NR. Balloon compression as treatment for refactory vaginal hemorrhage. Ann Emerg Med 2008;52:148–50.
30. Erikson LG, Mulc-Lutvica A, Jangland J, et al. Massive postpatrum hemorrhage treated with transcatheter arterial embolization: technical aspects and long term effects on fertility and menstrual cycle. Acta Radiol 2007;48:635–42.
31. Kim GM, Yoon GJ, Seong NJ, et al. Postpartum haemorrhage from ruptured pseudoaneurysm: efficacy of transcatheter arterial embolization using N-butyl-2-cyanoarcylate. Eur Radiol 2013;23:2344–9.
32. Dohan A, Soyer P, Subhani A, et al. Postpartum hemorrhage resulting from pelvic pseudoaneurysm: a retrospective analysis of 588 consecutive cases treated by arterial embolization. Cardiovasc Intervent Radiol 2013;26:1247–55.
33. Cornette J, van der Wilk E, Janssen NM, et al. Uterine artery pseudoaneurysm requiring embolization during pregnancy. Obstet Gynecol 2014;123:453–6.
34. Rajan DK, Beecroft JR, Clark TW, et al. Risk of intrauterine infectious complications after uterine artery embolization. J Vasc Interv Radiol 2004;15:1415–21.