Section: Obstetrics and Gynaecology

Case Series

UTERINE VASCULAR LESIONS AS A CAUSE OF SECONDARY POSTPARTUM HEMORRHAGE: A CASE SERIES OF RARE AND LIFE-THREATENING CONDITIONS

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ABSTRACT

Background: Secondary postpartum hemorrhage (PPH) is defined as vaginal bleeding occurring between 24 hours and 12 weeks after delivery. While retained products of conception, infection (endometritis) and subinvolution of the placental site are common causes, rare and life-threatening vascular anomalies such as uterine artery pseudoaneurysm (UAP) and arteriovenous malformations (AVMs) are increasingly being diagnosed as causes of secondary postpartum haemorrhage due to advancements in imaging. The objective is to describe a case series of seven women presenting with secondary PPH due to rare vascular causes, and to highlight the diagnostic and therapeutic challenges associated with them.

Case Summary: In this series three cases were found to have uterine arteriovenous malformations, two cases were diagnosed with uterine artery pseudoaneurysm, one case had rupture of a previous lower segment cesarean section (LSCS) scar with extension into the uterine artery resulting in a broad ligament hematoma in the puerperal period, and one patient had hematoma at uterine scar site mimicking pseudoaneurysm. All patients presented within the first six weeks postpartum with varying degrees of vaginal bleeding. Diagnosis was confirmed by Doppler ultrasound and/or CT angiography in hemodynamically stable patients. Management strategies included uterine artery embolization in most cases, with surgical intervention required in two cases due to hemodynamic instability.

Conclusion: Vascular lesions such as pseudoaneurysms and AVMs, though rare, should be considered in the differential diagnosis of secondary PPH, particularly in patients with prior uterine surgery or unexplained recurrent bleeding. Early use of color Doppler and cross-sectional imaging is essential for accurate diagnosis and timely management to reduce morbidity.

Keywords: Secondary postpartum hemorrhage, uterine artery pseudoaneurysm, uterine AV malformation, broad ligament hematoma, uterine artery rupture, uterine artery embolization.

INTRODUCTION

Postpartum hemorrhage (PPH) remains a leading cause of maternal morbidity and mortality worldwide. While primary PPH, occurring within 24 hours of delivery, is more commonly encountered and well-characterized, secondary PPH—defined as excessive vaginal bleeding occurring between 24 hours and 12 weeks postpartum poses unique diagnostic and therapeutic challenges. The incidence of secondary PPH is reported to range between 0.2% and 1% of all deliveries, yet it is often under-recognized and may lead to significant clinical consequences if not promptly diagnosed and managed.[1]

According to the Royal College of Obstetricians and Gynaecologists (RCOG), common causes of secondary PPH include retained products of

conception, endometritis, and subinvolution of the placental site.[2] However, rarer vascular anomalies such as uterine arteriovenous malformations (AVMs) and uterine artery pseudoaneurysms (UAPs) must be considered, especially in cases of unexplained or recurrent bleeding.[3] The American College of Obstetricians and Gynecologists (ACOG) also emphasizes the importance of including vascular lesions in the differential diagnosis of delayed PPH, particularly in patients with prior cesarean sections or uterine instrumentation.[4] Bleeding caused by these vascular lesions is episodic but can be torrential and potentially life-threatening, hence these conditions often require high clinical suspicion and imaging modalities such as color Doppler ultrasound, CT angiography, or MRI for diagnosis.[5]

Pseudoaneurysm is an extra luminal and perivascular collection of blood with turbulent flow, which communicates with the flowing arterial blood through a defect in the arterial wall. This occurs when the uterine arterial wall is injured or lacerated, often during surgical procedures such as cesarean section, and fails to seal completely.[6] Unlike a true aneurysm, which is lined by all three arterial layers (intima, media, and adventitia), a pseudoaneurysm is lined only by a single layer of thrombus, making it prone to rupture and cause life-threatening hemorrhage.[7] On color Doppler imaging, it classically shows a swirling blood flow with a "to and fro" pattern, also known as the yin-yang sign.[8] The gold standard for diagnosis is angiography, which allows both diagnosis and potential therapeutic embolization.[9]

Uterine arteriovenous malformation is an abnormal communication between branches of the uterine artery and the myometrial venous plexus. It may be congenital or acquired, the latter usually resulting from uterine surgery, instrumentation, or infections and can be exacerbated in the postpartum period.[10] These lesions can be diagnosed using simple, reliable, and non-invasive imaging such as gray-scale ultrasonography with color Doppler, which typically shows a hypoechoic lesion within the myometrium displaying a mosaic pattern of flow due to high-velocity turbulent blood flow. Power Doppler imaging can further enhance vascular visualization.[11] The gold standard for diagnosis is pelvic angiography, although it is usually reserved for cases undergoing therapeutic procedures, such as uterine artery embolization.[12] Even more rare is the presentation of rupture of a uterine scar into a major vessel, such as the uterine artery, which can result in catastrophic bleeding. This entity is scarcely reported in literature and underscores the diverse etiology of secondary PPH that clinicians must be prepared to manage.[13] A hematoma at the uterine scar site can also be a cause of delayed postpartum hemorrhage and should be distinguished from uterine artery vascular anomalies using Doppler imaging.

In this case series, we present seven diverse and challenging cases of secondary postpartum hemorrhage, including three cases of uterine arteriovenous malformation, two cases of uterine artery pseudoaneurysm, one rare case of uterine scar rupture involving the uterine artery, and one case of uterine scar site haemtoma. Through this series, we aim to highlight the importance of timely diagnosis, appropriate imaging, and individualized management strategies in addressing these uncommon but serious conditions.

CASE SERIES

This is a retrospective case series conducted at Malla Reddy Medical College for Women, Malla Reddy Narayana Multispecialty hospital over a period of three years from January 2022 to December 2024. Institutional ethical approval was obtained prior to data collection. Informed consent for publication was obtained from all patients, with assurance that their identities would be anonymized and confidentiality strictly maintained.

Case 1

A 28-year-old woman, Para 2, with a history of two previous Caesarean sections, presented with two episodes of vaginal bleeding following her most recent lower segment Caesarean section (LSCS), performed 25 days prior. The indication for the surgery was previous LSCS in labor with breech presentation. Her antenatal, intrapartum, and immediate postpartum periods were uneventful, and she was discharged on the 7th postoperative day. The first episode of vaginal bleeding occurred approximately two weeks after surgery and was minimal. However, the second episode was significantly heavier and prompted medical attention. There were no associated symptoms such as fever, offensive vaginal discharge, or abdominal pain. On examination, the patient appeared mildly pale. Her vital signs were stable. Abdominal examination revealed a soft, non-tender abdomen. Speculum examination showed active bleeding through the cervical os. Bimanual examination revealed a bulky uterus with a closed cervical os. A urine pregnancy test was negative, and serum beta-hCG was 6 U/L, effectively ruling out gestational trophoblastic disease. Hemoglobin was 8.6 g/dL, indicating moderate anemia. Pelvic ultrasound showed an intrauterine blood clot measuring 1.7 × 2 cm. Color Doppler imaging revealed a right-sided uterine artery pseudoaneurysm characterized by a classic 'yin-yang' flow pattern. A contrast-enhanced CT scan of the abdomen and pelvis using arterial phase imaging confirmed the presence of a right uterine artery pseudoaneurysm. Given the diagnosis, the patient underwent bilateral uterine artery embolization performed by an interventional radiologist. The procedure was successful, and the bleeding subsided completely following embolization. Her post-procedural period was uneventful, and she remained stable on follow-up.

Case 2

A 20-year-old Primigravida underwent emergency LSCS during the second stage of labor due to meconium-stained amniotic fluid, fetal distress, and failed instrumental delivery. Intraoperatively, the fetal head was deeply engaged, and there was an extension of the uterine incision involving the left uterine angle. She experienced atonic and traumatic postpartum hemorrhage (PPH), which was managed with uterotonic agents, application of uterine compression sutures and the extension of the uterine angle was well repaired. She received two units of packed red blood cells (PRBCs) and was discharged on the 10th postoperative day in stable condition. The patient experienced three episodes of vaginal bleeding postoperatively. The first occurred on postoperative day 30, presenting as moderate bleeding lasting one day. The second episode occurred two days later and was also moderate in volume, managed conservatively at a local clinic. The third episode occurred on the 38th postoperative day and was characterized by a sudden heavy bout of vaginal bleeding. She had no associated fever, foul-smelling discharge, or abdominal pain. Upon presentation, the patient was pale and hemodynamically unstable, with hypotension and tachycardia. Abdominal examination was soft and non-tender. Speculum examination revealed profuse vaginal bleeding. Bimanual examination showed a bulky uterus. Urine pregnancy test was negative, and serum beta-hCG was 0.8 IU/L. Hemoglobin was 5 g/dL. Trans abdominal and transvaginal ultrasound showed no retained products of conception. However, a well-defined saccular lesion measuring 1.7 × 1.6 × 1.3 cm was noted adjacent to the uterine scar on the left side. Color Doppler revealed turbulent swirling blood flow with the classic "yin-yang" sign, suggestive of a uterine artery pseudoaneurysm. Due to ongoing severe hemorrhage and hemodynamic instability, the patient was managed with fluid resuscitation and blood transfusions. Given the critical condition and lack of immediate access to uterine artery embolization, an emergency hysterectomy was performed. Intraoperatively, the pseudoaneurysm was confirmed to be arising from the left uterine artery near the site of the previous uterine incision. The postoperative period was uneventful, and the patient was discharged in stable condition following recovery.

Case 3

A 26-year-old woman, Gravida 3 Para2, with two previous lower segment cesarean sections (LSCS), underwent an elective LSCS for her third delivery. The indication for surgery was a history of 2 prior cesarean deliveries. Her antepartum, intraoperative, and immediate postpartum periods were uneventful, and she was discharged in stable condition on the seventh postoperative day.

After the 40th day postpartum, she experienced two episodes of vaginal bleeding, with a 10-day symptom-free interval between them. Following the first episode, a urine pregnancy test was negative, and serum beta-hCG was 10 IU/L. Her hemoglobin was found to be 8.6 g/dL. Transabdominal ultrasound revealed retained products of conception (RPOC) measuring 2.1 × 1.9 × 2 cm. She was managed conservatively with oral tranexamic acid, prostaglandin E1 (200 mcg twice daily for three days), and antibiotics. The second episode of bleeding was heavier, although the patient did not report any fever, offensive vaginal discharge, or abdominal pain. On examination, she appeared mildly pale, her vitals were stable, the abdomen was soft and non-tender, and speculum examination revealed minimal bleeding from a visible cervical os. Bimanual examination revealed a bulky uterus with a closed internal os. A repeat ultrasound showed persistent RPOC measuring 2.4 × 1.8 × 2 cm, and color Doppler imaging suggested the presence of a uterine arteriovenous malformation (AVM). Pelvic angiography confirmed the AVM, which was found to be predominantly fed by the left uterine artery. Bilateral uterine artery embolization was performed by an interventional radiologist, resulting in the cessation of bleeding. The post-embolization period was uneventful, and the patient received parenteral iron for anemia correction.

Case 4

A 32-year-old woman Gravid 2 Para 1 with a history of one previous lower segment cesarean sections (LSCS), underwent an elective LSCS in view of prior cesarean section with cephalopelvic disproportion (CPD). Her antenatal, intraoperative, and immediate postoperative period were uneventful, and she was discharged on the 7th postoperative day in stable condition. Three weeks post-surgery, she presented with a sudden heavy bout of vaginal bleeding. She was mildly pale, but her vital signs were stable. On abdominal examination, the abdomen was soft and non-tender. Bimanual pelvic examination revealed a bulky uterus with a closed internal os and bleeding was seen through the cervical canal. Urine pregnancy test was negative, and serum β-hCG level was 1.2 IU/L. Hemoglobin was 8 gm%. Transabdominal and transvaginal ultrasound with color Doppler showed a hypervascular mass measuring 25×18×32 mm on the left side of the uterus with multidirectional flow, suggestive of an arteriovenous malformation (AVM). Pelvic angiography confirmed the presence of an AVM fed by the left uterine artery with collateral supply from the vesicular artery. Selective embolization of the left uterine artery and vesicular artery was performed. The patient responded well to the procedure, with cessation of bleeding. Parenteral iron therapy was administered for correction of anemia. She remained stable and was discharged in good condition.

Case 5

A 24-year-old woman, Gravida 2, Para 1 with a history of one previous lower segment cesarean section (LSCS), underwent an emergency LSCS at

term due to fetal distress. Her antepartum and intrapartum periods were uneventful, and she was discharged in stable condition on the seventh postoperative day. Twenty days following the LSCS, she experienced her first episode of vaginal bleeding, which was managed conservatively with antibiotics and tranexamic acid. An ultrasound done after the first bleeding episode was unremarkable. She remained asymptomatic for the next five days, after which she presented with a second episode of vaginal bleeding. There was no associated history of fever, offensive vaginal discharge, or abdominal pain. On general examination, the patient appeared mildly pale, with stable vital signs. Abdominal examination revealed a soft and non-tender uterus. Per speculum examination showed minimal bleeding through the cervical os. On bimanual examination, the uterus was bulky with a closed internal os. Initial investigations revealed a negative urine pregnancy test, serum beta-HCG of 12 U/L, and hemoglobin of 7.2 g/dL. A repeat ultrasound following the second episode showed a hypoechoic lesion in the right uterine myometrium measuring 2 × 1.7 × 1.3 cm. Color Doppler evaluation was suggestive of a uterine arteriovenous malformation (AVM). This diagnosis was confirmed with pelvic angiography, which demonstrated an AVM fed by the right uterine artery. The patient was managed with bilateral uterine artery embolization. Following the procedure, the bleeding subsided completely, and her post-embolization recovery was uneventful. She was also administered parenteral iron therapy for correction of anemia.

Case 6

An unbooked 28-year-old woman, Gravida 3, Para 2 with a history of two previous lower segment cesarean sections (LSCS), underwent a repeat LSCS at 37+2 weeks of gestation while in active labour. Intraoperatively, a left-sided uterine scar dehiscence measuring approximately 4 cm was identified. The dehiscence was well repaired, and hemostasis was secured. The immediate postoperative period was uneventful. On the 14th postoperative day, the patient presented with a first episode of mild vaginal bleeding. She was hemodynamically stable. Speculum examination revealed minimal bleeding through the cervical os. A pelvic ultrasound with color Doppler showed no abnormalities. She was managed conservatively with antibiotics and tranexamic acid. On the 19th postoperative day, the patient presented again with profuse vaginal bleeding. On examination, she appeared very pale and was hemodynamically unstable. Abdominal examination revealed mild distension, tenderness, and guarding. Speculum examination showed active bleeding through the os with clots in the vaginal canal. Serum beta-hCG was negative. Her hemoglobin was 5.7 gm%. A pelvic ultrasound revealed a heterogeneous mass measuring 10 × 8.4 × 7.8 cm in the pelvis abutting the left uterine wall, with free fluid in the pouch of Douglas (POD), suggestive of a broad ligament hematoma or vascular lesion. The patient was resuscitated with warm intravenous fluids and blood products. In view of ongoing hemorrhage and hemodynamic instability, an emergency laparotomy was performed. Intraoperatively, a broad ligament hematoma measuring approximately 10 × 8 × 8 cm was noted on the left side. The uterine scar on the left lateral side had ruptured into the broad ligament, with active bleeding from the left uterine artery. The scar rupture measured approximately 6 cm. A hysterectomy was performed in view of uncontrolled bleeding and unstable vitals. The patient received 5 units of packed red blood cells (PRBC) and 5 units of fresh frozen plasma (FFP) intraoperatively. The postoperative course was uneventful, and the patient was discharged on the 8th postoperative day in stable condition.

Case 7

A 24-year-old Primigravida had undergone an emergency lower segment cesarean section (LSCS) for failure of progression of labour. Her antenatal, intraoperative, and immediate postpartum periods had been uneventful, and she had been discharged in a stable condition on the sixth postoperative day. She returned after three weeks with complaints of spotting followed by moderate vaginal bleeding for two days. There were no associated symptoms such as abdominal pain, fever, or foul-smelling discharge. On examination, she was hemodynamically stable, the uterus was well involuted, and dark-colored blood was noted through the cervical os. Transabdominal and transvaginal ultrasound revealed a 3 × 2 cm lesion at the left side of the uterine scar. Given the delayed secondary postpartum hemorrhage and the location of the lesion, a uterine artery pseudoaneurysm (UAP) was initially suspected. Pseudoaneurysms typically present as anechoic or hypoechoic lesions with internal turbulent blood flow on Doppler, often showing the classic “yin-yang” sign and a to-and-fro waveform, and are usually pulsatile due to their vascular nature. However, in this case, Doppler studies showed no internal vascularity, no pulsatility, and no characteristic flow pattern suggestive of a pseudoaneurysm. The lesion appeared hypoechoic and avascular, favoring a diagnosis of an organized hematoma at the scar site that had formed a small communication with the endometrial cavity, resulting in intermittent bleeding per vagina. This distinction was crucial, as management strategies for the two conditions differ significantly. While pseudoaneurysms often require embolization or surgical intervention due to the risk of sudden and severe hemorrhage, a hematoma, especially in a stable patient, can be managed conservatively. The patient was treated with tranexamic acid and antibiotics, following which the bleeding subsided within two days. She was discharged in stable condition, and a follow-up ultrasound one week later confirmed complete resolution of the hematoma. This case highlights the importance of considering a scar-site hematoma in the differential diagnosis of secondary postpartum

hemorrhage and underscores the value of detailed Doppler imaging in distinguishing it from vascular lesions like uterine artery pseudoaneurysms, thus preventing unnecessary invasive interventions in clinically stable patients.

DISCUSSION

This case series highlights a rare but critical subset of secondary postpartum hemorrhage (PPH) caused by vascular lesions, including uterine artery pseudoaneurysms (UAP) arteriovenous malformations (AVM), uterine scar rupture into uterine artery, and scar-site hematoma. These conditions are often underdiagnosed due to their infrequent occurrence and the overlap of symptoms with more common causes like retained products or endometritis. Our findings emphasize the importance of considering vascular etiologies, particularly in patients with a history of cesarean section or uterine instrumentation.

Two cases in our series were diagnosed as uterine artery pseudoaneurysm. One of the cases was diagnosed by color Doppler and CT angiography and was managed by uterine artery embolization while the other required emergency hysterectomy due to hemodynamic instability. Similar patterns were reported by Baba et al. and Brown et al. who described uterine artery pseudoaneurysm presenting with delayed vaginal bleeding weeks after cesarean section or curettage, emphasizing the need for vascular imaging when ultrasound is inconclusive.[14,15] In a case series by Dohan et al. involving 14 patients with uterine artery pseudoaneurysm, the authors demonstrated a 93% success rate with embolization, with hysterectomy reserved for embolization failures or unstable patients.[16] These findings support the RCOG Green-top Guideline No. 52, which recommends interventional radiology as first-line treatment for stable women with uterine vascular lesions, reserving surgery for refractory or unstable cases.[2] The ACOG Practice Bulletin No. 183 also aligns with this, supporting embolization as a fertility-sparing and effective approach.[4]

Three of our cases were diagnosed with uterine arteriovenous malformation using color Doppler and CT angiography. All were managed successfully with embolization. A study by Timmerman et al. confirmed the utility of Doppler imaging in detecting arteriovenous malformation, identifying the hallmark turbulent high-velocity flow with low-resistance waveforms.[3] These hemodynamic features were noted in all our AVM cases. O'Brien et al. also stressed the importance of avoiding unnecessary curettage in patients with undiagnosed AVM, as this can precipitate massive hemorrhage.[11] In our series, conservative non-surgical management proved successful in all cases, reinforcing the evidence from Yoon et al who reported that embolization preserves fertility in over 90% of women with uterine AVMs, with minimal complications.[17]

We encountered a rare case of uterine scar rupture involving direct communication with the uterine artery, leading to an extensive broad ligament hematoma and hypovolemic shock, managed by laparotomy and hysterectomy. A somewhat analogous scenario was reported by Luke et al.,where a concealed uterine tear extended alongside the ascending uterine artery into the broad ligament after a vaginal delivery, resulting in uncontrolled hemorrhage and necessitating total hysterectomy.[18] Other series such as those by Singh et al. and Yeniel et al. describe cases of pseudoaneurysm with cesarean scar dehiscence leading to massive bleeding, though without direct scar-artery rupture; management varied between angiographic embolization and surgery.[19,20]

One patient in our series presented with clinical features mimicking a pseudoaneurysm; however, Doppler ultrasound identified a non-pulsatile hematoma localized at the uterine scar site. She was managed conservatively with oral antifibrinolytics agents (tranexamic acid) and close follow-up. Matsubara et al. described cases where hematomas and vascular lesions were misinterpreted on grayscale ultrasound, leading to unnecessary embolization.[21]

Diagnostic Imaging and Triage plays a very important role. 5 out of 7 cases in our case series were haemodynamically stable and color Doppler ultrasonography served as the initial diagnostic modality. The characteristic findings of vascular lesions, turbulent flow, low resistance index, and high peak systolic velocities were reliable in directing further investigation. CT angiography provided detailed vascular mapping, aiding the decision to proceed with embolization or surgery.

CONCLUSION

Our experience demonstrates that while secondary PPH is often due to benign causes, vascular lesions must be considered in atypical or delayed presentations, particularly in patients with prior cesarean sections or uterine instrumentation. Early use of Doppler imaging, CT angiography, and a multidisciplinary team approach allows for accurate diagnosis and prompt management. Embolization remains the preferred option for hemodynamically stable patients, while hysterectomy is reserved for life-threatening hemorrhage. Proper differentiation between pseudoaneurysm, AVM, hematoma, and scar rupture is critical for effective and safe patient care. This case series supports current evidence and guidelines favoring conservative, uterus-sparing therapy in stable patients, contributing to the growing recognition of vascular causes of secondary PPH in modern obstetric practice.

Conflict of Interest

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REFERENCES

1. Alexander J, Thomas P, Sanghera J. Treatments for secondary postpartum haemorrhage. Cochrane Database Syst Rev. 2002;(1):CD002867.
2. Royal College of Obstetricians and Gynaecologists (RCOG). Green-top Guideline No. 52: Prevention and Management of Postpartum Haemorrhage. 2016.
3. Timmerman D, Van den Bosch T, Peeraer K, et al. Vascular malformations in the uterus: ultrasonographic diagnosis and conservative management. Eur J Obstet Gynecol Reprod Biol. 2000;92(1):171-178.
4. American College of Obstetricians and Gynecologists. ACOG Practice Bulletin No. 183: Postpartum Hemorrhage. Obstet Gynecol. 2017;130(4):e168-e186.
5. Huang MW, Muradali D, Thurston WA, Burns PN, Wilson SR. Uterine pseudoaneurysm: gray-scale and Doppler US features with MR imaging correlation. Radiology. 1998;206(1):115-123.
6. Tropeano G, Di Stasi C, Amoroso S, et al. Uterine artery pseudoaneurysm after cesarean section: diagnosis with color Doppler ultrasonography. J Ultrasound Med. 2004;23(10):1349–1352.
7. Sharma B, Soni A, Patel A, et al. Uterine artery pseudoaneurysm: a rare cause of secondary postpartum hemorrhage. J Obstet Gynaecol India. 2012;62(5):541–543.
8. Abu-Yousef MM, Wiese JA, Shamma AR. The "to-and-fro" sign: duplex Doppler evidence of femoral artery pseudoaneurysm. AJR Am J Roentgenol. 1988;150(3):632–634.
9. Ghi T, Giunchi S, Pilu G, et al. Sonographic diagnosis and management of uterine artery pseudoaneurysm after cesarean section. Ultrasound Obstet Gynecol. 2003;21(3):280–283.
10. Timmerman D, Van den Bosch T, Peeraer K, et al. Vascular malformations in the uterus: ultrasonographic diagnosis and conservative management. Eur J Obstet Gynecol Reprod Biol. 2000;92(1):171–178.
11. O'Brien P, Neyastani A, Buckley AR, Chang SD, Legiehn GM. Uterine arteriovenous malformations: from diagnosis to treatment. J Ultrasound Med. 2006;25(11):1387–1392.
12. Jain KA. Imaging of uterine arteriovenous malformations. Radiographics. 2002;22(6):1481–1493.
13. Aras AB, Yavuz A, Yildiz AE, et al. Rupture of uterine artery pseudoaneurysm presenting as delayed postpartum hemorrhage: diagnosis with Doppler US. J Clin Ultrasound. 2012;40(4):241-243.
14. Baba Y, Matsubara S, Kuwata T, Usui R, Ichikawa M, Suzuki M. Uterine artery pseudoaneurysm: not a rare condition occurring after non-traumatic delivery or non-traumatic abortion. Arch Gynecol Obstet. 2010;281(5):945–9.
15. Brown BJ, Heaston DK, Poulson AM, Gabert HA, Mineau DE, Miller FJ. Unusual causes of postpartum hemorrhage: angiographic diagnosis and treatment. AJR Am J Roentgenol. 2013;141(3):529–32.
16. Dohan A, Soyer P, Subhani A, et al. Postpartum hemorrhage due to uterine artery pseudoaneurysm: first-line treatment with selective arterial embolization. Eur Radiol. 2015;25(3):728–34.
17. Yoon DJ, Jones M, Taani JA, Buhimschi IA, Dowell JD. A review of uterine arteriovenous malformations and minimally invasive management options. Obstet Gynecol Surv. 2016;71(12):695–703.
18. Luke ND, Risseeuw R, Mercado F. Concealed uterine rupture in the broad ligament in an unscarred uterus with postpartum hemorrhage: a case report. Cureus. 2022;14(6):e26041.
19. Singh K, Bharati G, Kumari S, Tripathy N. Pseudoaneurysm of uterine artery and cesarean scar dehiscence causing secondary postpartum haemorrhage managed by uterine artery embolisation: a case report. Int J Reprod Contracept Obstet Gynecol. 2017;5(8):2895–8.
20. Yenial AO, Ergenoglu AM, Akdemir A. Massive secondary postpartum hemorrhage with uterine artery pseudoaneurysm after cesarean section. Case Rep Obstet Gynecol. 2013;2013:285846.
21. Matsubara S, Kuwata T, Baba Y, et al. Misdiagnosis of uterine vascular lesion: pseudoaneurysm or hematoma? J Obstet Gynaecol Res. 2015;41(1):1–4.