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Postpartum Retroperitoneal Haematoma Associated With Suspected Ovarian Artery Pathology Following Spontaneous Vaginal Delivery: A Case Report

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Abstract

Postpartum retroperitoneal haemorrhage is rare and can be challenging to recognise because substantial blood loss may remain concealed. A 22-year-old multiparous woman presented three days after an uncomplicated vaginal delivery with syncope, severe right-sided abdominal and back pain, vomiting, and haemodynamic instability. Pelvic ultrasonography did not adequately explain the severity of her clinical presentation. Computed tomography revealed a large right-sided retroperitoneal haematoma associated with suspected ovarian artery pathology. She underwent successful endovascular coil embolization and received a blood transfusion. Her recovery was complicated by fever and a marked inflammatory response, necessitating prolonged antimicrobial treatment and close outpatient follow-up. This case highlights the importance of considering concealed extrauterine haemorrhage when postpartum symptoms are disproportionate to visible blood loss or initial ultrasonographic findings.

Categories: Obstetrics/Gynecology
Keywords: case report, embolisation, ovarian artery, postpartum abdominal pain, postpartum haemorrhage, retroperitoneal haematoma

Introduction

Postpartum haemorrhage most commonly arises from uterine atony, genital tract trauma, retained placental tissue, or coagulation disorders. Retroperitoneal bleeding is much less common and may not be apparent externally; consequently, visible vaginal blood loss may underestimate the severity of haemorrhage [1,2]. Ovarian artery aneurysms, pseudoaneurysms, and ruptures are rare causes of postpartum retroperitoneal bleeding and have most often been reported in multiparous patients during late pregnancy or the puerperium [3-7].

The clinical presentation is variable and may include severe abdominal, flank, or back pain, syncope, hypotension, and haemorrhagic shock [2-7]. Ultrasonography remains an appropriate initial investigation when a uterine cause of secondary postpartum haemorrhage is suspected. However, a non-diagnostic pelvic ultrasound does not exclude extrauterine bleeding. Contrast-enhanced computed tomography can identify the extent and likely source of concealed haemorrhage and help plan treatment [8,9]. We report a case of a large postpartum retroperitoneal haematoma associated with suspected right ovarian arterial pathology, which was managed successfully with endovascular embolisation.

Case Presentation

Presentation and initial assessment

A 22-year-old woman, para 4, presented to the emergency department three days after an uncomplicated term spontaneous vaginal delivery. She had felt unwell from the previous day and had experienced several episodes of dizziness. She then developed severe right-sided abdominal and back pain, repeated vomiting, and increasing lochia, followed by a syncopal episode. The pain was aggravated by movement and prevented mobilisation.

On arrival, her blood pressure was 80/55 mmHg, and her heart rate was 115 beats/min. She received 1,000 mL of intravenous Hartmann's solution, intravenous morphine, ondansetron, and tranexamic acid before transfer to maternity triage with a working diagnosis of postpartum haemorrhage. After initial fluid resuscitation, her blood pressure improved to 112/70 mmHg, although she remained tachycardic. She was afebrile. Examination was limited by pain, but there was marked right flank and renal angle tenderness with guarding. Her maternity pad was moderately soaked with lochia, without large clots. The differential diagnosis included secondary postpartum haemorrhage, endometritis, pyelonephritis, renal colic, appendicitis, and other intra-abdominal or retroperitoneal pathology.

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Investigations

Initial blood tests showed decreased haemoglobin with increased white cell count and C-reactive protein. Renal and liver function were within the reference range. The available serial laboratory results are presented in Table *1* and Figure *1*.

Parameter	Reference range	Before presentation	At presentation	Before embolisation	After embolisation	Febrile episode
Haemoglobin (g/L)	115-165	107 (L)	93 (L)	79 (L)*	82 (L)	79 (L)
White cell count ($x10^9$/L)	4.0-11.0	9	21.0 (H)	18.5 (H)	12.9 (H)	11.1 (H)
C-reactive protein (mg/L)	0-5	<5	16 (H)	189 (H)	281 (H)	218 (H)
Creatinine (micromol/L)	49-90	49	55	-	45	50
eGFR (mL/min/1.73 m^2)	>90	>90	>90	-	>90	>90
Prothrombin ratio	0.9-1.1	1.0	1.0	-	1.0	1.2
Prothrombin time (seconds)	9.6-12.4	10.7	11.6	-	11.8	12.3

TABLE 1: Laboratory investigations during the clinical course

Values outside the reference range are marked L (low) or H (high). Reference ranges are the adult ranges of the reporting laboratory.

*Measured on venous blood gas analysis.

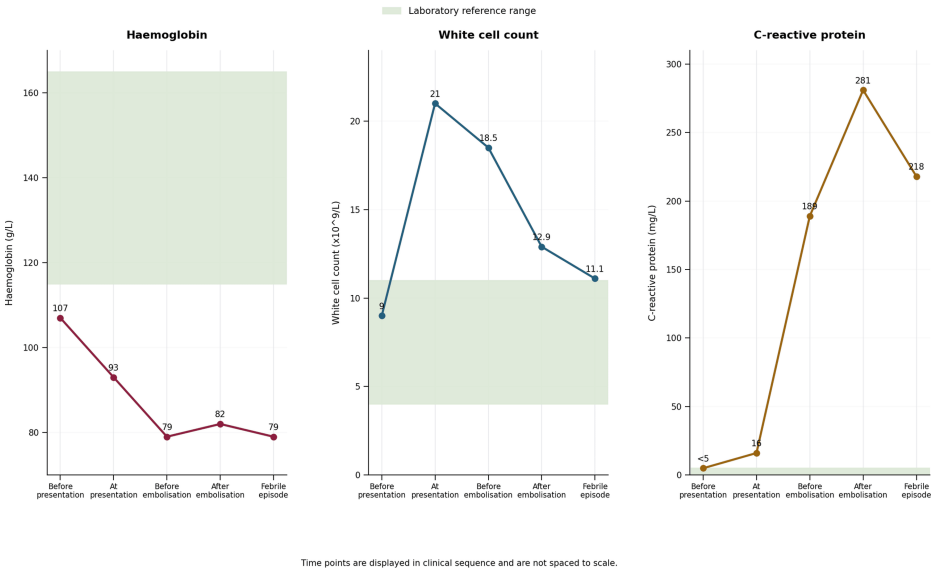


FIGURE 1: Trends in haemoglobin, white cell count, and C-reactive protein during the clinical course

Each point represents a measured value. The time points are displayed in clinical sequence and are not spaced to scale. The shaded band in each panel indicates the adult reference range of the reporting laboratory. Haemoglobin decreased before embolisation and remained below the reference range thereafter. The white cell count was highest at presentation and subsequently decreased, whereas C-reactive protein increased markedly during the post-embolisation period before decreasing during the febrile episode.

Pelvic ultrasonography showed a postpartum uterus with an endometrial thickness of 16 mm, no obvious

retained products of conception, minimal fluid in the pouch of Douglas, and no upper abdominal free fluid. These findings did not explain the severity of the symptoms. Contrast-enhanced computed tomography of the abdomen and pelvis demonstrated a large right-sided retroperitoneal collection, measuring approximately 22 × 18 × 8 cm, and extending from the pelvis to the inferior margin of the liver. The collection was interpreted as a retroperitoneal haematoma. The presumed right ovarian artery traversed the collection and demonstrated focal irregularity with a small outpouching, raising suspicion of an associated arterial lesion or pseudoaneurysm. The retroperitoneal haematoma and suspected pseudoaneurysm were therefore regarded as separate but potentially related findings: the former represented accumulated retroperitoneal blood, while the latter was considered a possible vascular source. Subsequent angiography demonstrated arterial irregularity but no active contrast extravasation (Figure *2*).

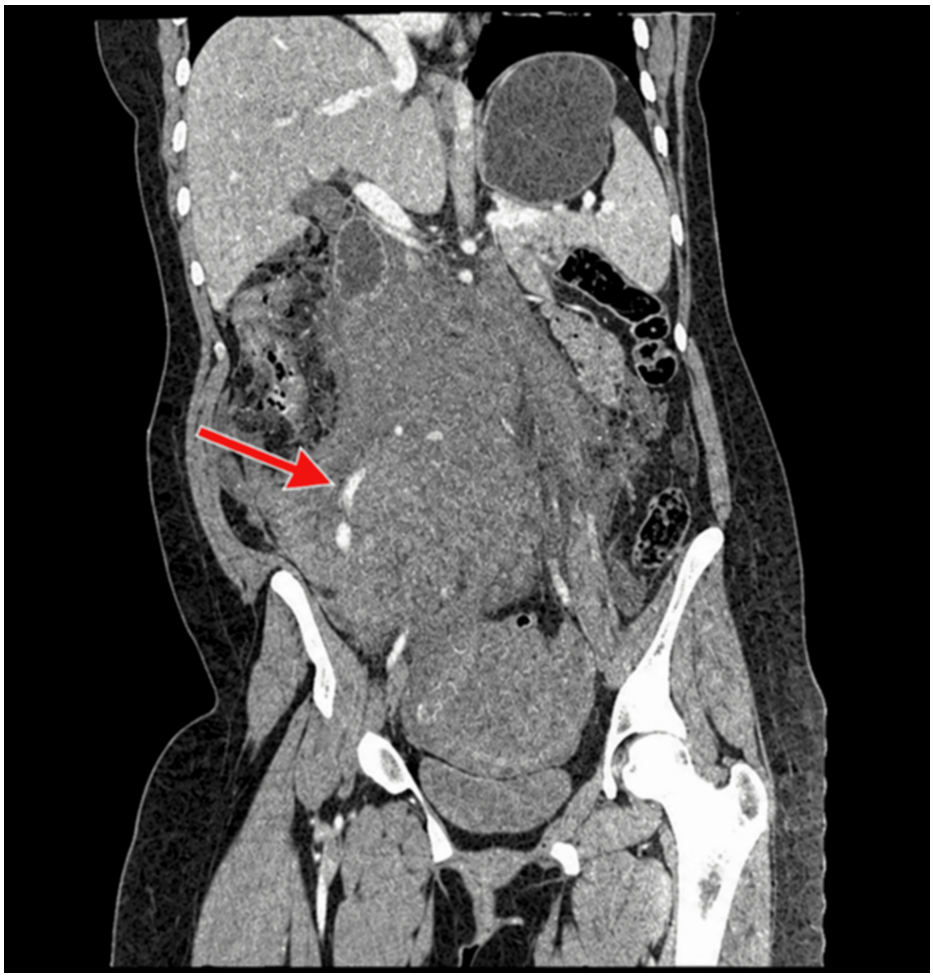


FIGURE 2: Contrast-enhanced computed tomography demonstrating a right retroperitoneal haematoma and suspected ovarian artery abnormality

Coronal contrast-enhanced computed tomography image demonstrating a large right-sided retroperitoneal collection consistent with haematoma. The presumed right ovarian artery traverses the collection and demonstrates focal irregularity with a small outpouching, indicated by the red arrow. This appearance raised suspicion of an associated arterial lesion or pseudoaneurysm. The collection represents the retroperitoneal haematoma and is distinct from the suspected vascular lesion.

Treatment

The radiologist immediately informed the obstetric team. In view of the further decrease in haemoglobin and the computed tomography findings, the case was discussed with vascular surgery and interventional radiology. Four units of packed red blood cells were made available, and the patient received two units during the admission. Ultrasound-guided right common femoral arterial access was obtained. Angiography showed an irregular segment in the midportion of the right ovarian artery, considered suggestive of a pseudoaneurysm, although there was no active contrast extravasation. The proximal and distal aspects of the abnormal segment were embolised with coils, with a satisfactory final angiographic appearance (Figure *3*). Because active bleeding was not demonstrated angiographically, the lesion is described here as suspected

pseudoaneurysm or ovarian artery pathology rather than confirmed rupture.



FIGURE 3: Selective angiographic assessment of the right ovarian artery before embolisation

Selective angiographic assessment of the presumed right ovarian artery before embolisation. The opacified vessel demonstrates focal irregularity near the catheter tip, without visible active contrast extravasation. The appearance was considered suspicious for arterial pathology, although a pseudoaneurysm or active rupture was not definitively demonstrated on this image.

Clinical course and follow-up

Following embolisation, the patient remained haemodynamically stable. Her abdominal findings gradually improved, she was able to pass urine, and she progressively regained mobility. She received intravenous co-amoxiclav. Several days later, she developed a temperature of 38.6°C and persistent tachycardia, although her abdominal pain continued to improve. She also reported exertional breathlessness. Repeat blood tests demonstrated persistent anaemia, a decreasing white cell count and a marked increase in C-reactive protein. A high vaginal swab grew *Escherichia coli*, while the remaining microbiological investigations were negative.

Following review by the microbiology team, antimicrobial treatment was broadened in accordance with specialist advice. In view of the persistent fever and increasing C-reactive protein concentration, the case

was discussed with the interventional radiology consultant who had performed the right ovarian artery embolisation. Drainage of the retroperitoneal haematoma was considered; however, complete drainage was not considered technically feasible because of its large size and mixed solid and liquid composition. Conservative management was therefore recommended, as gradual spontaneous resorption was expected. The interventional radiology team advised that focal infection or abscess formation could develop during this process and that any discrete liquefied infected component might subsequently be amenable to targeted percutaneous drainage. Repeat computed tomography was recommended if fever and inflammatory markers remained elevated despite adjustment of antimicrobial treatment, to assess for a focal drainable collection. The haematoma was not sampled or drained during the admission; consequently, infection within the collection was not microbiologically confirmed. The positive high vaginal swab for *Escherichia coli* did not, by itself, establish infection of the retroperitoneal haematoma.

The patient subsequently chose to leave hospital after the risks of self-discharge had been explained. She returned for clinical assessment, serial blood tests, and intravenous antimicrobial treatment. Ertapenem 1 g once daily was commenced through the outpatient parenteral antimicrobial therapy service for a planned 14-day course.

At outpatient review, she was clinically well (Table *2*). She was counselled that evidence regarding reproductive outcomes following selective unilateral ovarian artery embolisation is limited and that any potential effect would depend on the vascular anatomy and extent of embolisation. She did not plan further pregnancies and was using depot medroxyprogesterone acetate.

Time point	Clinical event
Delivery	Term spontaneous vaginal delivery
Postpartum days 2-3	Increasing lochia, dizziness, malaise, and worsening abdominal and back pain
Presentation	Syncope, vomiting, hypotension, and tachycardia
Initial imaging	Pelvic ultrasonography did not identify a cause proportionate to the clinical presentation
Computed tomography	Large right-sided retroperitoneal haematoma with suspected right ovarian artery pathology
Definitive treatment	Emergency right ovarian artery coil embolisation and transfusion
Later inpatient course	Pyrexia, persistent tachycardia and increased inflammatory markers
Follow-up	Outpatient intravenous antimicrobial therapy; clinically well at review

TABLE 2: Clinical timeline

Chronological summary of presentation, investigations, treatment, and follow-up.

Approximately three months after the initial presentation, contrast-enhanced pelvic magnetic resonance imaging was performed because of intermittent pain and persistent vaginal bleeding, principally to exclude a uterine arteriovenous malformation. The previously observed distension of the endometrial cavity containing possible haemorrhagic material had resolved. There was no evidence of a uterine arteriovenous malformation, focal myometrial lesion, adnexal lesion, or tubo-ovarian collection. Both ovaries were normal in size, and no pelvic free fluid was present. Mildly tortuous parauterine vessels measuring up to 11 mm were noted, with appearances suggestive of pelvic congestion. The MRI provided reassuring pelvic follow-up; however, it was directed towards assessment of the uterus and pelvis and did not specifically document the full extent of the previous retroperitoneal haematoma, which had extended to the inferior margin of the liver. Complete radiological resolution of the retroperitoneal collection could therefore not be confirmed from this examination.

Discussion

Retroperitoneal haematoma is a rare but important cause of postpartum deterioration. Redondo Villatoro et al. described three postpartum retroperitoneal haematomas, while El Safadi et al. reported a massive retroperitoneal haematoma following vaginal delivery [2,10]. These reports demonstrate that substantial postpartum blood loss may remain concealed within the retroperitoneal space despite limited visible bleeding. In the present case, hypotension, tachycardia, syncope, and anaemia initially suggested secondary postpartum haemorrhage, but the severity and distribution of pain were not explained by the visible vaginal loss or pelvic ultrasonography. Recognition of this discrepancy prompted cross-sectional imaging.

Puerperal haematomas more commonly follow traumatic injury to the genital tract after operative vaginal

delivery, episiotomy, or perineal laceration. However, concealed postpartum bleeding may also result from disruption of a pelvic vessel or rupture of a pseudoaneurysm without an obvious associated soft-tissue injury. Po et al. reported concealed postpartum haemorrhage successfully treated by transcatheter arterial embolisation, while Nagayama et al. described a postpartum pseudoaneurysm managed by selective embolisation [11,12]. These reports support consideration of a vascular lesion when the clinical severity of postpartum bleeding is not explained by uterine findings or visible genital tract trauma. Risk factors associated with vulvar and vaginal puerperal haematomas should not be assumed to apply directly to spontaneous ovarian artery pathology.

Ovarian artery aneurysm and pseudoaneurysm are uncommon. Speier et al., Enakpene et al., Poilblanc et al., Van Kalsbeek et al., Shibahara et al., and Yildiz et al. described ovarian artery aneurysm or rupture during pregnancy or the puerperium, typically presenting with abdominal or flank pain, haemodynamic instability, and retroperitoneal haemorrhage [3-7,13]. Pregnancy-related increases in blood volume and pelvic blood flow, together with hormonal and structural changes in the arterial wall, have been proposed as possible contributing factors, although causation cannot be established in an individual patient [5,7,13].

A pseudoaneurysm and a haematoma are distinct findings. A pseudoaneurysm represents a contained arterial wall disruption that communicates with the parent vessel, whereas a haematoma represents an extravascular collection of blood. In this case, computed tomography demonstrated a large retroperitoneal collection interpreted as a haematoma. The presumed right ovarian artery traversed the collection and demonstrated focal irregularity with a small outpouching, raising suspicion of an associated arterial lesion or pseudoaneurysm. Subsequent angiography demonstrated an irregular arterial segment but no active contrast extravasation or unequivocal contrast-filled pseudoaneurysm. The retroperitoneal haematoma and suspected arterial lesion were therefore regarded as distinct but potentially related findings. The former represented accumulated retroperitoneal blood, while the latter was considered a possible source. As the precise arterial abnormality was not conclusively demonstrated, the lesion is described as suspected ovarian artery pathology rather than confirmed pseudoaneurysm or rupture.

Alonso-Burgos et al. and Woodhams et al. described the value of contrast-enhanced computed tomography and angiography in identifying extrauterine sources of postpartum haemorrhage and guiding intervention [8,9]. Pelvic ultrasonography is appropriate when retained products of conception or another uterine cause is suspected, but a non-diagnostic pelvic scan does not exclude retroperitoneal bleeding. Furthermore, the absence of active extravasation during angiography does not exclude preceding haemorrhage, as bleeding may be intermittent or may have ceased before the procedure. In this case, the combination of haemodynamic instability, a marked decrease in haemoglobin, and a large retroperitoneal haematoma supported preceding clinically significant blood loss despite the absence of active extravasation during angiography.

Management should be individualised according to haemodynamic stability, the suspected source, the characteristics of the haematoma, and the expertise available. Options include close observation in selected stable patients, surgery, and transcatheter arterial embolisation. In their systematic review and meta-analysis, Zhang et al. found that emergent pelvic arterial embolisation was an effective treatment for postpartum haemorrhage [14]. In the present case, collaboration among obstetrics, anaesthesia, vascular surgery, and interventional radiology enabled selective embolisation without laparotomy.

The subsequent fever, persistent tachycardia, and inflammatory response raised concern about secondary infection of the residual haematoma. Yokoe et al. reported two infected postpartum retroperitoneal haematomas that required minimally invasive drainage when antimicrobial treatment alone was insufficient [15]. In the present case, the possibility of drainage was discussed with the interventional radiology consultant who had performed the right ovarian artery embolisation. Complete drainage was not considered technically feasible because the haematoma was large and contained mixed solid and liquid components. Conservative management was advised because gradual spontaneous resorption was expected. Interventional radiology also advised that focal infection or abscess formation could develop during this process and that any discrete liquefied infected component might subsequently become amenable to targeted percutaneous drainage. Repeat computed tomography was recommended if fever and inflammatory markers remained elevated despite adjustment of antimicrobial treatment, to identify any focal drainable collection.

The haematoma was neither sampled nor drained; therefore, infection within the retroperitoneal collection was not microbiologically confirmed. Although a high vaginal swab grew *Escherichia coli*, this finding did not establish infection of the haematoma. The manuscript consequently describes a suspected infective complication rather than confirmed infection of the retroperitoneal collection.

Approximately three months after the initial presentation, contrast-enhanced pelvic magnetic resonance imaging was performed because of intermittent pain and persistent vaginal bleeding, principally to exclude a uterine arteriovenous malformation. The previously observed distension of the endometrial cavity containing possible haemorrhagic material had resolved. There was no evidence of a uterine arteriovenous malformation, focal myometrial lesion, adnexal lesion, tubo-ovarian collection, or pelvic free fluid. Both

ovaries were normal in size. Mildly tortuous parauterine vessels measuring up to 11 mm were reported, with appearances suggestive of pelvic congestion. These findings provided reassuring pelvic follow-up. However, the MRI was directed towards assessment of the uterus and pelvis and did not specifically document the full extent of the previous retroperitoneal haematoma, which had extended to the inferior margin of the liver. Complete radiological resolution of the retroperitoneal collection could therefore not be confirmed from this examination.

Counselling after embolisation should acknowledge the limitations of the available evidence. Mailli et al. noted that evidence concerning fertility following uterine artery embolisation remains heterogeneous [16]. These findings cannot be directly extrapolated to selective unilateral ovarian artery embolisation, for which reproductive outcome data are particularly limited. Counselling should therefore be individualised according to the vessel treated, collateral circulation, the extent of embolisation, and the patient's reproductive plans.

Limitations

This is a single case. Active contrast extravasation was not demonstrated during angiography; therefore, the precise arterial lesion and source of the preceding haemorrhage could not be definitively confirmed. Although focal ovarian arterial irregularity raised suspicion of a pseudoaneurysm or another arterial abnormality, the available imaging did not establish either diagnosis conclusively. The retroperitoneal haematoma was not sampled or drained, so infection within the collection was not microbiologically confirmed. Follow-up pelvic MRI demonstrated resolution of the previously noted endometrial cavity distension and excluded a uterine arteriovenous malformation, adnexal lesion, and pelvic collection. However, this targeted examination did not specifically assess the full extent of the previous retroperitoneal haematoma; therefore, complete resolution of that collection and any residual effect on structures beyond the pelvis could not be confirmed. Long-term reproductive outcomes were also unavailable.

Conclusions

Postpartum retroperitoneal haematoma associated with suspected ovarian artery pathology is rare but potentially life-threatening. In this case, computed tomography demonstrated a large retroperitoneal haematoma, while focal irregularity of the presumed right ovarian artery raised suspicion of a possible vascular source. The absence of active contrast extravasation during angiography prevented definitive confirmation of active rupture or pseudoaneurysm. Severe abdominal or flank pain, syncope, haemodynamic instability, or otherwise unexplained anaemia should prompt consideration of concealed retroperitoneal bleeding, even when visible vaginal blood loss is limited and pelvic ultrasonography is non-diagnostic. Prompt cross-sectional imaging and multidisciplinary assessment can facilitate diagnosis and guide endovascular treatment. Large residual haematomas may not be suitable for complete percutaneous drainage when they contain mixed solid and liquid components; therefore, continued clinical surveillance and interval imaging should be considered to assess resolution and identify focal infection, abscess formation, or compression of adjacent structures.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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Acquisition, analysis, or interpretation of data: Aishwarya R. Kadrekar, Sanjay Rao, Ahmed Elnaggar, Abdur Rahman Nabeel

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Critical review of the manuscript for important intellectual content: Aishwarya R. Kadrekar, Sanjay Rao, Ahmed Elnaggar, Abdur Rahman Nabeel

Supervision: Aishwarya R. Kadrekar, Sanjay Rao

Disclosures

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submitted work.

References

1. Prevention and management of postpartum haemorrhage: Green-Top guideline No. 52 . BJOG. 2017, 124:e106-49. 10.1111/1471-0528.14178
2. Redondo Villatoro A, Azcona Sutil L, Vargas Gálvez D, Carmona Domínguez E, Cabezas Palacios MN: Diagnosis and management of postpartum retroperitoneal hematoma: a report of 3 cases . Am J Case Rep. 2022, 23:e935787. 10.12659/AJCR.935787
3. Speier L, Ward T, Bednar J, Kramer N, Almario L: Spontaneous rupture of an ovarian artery aneurysm in the early postpartum period: a case report. Cureus. 2024, 16:e65137. 10.7759/cureus.65137
4. Enakpene CA, Stern T, Barzallo Salazar MJ, Mukherjee P: Spontaneous rupture of an ovarian artery aneurysm: a rare postpartum complication. Case Rep Obstet Gynecol. 2016, 2016:1029561. 10.1155/2016/1029561
5. Poilblanc M, Winer N, Bouvier A, Gillard P, Boussion F, Aubé C, Descamps P: Rupture of an aneurysm of the ovarian artery following delivery and endovascular treatment. Am J Obstet Gynecol. 2008, 199:e7-8. 10.1016/j.ajog.2008.04.053
6. Van Kalsbeek MB, Morris K, Degen K: Ruptured ovarian artery aneurysm complicating a term vaginal delivery in the early puerperium period: a case study. S D Med. 2023, 76:156-159.
7. Shibahara M, Kondo E, Shibata E, et al.: Spontaneous rupture of an ovarian artery aneurysm complicated by postpartum hypertensive disorders of pregnancy after caesarean section: a case report and literature review. J Med Case Rep. 2024, 18:553. 10.1186/s13256-024-04871-y
8. Alonso-Burgos A, Díaz-Lorenzo I, Muñoz-Saá L, Gallardo G, Castellanos T, Cardenas R, Chiva de Agustín L: Primary and secondary postpartum haemorrhage: a review for a rationale endovascular approach . CVIR Endovasc. 2024, 7:17. 10.1186/s42155-024-00429-7
9. Woodhams R, Fujii K, Kurihara Y, Ochiai D: Interventional radiology for primary postpartum hemorrhage: optimal strategy based on the pathogenesis of bleeding. Interv Radiol (Higashimatsuyama). 2025, 10:e20250014. 10.22575/interventionalradiology.2025-0014
10. El Safadi A, Obeid M, Chamseddine N, Usta I: Massive retroperitoneal hematoma following vaginal delivery: a case report and review of literature. Cureus. 2026, 18:e102505. 10.7759/cureus.102505
11. Po LK, Simons ME, Levinsky ES: Concealed postpartum hemorrhage treated with transcatheter arterial embolization. Obstet Gynecol. 2012, 120:461-4. 10.1097/AOG.0b013e3182550526
12. Nagayama C, Gibo M, Nitta H, et al.: Rupture of pseudoaneurysm after vaginal delivery successfully treated by selective arterial embolization. Arch Gynecol Obstet. 2011, 283:37-40. 10.1007/s00404-009-1271-1
13. Yildiz AF, Sari S, Sabak M: Postpartum retroperitoneal hematoma secondary to ovarian artery rupture: A case presentation. Turk J Emerg Med. 2026, 26:242-7. 10.4103/tjem.tjem_409_25
14. Zhang XQ, Chen XT, Zhang YT, Mai CX: The emergent pelvic artery embolization in the management of postpartum hemorrhage: a systematic review and meta-analysis. Obstet Gynecol Surv. 2021, 76:234-44. 10.1097/OGX.0000000000000887
15. Yokoe T, Kita M, Fukuda H, Butsuhara Y, Sumi G, Okada H: Successful minimally invasive surgery for postpartum retroperitoneal hematoma complicated by an infection: two case reports. Ann Med Surg (Lond). 2021, 71:103025. 10.1016/j.amsu.2021.103025
16. Mailli L, Patel S, Das R, Chun JY, Renani S, Das S, Ratnam L: Uterine artery embolisation: fertility, adenomyosis and size - what is the evidence?. CVIR Endovasc. 2023, 6:8. 10.1186/s42155-023-00353-2