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Case Report

Post-surgical pseudoaneurysm of the corona mortis artery treated by arterial embolization from two arteries: A case report^{☆,☆☆}

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ABSTRACT

Post-surgical pseudoaneurysm in the pelvis is rare. However, when it does occur, it may cause life-threatening hemorrhage. Hemostatic treatment for pelvic pseudoaneurysms may be complicated because the blood vessels in the pelvis may present with various anastomoses. Herein, we describe a case of a pseudoaneurysm that necessitated embolization of two arteries. A 47-year-old woman had undergone a total hysterectomy, a bilateral adnexectomy, and a pelvic lymphadenectomy for endometrial cancer; 13 days after surgery, she complained of sudden abdominal pain. Contrast-enhanced computed tomography revealed a retroperitoneal hematoma and a pseudoaneurysm with contrast leakage. The pseudoaneurysm had two feeding arteries (from the external and internal iliac systems). The first feeding artery was the obturator artery, which arose from the anterior trunk of the internal iliac artery. The second feeding artery was the aberrant obturator artery, which arose from the medial femoral circumflex artery. Both feeders were embolized and hemostasis was achieved. Pseudoaneurysms in the pelvis may have double origins from the external and internal iliac systems, and the aberrant obturator artery may arise from the medial femoral circumflex artery. Therefore, radiologists should be aware of these variations to effectively address post-surgical pseudoaneurysms of the corona mortis artery.

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Introduction

Post-surgical pseudoaneurysm in the pelvis is rare. However, when it does occur, it may cause life-threatening hemorrhage [1,2]. Blood vessels in the pelvis may present with various anastomoses; an anastomosis occurring between the external and internal iliac systems is known as corona mortis (crown of death) and may cause uncontrolled bleeding [3]. The prevalence of arterial corona mortis ranges from 17%–45% [4–9], but few cases of bleeding in the corona mortis artery require embolization of the external and internal iliac systems [3,10–15]. An aberrant obturator artery arising from the medial femoral circumflex artery is extremely rare, with an estimated prevalence of <0.43% [17], and it may complicate arterial embolization. Herein, we describe a case of a ruptured post-surgical pseudoaneurysm in the corona mortis artery that was successfully treated by embolization of two arteries.

Case report

A 47-year-old woman had undergone a total hysterectomy, a bilateral adnexectomy, and a pelvic lymphadenectomy for endometrial cancer. She complained of sudden abdominal pain 13 days after surgery. Contrast-enhanced computed tomography (CT) revealed abdominal bleeding, a retroperitoneal hematoma, and a pseudoaneurysm with contrast leakage (Fig. 1). The attending gynecologist consulted the emergency department at our tertiary medical center for hemostatic treatment. On arrival in our tertiary medical center, she had mild disturbance of consciousness (Glasgow Coma Scale E3V5M6) but continued to complain of abdominal pain. Physical examination revealed the following: blood pressure, 93/55 mmHg; heart rate, 148 beats/min; and respiratory rate,



Fig. 1 – Contrast-enhanced computed tomography of the pelvis depicting a pseudoaneurysm (arrow) and a hematoma in the retroperitoneal space. A ureteral stent (arrowhead) was inserted for treatment of the ureteral injury.

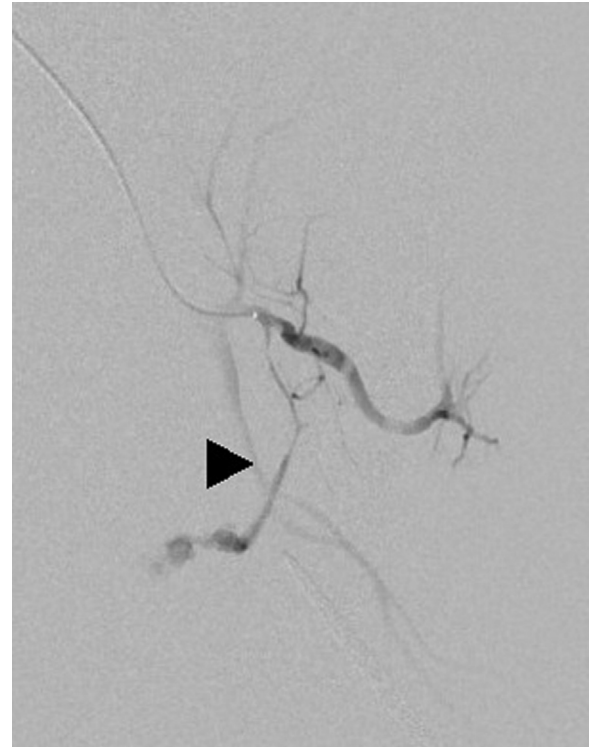


Fig. 2 – Digital subtraction angiography from the internal iliac artery demonstrated that the obturator artery (arrowhead) fed the pseudoaneurysm.

24 breaths/min. Further, the hemoglobin concentration was 7.3g/dl, platelet count was 309000/ μ l, and fibrinogen concentration was 341mg/dl. She was in an unstable condition and needed hemostatic treatment. We anticipated difficulty in surgical hemostasis due to postoperative adhesions and decided to perform arterial embolization as a hemostatic treatment.

An angiogram of the left internal iliac artery showed a pseudoaneurysm of the left obturator artery with contrast leakage (Fig. 2). We were unable to place the catheter around the obturator artery in a stable fashion. Therefore, we abandoned the attempt at embolization with coils and instead performed embolization with gelatin sponge particles (Serescue, Astellas Pharma Inc, Tokyo, Japan) through the left internal iliac artery. Although the left obturator artery was no longer imaged from the left internal iliac artery, contrast leakage into the ruptured pseudoaneurysm was ongoing from another arterial origin. We found that the other feeder to the pseudoaneurysm was the aberrant obturator artery originating from the medial femoral circumflex artery (Fig. 3). This artery had a small diameter and could not be embolized using coils. Hence, we embolized the second feeder using gelatin sponge particles. A completion angiogram revealed the complete disappearance of the pseudoaneurysm (Fig. 4). The patient was discharged 65 days after arterial embolization. Recurrence of the pseudoaneurysm was not found on follow-up contrast-enhanced CT conducted three months after arterial embolization.

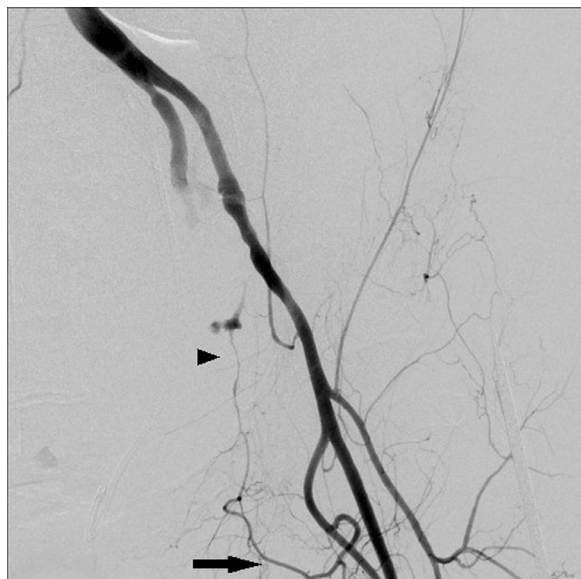


Fig. 3 – Distal subtraction angiography from the left common iliac artery showed that the aberrant obturator artery (arrowhead), which arose from the medial femoral circumflex artery (arrow), fed the pseudoaneurysm.

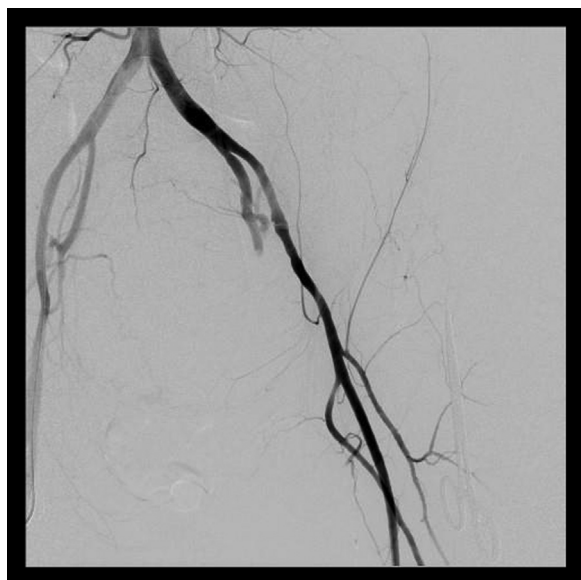


Fig. 4 – Completion angiography showing that the pseudoaneurysm had disappeared completely.

Discussion

Post-surgical pseudoaneurysm is a rare complication of pelvic surgery. It has been reported as a potential source of bleeding in trauma surgery as well as urological and gynecological procedures [1,2,18–20] and may require hemostatic treatment, including arterial embolization.

Corona mortis is a vascular variant presenting with communication between the external and internal iliac systems

[18]. The prevalence of arterial corona mortis, as reported in the literature, ranges from 17%-45% [4–9]. Thus, although the reported incidence varies substantially, it is high. Considering this elevated incidence of arterial corona mortis, it is likely that many cases require arterial embolization of the external and internal iliac systems. We searched for such case reports through PubMed using the keywords “corona mortis,” “aberrant obturator artery,” “pelvic pseudoaneurysm,” and “pubic ramus fracture” with no date limits but with English-language restriction. However, there are few cases of pubic ramus fracture requiring such embolization reported in the literature to date [3,10–15].

The reason for this lower-than-expected incidence of excessive hemorrhage from the corona mortis artery necessitating hemostatic treatment from the external and internal iliac systems is currently unclear. Previous reports described that this might be due to direct injury to the artery, arterial spasms, and/or compression from retroperitoneal hematomas [4,16].

This case presented with double origins of the obturator artery from the anterior trunk of the internal iliac artery and the medial femoral circumflex artery. An obturator artery arising from the medial femoral circumflex artery is an extremely rare presentation, with an estimated prevalence of <0.43% [17]. Because the aberrant obturator artery reported in this case arose from a more caudal side than expected, we did not notice it on initial examination (though it was present on the initial contrast-enhanced CT scan). Thus, to avoid overlooking the source of bleeding in similar presenting cases, it is important that radiologists consider the possibility of such variations in evaluation and treatment.

Conclusion

Post-surgical pseudoaneurysm in the pelvic area occurs rarely. However, it may cause life-threatening hemorrhage. Moreover, corona mortis sometimes occurs in this region. Pseudoaneurysms in the pelvis may have double origins in the external and internal iliac systems, and the aberrant obturator artery may arise from the medial femoral circumflex artery. Therefore, in order to effectively address post-surgical pseudoaneurysm of the corona mortis artery, radiologists should be aware that these variations may occur. The findings of this case report will guide future research directions and medical guidelines.

Patient Consent Statement

This case report was written and conducted in accordance with the guidelines set forth by the ethics review board at our medical center. Written informed consent was obtained from the patient for the publication of this report and associated images.

Data statement

No data was generated within this case report.

REFERENCES

- [1] Bolster F, Mocanu E, Geoghegan T, Lawler L. Transvaginal oocyte retrieval complicated by life-threatening obturator artery hemorrhage and managed by a vessel-preserving technique. *Ulster Med J* 2014;83:146–8 Doi:PMID: 25484463. doi:[10.1016/j.ogc.2019.08.001](https://doi.org/10.1016/j.ogc.2019.08.001).
- [2] Han J, Shah M, Djaladat H, Aron M. Corona mortis artery pseudoaneurysm causing delayed intermittent hemoperitoneum after robotic radical prostatectomy. *Urology* 2020;141:e24–5 Doi:PMID: 32330530. doi:[10.1016/j.urology.2020.04.017](https://doi.org/10.1016/j.urology.2020.04.017).
- [3] Theodorides AA, Morgan BW, Simmons D. Hemodynamic instability resulting from a low energy pubic ramus fracture in a 78-year-old woman. A case report and review of the literature. *Injury* 2011;42:722–4 Doi:PMID: 20926073. doi:[10.1016/j.injury.2010.08.037](https://doi.org/10.1016/j.injury.2010.08.037).
- [4] Darmanis S, Lewis A, Mansoor A, Bircher M. Corona mortis: an anatomical study with clinical implications in approaches to the pelvis and acetabulum. *Clin Anat* 2007;20:433–9 Doi:PMID: 16944498. doi:[10.1002/ca.20390](https://doi.org/10.1002/ca.20390).
- [5] Perandini S, Perandini A, Puntel G, Puppini G, Montemezzi S. Corona mortis variant of the obturator artery: a systematic study of 300 hemipelvises by means of computed tomography angiography. *Pol J Radiol* 2018;83:e519–23 Doi:PMID: 30800190. doi:[10.5114/pjr.2018.81441](https://doi.org/10.5114/pjr.2018.81441).
- [6] Sanna B, Henry BM, Vikse J, Skinningsrud B, Pękala JR, Walocha JA, et al. The prevalence and morphology of the corona mortis (Crown of death): A meta-analysis with implications in abdominal wall and pelvic surgery. *Injury* 2018;49:302–8 Doi:PMID:29241998. doi:[10.1016/j.injury.2017.12.007](https://doi.org/10.1016/j.injury.2017.12.007).
- [7] Leite TFO, Pires LAS, Goke K, Silva JG, Chagas CAA. Corona mortis: anatomical and surgical description on 60 cadaveric hemipelvises. *Rev Col Bras Cir* 2017;44:553–9 Doi:PMID: 29267551. doi:[10.1590/0100-69912017006001](https://doi.org/10.1590/0100-69912017006001).
- [8] Stavropoulou-Deli A, Anagnostopoulou S. Corona mortis: anatomical data and clinical considerations. *Aust N Z J Obstet Gynaecol* 2013;53:283–6 Doi:PMID: 23551084. doi:[10.1111/ajo.12076](https://doi.org/10.1111/ajo.12076).
- [9] Ates M, Kinaci E, Kose E, Soyer V, Sarici B, Cuglan S, et al. Corona mortis: in vivo anatomical knowledge and the risk of injury in totally extraperitoneal inguinal hernia repair. *Hernia* 2016;20:659–65 Doi:PMID: 26621137. doi:[10.1007/s10029-015-1444-8](https://doi.org/10.1007/s10029-015-1444-8).
- [10] Marsman JW, Schilstra SH, van Leeuwen H. Angiography and embolization of the corona mortis (aberrant obturator artery). A source of persistent pelvic bleeding. *RöFo* 1984;141:708–10 Doi:PMID: 6440242. doi:[10.1055/s-2008-1053221](https://doi.org/10.1055/s-2008-1053221).
- [11] Daeubler B, Anderson SE, Leunig M, Triller J. Hemorrhage secondary to pelvic fracture: coil embolization of an aberrant obturator artery. *J Endovasc Ther* 2003;10:676–80 Doi:PMID: 12932187. doi:[10.1177/152660280301000341](https://doi.org/10.1177/152660280301000341).
- [12] Macdonald DJ, Tollan CJ, Robertson I, Rana B. Massive hemorrhage after a low-energy pubic ramus fracture in a 71-year-old woman. *Postgrad Med J* 2006;82:e25 Doi:PMID: 17068268. doi:[10.1136/pgmj.2006.047381](https://doi.org/10.1136/pgmj.2006.047381).
- [13] Henning P, Brenner B, Brunner K, Zimmermann H. Hemodynamic instability following an avulsion of the corona mortis artery secondary to a benign pubic ramus fracture. *J Trauma* 2007;62:E14–17 Doi:PMID: 17429331. doi:[10.1097/01.ta.0000210355.44804.24](https://doi.org/10.1097/01.ta.0000210355.44804.24).
- [14] Ferrada PA, Jain K. Aberrant obturator artery: a hidden threat after pelvic fracture. *Am Surg* 2011;77:e126 Doi:PMID: 21679627. doi:[10.1177/000313481107700614](https://doi.org/10.1177/000313481107700614).
- [15] Ten Broek RP, Bezemer J, Timmer FA, Mollen RM, Boekhoudt FD. Massive hemorrhage following minimally displaced pubic ramus fractures. *Eur J Trauma Emerg Surg* 2014;40:323–30 Doi:PMID: 26816067. doi:[10.1007/s00068-013-0361-8](https://doi.org/10.1007/s00068-013-0361-8).
- [16] Requarth JA, Miller PR. Aberrant obturator artery is a common arterial variant that may be a source of unidentified hemorrhage in pelvic fracture patients. *J Trauma* 2011;70:366–72 Doi:PMID: 21307735. doi:[10.1097/TA.0b013e3182050613](https://doi.org/10.1097/TA.0b013e3182050613).
- [17] Sañudo JR, Mirapeix R, Rodriguez-Niedenführ M, Marañillo E, Parkin IG, Vázquez T. Obturator artery revisited. *Int Urogynecol J* 2011;22:1313–18 Doi:PMID: 21655978. doi:[10.1007/s00192-011-1467-3](https://doi.org/10.1007/s00192-011-1467-3).
- [18] Pisano U, Soon VL, Douglas P. Corona mortis injury causing delayed presentation of pelvic pseudoaneurysm. *Radiol Case Rep* 2021;16:1095–8 Doi:PMID: 33717390. doi:[10.1016/j.radcr.2021.02.017](https://doi.org/10.1016/j.radcr.2021.02.017).
- [19] Lorenz JM, Leef JA. Embolization of postsurgical obturator artery pseudoaneurysm. *Semin Intervent Radiol* 2007;24:68–71 Doi:PMID: 21326740. doi:[10.1055/s-2007-971192](https://doi.org/10.1055/s-2007-971192).
- [20] Huang TY, Huang CN, Lee YC. Life-threatening urethral bleeding induced by a pseudoaneurysm of the obturator artery. *Urology* 2013;82:e43–4 Doi:PMID: 24295270. doi:[10.1016/j.urology.2013.08.016](https://doi.org/10.1016/j.urology.2013.08.016).