

Case Report

Intraperitoneal Bleeding Induced by a Ruptured Inferior Epigastric Artery Pseudoaneurysm following Interval Debulking Surgery for Ovarian Cancer: A Case Report

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Keywords

Pseudoaneurysm · Inferior epigastric artery · Ovarian cancer · Interval debulking surgery

Abstract

Introduction: Pseudoaneurysm following gynecologic cancer surgery is a rare complication that can become fatal when it ruptures. Common sites of pseudoaneurysms are the external iliac artery, hypogastric artery, and aorta, which are located around the lymphadenectomy site. There are no previous reports of ruptured inferior epigastric (IEA) artery pseudoaneurysms after gynecologic cancer surgery. We report a case of intraperitoneal bleeding induced by a ruptured IEA pseudoaneurysm following interval debulking surgery for stage IVB ovarian cancer. **Case Presentation:** The patient underwent total abdominal simple hysterectomy, bilateral salpingo-oophorectomy, omentectomy, ileocolic resection, and peritonectomy around the ileocecal area after 5 cycles of neoadjuvant chemotherapy. The patient suddenly presented with loss of consciousness and reduced blood pressure on postoperative day 20. Her blood hemoglobin levels also decreased. Contrast-enhanced computed tomography revealed a pseudoaneurysm in the right IEA. There were no signs of extravasation from the pseudoaneurysm; however, bloody ascites was observed in the abdominal cavity. A ruptured IEA pseudoaneurysm was suspected, and coil embolization was immediately performed. Her symptoms abated soon after

coil embolization, and she remained symptom-free during the 8 months of postoperative follow-up. **Conclusion:** Awareness of this rare complication is clinically important for its early detection and treatment.

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Introduction

Pseudoaneurysm following gynecologic cancer surgery is a rare complication that can become fatal when it ruptures. Most pseudoaneurysms after gynecologic surgery develop as a result of pelvic or para-aortic lymphadenectomy and radiation. Therefore, the common sites of pseudoaneurysms are the external iliac artery, hypogastric artery, and aorta [1]. However, there are no previous reports of ruptured inferior epigastric artery (IEA) pseudoaneurysm following gynecologic cancer surgery.

IEA pseudoaneurysm is a rare complication following abdominal wall interventions such as abdominal retention suture, laparoscopic trocar insertion, therapeutic paracentesis, and surgical drain placement [2]. The IEA arises from the external iliac artery and ascends along the peritoneum, penetrating the posterior rectus sheath and entering the rectus abdominis. Owing to the anatomical location of the IEA, an abdominal mass is a typical symptom of a ruptured pseudoaneurysm, and intraperitoneal bleeding without the formation of an abdominal mass has not been reported as an initial presentation [3].

We report a case of ruptured right IEA pseudoaneurysm following interval debulking surgery (IDS) for ovarian cancer. The patient initially presented with intraperitoneal bleeding without formation of an abdominal mass, which resulted in hemorrhagic shock.

Case Report

A 73-year-old woman with an Eastern Cooperative Oncology Group Performance Status of 0 presented with abdominal distention. Her medical history included hypertension and nontuberculous mycobacterial disease. The patient had no history of abdominal surgery. Radiologic examination revealed a 10 cm multicystic tumor with a solid vascular component in the right pelvic region. Accumulation of pleural and ascitic fluids, thickened peritoneum, omental mass, and multiple lymph node enlargements in the pelvic and para-aortic regions were observed. Her serum carbohydrate antigen 125 (CA125) level had increased to 42,675 U/mL. Lower gastrointestinal endoscopy revealed tumor invasion into the mucosal surfaces of the ascending colon, 2 cm anorectally from the ileum. Based on these findings, advanced-stage ovarian cancer was suspected. Therefore, exploratory laparoscopy was performed to confirm whether complete or optimal surgery was possible.

During the exploratory laparoscopy, trocars were placed as shown in Figure 1a (yellow circle). There was no damage to the IEA during trocar insertion. Exploratory laparoscopy showed that the right ovarian tumor was tightly adhered to the ileum and right pelvic sidewall. Disseminated lesions >1 cm were observed on the abdominal and intestinal surfaces. Because complete or optimal surgery was considered not feasible, we performed only an abdominal wall biopsy. Based on clinical and pathologic examinations, the patient was diagnosed with an International Federation of Gynecology and Obstetrics (FIGO) 2014 stage IVB high-grade serous carcinoma of the right ovary. Therefore, we administered carboplatin and paclitaxel as neoadjuvant chemotherapy (NACT) before IDS.

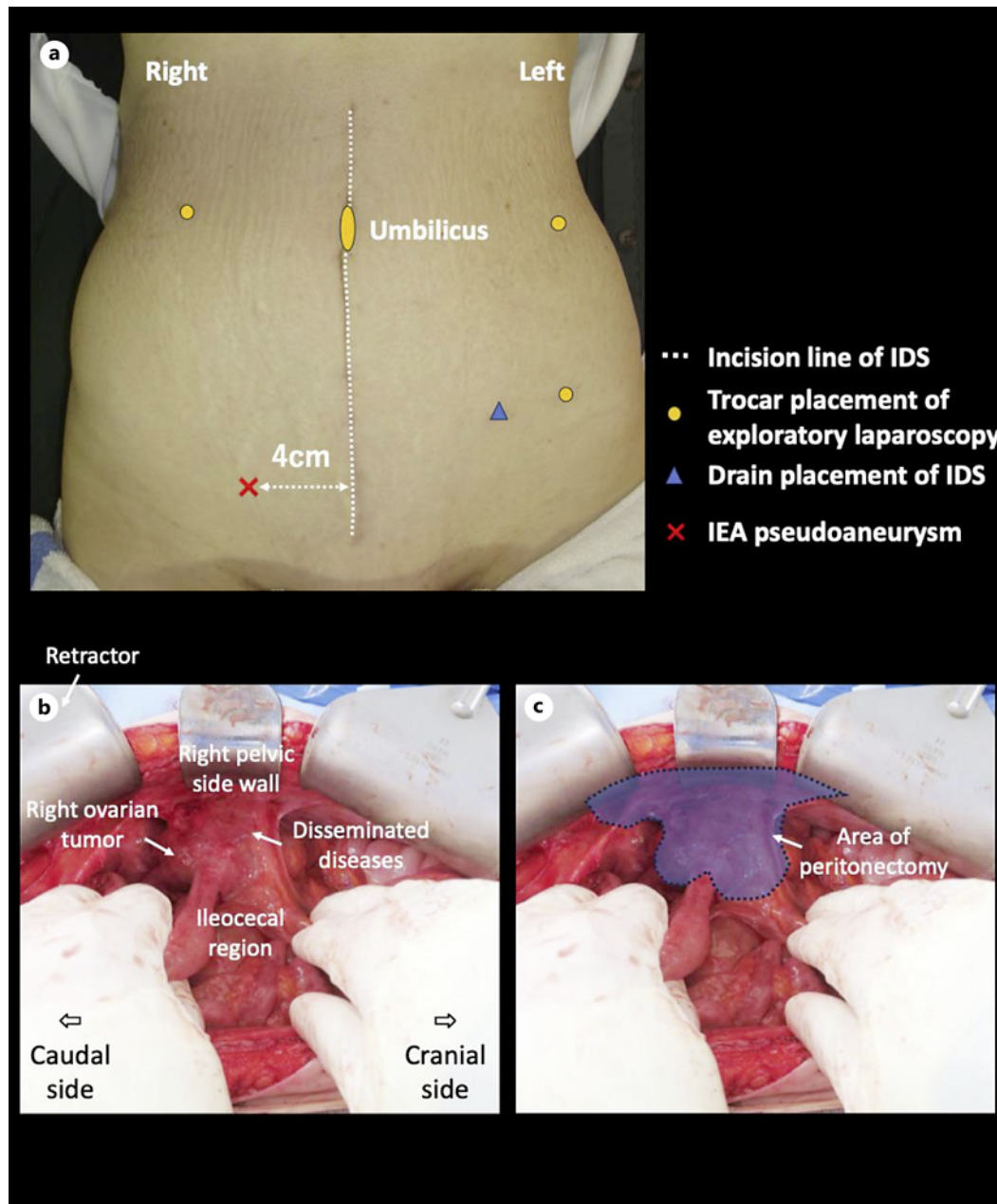


Fig. 1. **a** Location of surgical wound and inferior epigastric artery (IEA) pseudoaneurysm. **b** Image of the surgical field in interval debulking surgery (IDS). The ileocecal area was adhered to the right pelvic sidewall and surrounded by dissemination. A retractor was used to develop the surgical field. **c** The blue area indicates the peritonectomy region during IDS.

After 5 cycles of NACT, the diameter of right ovarian tumor was reduced by 50% and peritoneal dissemination was vanished. The CA125 level had decreased from 42,675 U/mL to 141 U/mL. Therefore, we decided to perform IDS. The median incision line is shown in Figure 1a (white dotted line). The surgical field was developed using a retractor (Fig. 1b). The ileocecal area was adhered to the right pelvic sidewall and surrounded by dissemination. Simple total abdominal hysterectomy, bilateral salpingo-oophorectomy, omentectomy, ileocolic resection, and peritonectomy around the ileocecal region were performed. The complete

cytoreductive surgery was done with no residual disease. The peritonectomy area around the ileocecal area is shown in Figure 1c. Interrupted sutures (#0 PDS[®]) were used for fascial closure and embedded sutures (#4-0 PDS[®]) were used for dermal closure. A 19 Fr J-VAC Blake silicon drain (Ethicon, Tokyo, Japan) was placed through the left lower abdomen to the pouch of Douglas, as shown in Figure 1a (blue triangle). The operation time was 8 h and 41 min, and the blood loss was 380 mL.

The patient's immediate postoperative course was uneventful. On postoperative day (POD) 9, the patient experienced loss of consciousness and a reduction in blood pressure. Her blood pressure was 76/45 mm Hg and blood hemoglobin level decreased from 9.6 to 6.6 g/dL in a day. Contrast-enhanced computed tomography (CT) revealed no signs of active bleeding. Her symptoms abated soon after administering 4 U of red blood cells to achieve hemostasis. Therefore, we decided to perform careful follow-up with continued hospitalization. On POD 20, a sudden loss of consciousness and reduction in blood pressure recurred. Blood pressure was 60/37 mm Hg and blood hemoglobin level decreased from 10.7 to 7.1 g/dL in a day. Contrast-enhanced CT performed immediately revealed a pseudoaneurysm in the right IEA (Fig. 2a). There were no signs of extravasation from the pseudoaneurysm; however, bloody ascites was observed in the abdominal cavity. A ruptured IEA pseudoaneurysm was clinically suspected, and coil embolization was immediately performed (Fig. 2b, c). The postoperative course after coil embolization was uneventful. The patient was administered adjuvant chemotherapy on POD 32 and discharged on POD 37. After the coil embolization, she remained symptom-free during 8 months of postoperative follow-up.

Discussion

We searched the PubMed database for all English-language articles related to IEA pseudoaneurysms using the following combinations of keywords: “inferior epigastric artery pseudoaneurysm” and “inferior epigastric artery false aneurysm.” Of 49 cases of IEA pseudoaneurysms, only two cases were related to gynecologic surgery. However, both cases occurred after laparoscopic surgery for benign indications and were related to trocar insertion [4, 5]. To our knowledge, this is the first reported case of an IEA pseudoaneurysm following gynecologic oncology surgery.

The IEA arises from the external iliac artery and ascends along the peritoneum, penetrating the posterior rectus sheath and entering the rectus abdominis. Owing to the anatomy of the IEA, the initial presentation in most cases is the formation of a hematoma in the closed cavity of the abdominal wall, which rarely causes intraperitoneal bleeding [3]. However, the initial presentation in the present case was intraperitoneal bleeding without formation of an abdominal mass, which occurred for two reasons. First, the pseudoaneurysm formed at the IEA before penetrating the posterior rectus sheath. Second, peritonectomy was performed during the IDS. These two factors allowed blood to drain along the peritoneum into the abdominal cavity when the pseudoaneurysm ruptured. Fujisaki et al. [6] reported a case of a ruptured IEA pseudoaneurysm following robot-assisted radical prostatectomy in which the peritoneum was extensively incised and intraperitoneal hemorrhage was the initial presentation without the formation of an abdominal mass [6]. Surgery for advanced-stage ovarian cancer requires peritonectomy to improve the patient's prognosis [7]. Therefore, when peritonectomy is performed, as in the present case, it should be considered that the initial presentation of a ruptured IEA pseudoaneurysm is intraperitoneal bleeding without the formation of an abdominal mass, resulting in hemorrhagic shock.

Common etiologies for IEA pseudoaneurysms are abdominal wound closure, laparoscopic trocar insertion, therapeutic paracentesis, and surgical drain placement [2]. However,

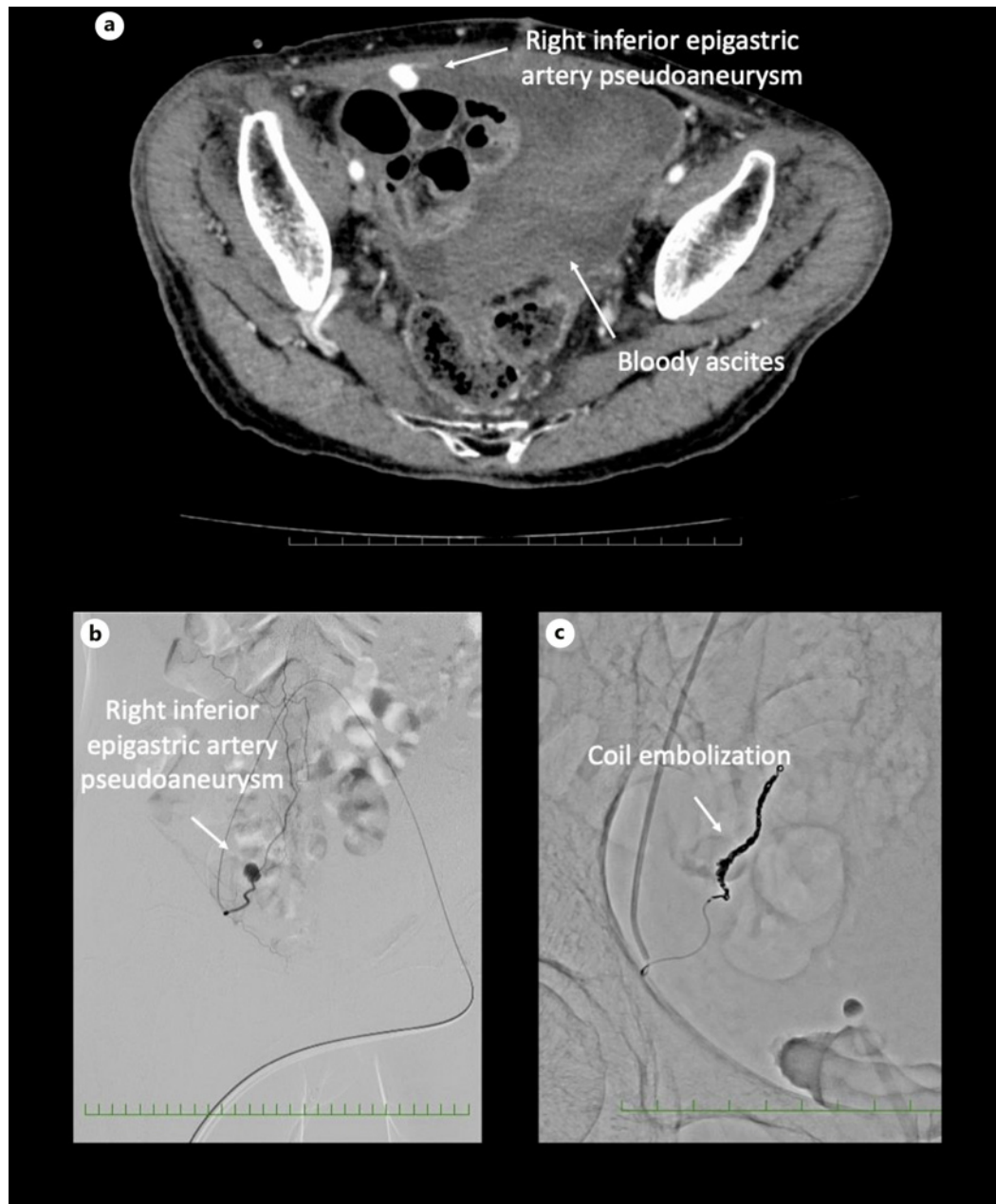


Fig. 2. **a** Computed tomography shows that the pseudoaneurysm developed on the right inferior epigastric artery (IEA). An accumulation of bloody ascites was also seen in the abdominal cavity. **b** Catheter testing showed pseudoaneurysm on the right IEA. **c** Coil embolization was performed for the right IEA pseudoaneurysm.

considering the location of the surgical wound and pseudoaneurysm in Figure 1, none of the previously mentioned causes was consistent with the cause in the present case. One possible reason for the development of a pseudoaneurysm in the present case was the prolonged traction to the inguinal side by the retractor. Figure 3 shows the estimated location of the right IEA pseudoaneurysm and retractors using images of the surgical field and CT. The right IEA pseudoaneurysm appeared to be completely covered by the retractor on the inguinal side (Fig. 3b). There are previous reports about pseudoaneurysm development caused by a

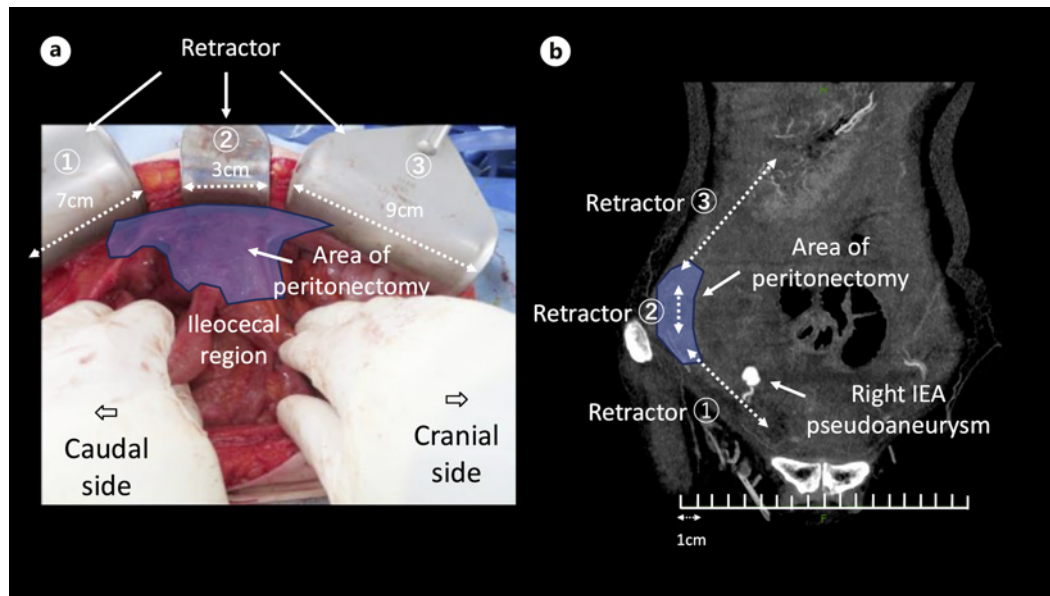


Fig. 3. **a** Three retractors were used to create the surgical field on the right side during interval debulking surgery. The blue area was the region of the peritonectomy around the ileocecal region. **b** The estimated locations of retractors 1–3 are drawn on the computed tomography image. The right inferior epigastric artery pseudoaneurysm appeared to be completely covered by retractor 1.

retractor following knee and hip surgery [8–10]. They considered that the development of the pseudoaneurysms was due to direct damage to the artery by the retractor and hyperextension of the artery by traction. Therefore, to prevent IEA pseudoaneurysms, it may be important to place gauze between the retractor and the abdomen to prevent direct damage to the IEA, and to loosen the retractor periodically during surgery to prevent hyperextension of the IEA.

Conclusion

Ruptured IEA pseudoaneurysms can cause postoperative bleeding following ovarian cancer surgery. When peritonectomy is performed as in the present case, it is important to consider that the initial symptoms of a ruptured IEA pseudoaneurysm may become intra-peritoneal bleeding without forming an abdominal mass, resulting in hemorrhagic shock.

Statement of Ethics

Ethical approval is not required for this study in accordance with local or national guidelines. Written informed consent was obtained from the patient for the publication of this case report and accompanying images. The CARE Checklist has been completed by the authors for this case report, attached as online supplementary material (for all online suppl. material, see <https://doi.org/10.1159/000543127>).

Conflict of Interest Statement

The authors report no conflicts of interest.

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Author Contributions

Shota Higami: conceptualization, writing – original draft, and investigation. Yasuyuki Kinjo: conceptualization, writing – original draft, and writing – review and editing. Mao Sekimata: investigation. Yuta Yoshimatsu, Yu Murakami, and Tomoko Kurita: writing – review and editing. Kiyoshi Yoshino: writing – review and editing and supervision.

Data Availability Statement

The data that support the findings of this study are not publicly available due to their containing information that could compromise the privacy of research participant but are available from the corresponding author upon request.

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