

Abdominal Compartment Syndrome Complicating Emergency Endovascular Aneurysm Repair for Ruptured Common Iliac Artery Aneurysm

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Abstract This case report describes a 62-year-old male who presented with left-sided abdominal and lower back pain following a fall, which was followed by a vehicular accident resulting in a helicopter evacuation. Upon arrival, he exhibited signs of shock, including bradycardia and hypotension, with imaging revealing a ruptured left common iliac artery aneurysm (CIAA) and retroperitoneal hematoma. Emergency stent graft placement and embolization were performed, but intraoperative complications led to significant bleeding and the development of abdominal compartment syndrome (ACS). Despite surgical intervention, the patient succumbed to pulseless electrical activity. This case highlights the challenges in managing ruptured isolated CIAAs and the potential for complications such as ACS. Early recognition and prompt intervention are crucial, and consideration of radical or decompressive surgery may be warranted to prevent ACS in similar cases.

Keywords: left common iliac artery aneurysm, shock, abdominal compartment syndrome

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1. Introduction

Iliac artery aneurysms (IAA) are often associated with abdominal aortic aneurysms (AAA). Isolated IAA, however, are relatively rare, representing only 2% to 7% of all intra-abdominal aneurysms [1]. The mechanism of IAA may be correlated with arteriosclerosis, trauma, surgical or interventional procedures, infection, connective tissue disorders, vasculitis, inflammation, and erosion secondary to malignancy [2]. A common iliac artery is considered aneurysmal when its diameter is ≥ 18 mm for men and ≥ 15 mm for women. If large and symptomatic, they typically exhibit pressure symptoms as a result of compression of the structures around them. Common symptoms include generalized stomach pain, urological problems, gastrointestinal bleeding, and neurological symptoms such as leg paralysis or sciatica-like back pain. Rupture is common in patients, with iliac artery pseudoaneurysms being associated with perioperative mortality up to 60% when managed by open repair [3,4]. The life-threatening aspect of this pathology is given by the possibility of secondary rupture and bleeding [2]. The commonly held indications for treatment of asymptomatic isolated common IAA (CIAA) include

aneurysms >3.5 cm in diameter, a 6-month diameter increase of >7 mm, or a diameter increase of >1 cm per year [1]. CIAA can be treated with either open surgical repair or endovascular techniques. Endovascular repair is associated with shorter procedure times, lower incidences of procedural complications, a decrease in perioperative mortality, and acceptable long-term patency rates compared with surgical repair [1].

We present a case of a ruptured left common iliac artery aneurysm (CIAA) successfully treated with endovascular techniques. Unfortunately, the patient developed abdominal compartment syndrome (ACS) postoperatively. Despite efforts to alleviate the syndrome through decompression, the patient succumbed to hemorrhagic death due to underlying bleeding tendencies.

2. Case Report

A 31-year-old male with no medical history, who runs his A 62-year-old male presented with left-sided abdominal and lower back pain after a 1.2-meter fall (Day X-1). The following day (Day X), while driving, he experienced abdominal discomfort and attempted to stop but lost consciousness, resulting in a vehicular fire accident that required helicopter evacuation. His past

medical history included hypertension. In terms of his social history, he was employed as high school staff and lived with his wife.

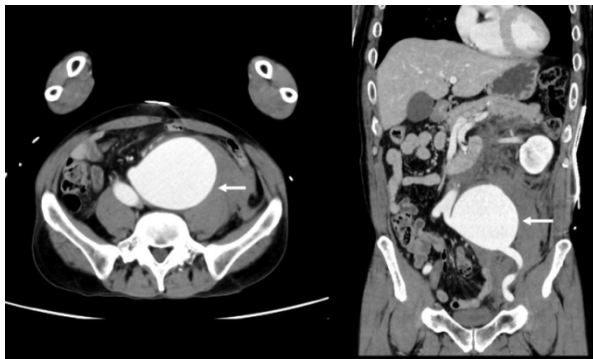


Figure 1. Enhanced truncal computed tomography (CT) on arrival (left, axial and right, coronal image)

Upon arrival, his vital signs were as follows: Glasgow Coma Scale, E4V5M6; pulse, 46 beats/min (BPM); blood pressure, 74/51 mmHg; respiratory rate, 16 breaths/min; SpO₂, 100% with oxygen flow at 6L/min; and temperature, 36.0°C. Physical examination revealed a flat and soft abdomen, with spontaneous pain and tenderness on the left side. The ultrasound examination showed an ejection fraction of 50% with no pericardial effusion. There were no signs of intra-abdominal bleeding, although the area around the left kidney was indistinct. The electrocardiogram indicated a heart rate of 40 BPM, displaying bradycardia and ST depression in II, III, aVF. Blood gas analysis showed a pH of 7.41, PaO₂ of 268 mmHg, PaCO₂ of 40.4 mmHg, HCO₃⁻ of 25.1 mmol/L, and lactate of 1.5 mmol/L. Following fluid loading, his heart rate increased to 50 BPM and blood pressure to 100 mmHg. A contrast-enhanced computed tomography (CT) scan was performed, revealing a 90 mm × 70 mm aneurysm in the left common iliac artery (CIAA) and a hematoma in the left retroperitoneal area, causing displacement of pelvic organs to the right (Figure 1). The results of the blood test were as follows: albumin, 3.2 g/dL; total bilirubin, 0.8 mg/dL; aspartate aminotransferase, 18 IU/L; alanine aminotransferase, 13 IU/L; creatine kinase, 89 IU/L; glucose, 192 mg/dL; blood urea nitrogen, 15.5 mg/dL; creatinine, 1.03 mg/dL; sodium, 140 mmol/L; potassium, 3.9 mmol/L; B-type natriuretic peptide, 50.8 mg/dL; C-reactive protein, 0.18 mg/dL; white blood cell count, 11.2 /μL; hemoglobin, 11.8 g/dL; platelets, 19.0 × 10⁴ /μL; prothrombin time international normalized ratio, 0.85; activated partial thromboplastin time, 20.4 sec; fibrinogen, 210 mg/dL; d-dimer, 1.7 μg/mL. Following consultation with the cardiovascular surgery team, we performed emergency stent graft placement in the left iliac artery and embolization of the left internal iliac artery. However, following stent placement, the patient's blood pressure dropped to 40 mmHg, raising concern for intraoperative rupture. As a result, an emergency transfusion of 12 units of red blood cells (RBCs) and 10 units of fresh frozen plasma (FFP) was administered. Transient ST elevation was observed in leads II, III, and aVF during this period, prompting a coronary angiography, which revealed no significant abnormalities in the coronary arteries. Subsequently, the patient's blood pressure improved to

around 80-90 mmHg, and they were transferred to the intensive care unit (ICU).

The CT scan was performed, revealing a 90 mm × 70 mm aneurysm in the left common iliac artery (arrow) and a hematoma in the left retroperitoneal area, causing displacement of pelvic organs to the right.

3. Discussion

This case represents a rare instance of a ruptured isolated CIAA treated with endovascular therapy, complicated by ACS. Following decompression surgery for the syndrome, the patient unfortunately died. As no similar cases were found in the current literature, this case appears to be the first of its kind.

Since the year 2000, there have been few reported cases of death due to ruptured CIAA [5,6]. This may be attributed to the widespread adoption and safety of endovascular treatments, which have reduced mortality rates. Additionally, cases resulting in death may be less likely to be reported compared to successful outcomes, potentially leading to underreporting.

In this particular case, the main cause of death was presumed to be ACS resulting from massive hemorrhage, multi-organ failure, and hemorrhagic shock associated with dilutional coagulopathy. ACS leads to multi-organ failure and decreased cardiac output due to increased intra-abdominal pressure. Diagnosis involves measuring bladder pressure, with pressures above 30 mmHg or 20 mmHg in the presence of organ failure indicating the need for preventative or early surgical decompression [7,8]. In this case, the patient was diagnosed with ACS following endovascular treatment and underwent prompt decompressive surgery. Unfortunately, the patient could not be saved. Radiological imaging of the present case revealed a mass of the ruptured CIAA and a hematoma, suggesting significant compression of abdominal viscera, which could lead to the development of ACS. One report indicated that among 11 patients with iliac artery aneurysms, three developed ACS, suggesting that this complication may not be uncommon [4]. Accordingly, it may have been appropriate to consider decompressive surgery aimed at preventing the development of ACS alongside definitive repair of the ruptured CIAA from the initial intervention [9].

4. Conclusion

This case represents a rare instance of a ruptured isolated CIAA treated with endovascular therapy, complicated by ACS. Following decompression surgery for the syndrome, the patient unfortunately died. It may have been appropriate to consider decompressive surgery aimed at preventing the development of ACS alongside definitive repair of the ruptured CIAA from the initial intervention.

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