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DeBakey Type III Aortic Dissection Causing Bowel Necrosis: A Case Report

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Abstract: *Rationale:* Aortic dissection is a life-threatening medical emergency associated with high morbidity and mortality. Preoperative mesenteric malperfusion increases the surgical risk and mortality in patients with type B aortic dissection. For DeBakey type III B patients involving most of the thoracoabdominal aorta, endovascular treatment to improve true lumen perfusion may have limited benefits. Organ reperfusion on-time is crucial. *Patient concerns:* A 38-year-old man was admitted with sudden severe upper abdominal pain. Emergency CTA of the entire aorta revealed an aortic dissection with an entry tear in the descending aortic arch involving the celiac trunk, superior mesenteric artery, bilateral common iliac arteries and right external iliac artery, with thrombosis in the superior mesenteric artery. *Diagnoses:* The patient was diagnosed with DeBakey type III aortic dissection with mesenteric artery embolism. Enhanced chest CT showed the entry tear location and involvement of major arteries. Angiography confirmed partial blood flow in the superior mesenteric artery. *Interventions:* The patient underwent endovascular aortic stent-graft implantation through the left femoral artery, covering the descending aortic arch and sealing the entry tear. Postoperatively, the patient received intensive care, including ventilatory support, CRRT, anti-infection therapy, vasoactive drugs and lumbar cistern drainage. *Outcomes:* Two weeks postoperatively, the patient developed massive black stools, indicative of intestinal obstruction and necrosis. Exploratory laparotomy revealed ischemic necrosis and rupture of the stomach, small intestine, and colon. Despite surgical efforts, the patient's condition deteriorated, leading to death from severe infection, acid-base imbalance and multiple organ failure.

Keywords: Abdominal pain; Aortic dissection; Arterial embolism; Mesenteric artery

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1. Lessons

Aortic dissection, particularly with atypical presentations, remains a dangerous and often misdiagnosed condition. Early diagnosis and prompt management of organ complications are essential. Mesenteric ischemia can be masked by aortic dissection pain, leading to delayed treatment. Acute aortic dissection with mesenteric artery embolism is rare and timely revascularization is critical for patient prognosis.

2. Case presentation

A 38-year-old male was admitted to the hospital with a sudden onset of severe upper abdominal pain. An emergency aortic Computed Tomography Angiography (CTA) revealed an aortic dissection with a tear in the descending aortic arch. The celiac trunk, superior mesenteric artery, bilateral common iliac arteries, and right external iliac artery were involved. Thrombus formation was observed in the lumen of the superior mesenteric artery (**Figure A**). Emergency endovascular repair with aortic stent grafting was performed, with the stent placed via the left femoral artery extending to the distal opening of the left subclavian artery. Angiography showed complete sealing of the intimal tear. During the procedure, angiography indicated blood flow to the celiac trunk and renal arteries through the true lumen, with partial supply to the superior mesenteric artery. Despite comprehensive supportive care in the ICU, the patient's condition continued to deteriorate.

Two weeks post-surgery, the patient suddenly developed massive melena, raising suspicion of bowel obstruction and ischemia leading to necrosis, requiring surgical intervention. Exploratory laparotomy revealed ischemic necrosis and rupture of the stomach, small intestine and colon (**Figure C**). Complete resection was not feasible, and the surgery concluded after only evacuating necrotic tissue and intestinal contents. The following day, CTA showed that after aortic dissection (Stanford type B) stent placement, the celiac trunk, superior mesenteric artery and bilateral common iliac arteries originated from the false lumen. In contrast, the renal arteries originated from the true lumen. Thrombus formation was noted within the lumen of the superior mesenteric artery (**Figure B**). The patient eventually succumbed to severe infection, acid-base imbalance and multiple organ failure.

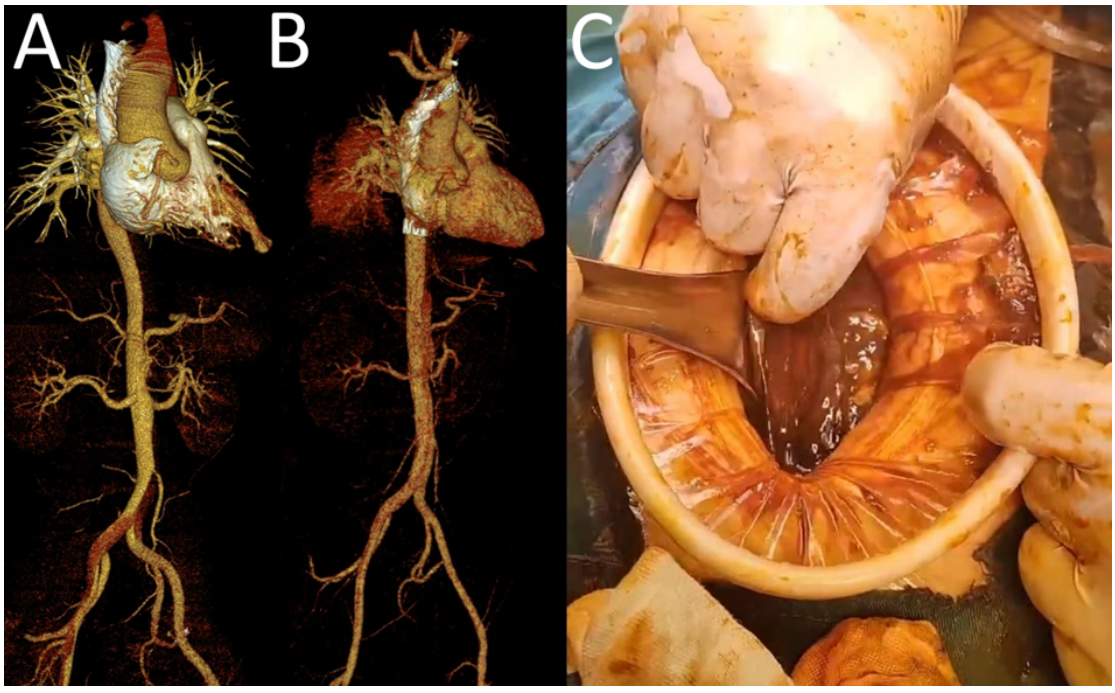

Figure 1. (A) Contrast-enhanced CTA image on admission; (B) CTA image after endovascular repair of aortic stent grafting; (C) Intraoperative image

3. Discussion

Aortic dissection is one of the most dangerous acute conditions, with rapid progression and a high mortality rate of approximately 30–50% if not promptly treated [1,2]. The dissection involves a tear in the aortic intima,

allowing blood to enter the tear and separate the middle and outer layers of the vessel wall, forming a false lumen [3]. Patients may present with tearing pain in the chest or lower back, depending on the location of the intimal tear [4].

In this case, the patient presented with sudden upper abdominal pain and underwent emergency endovascular treatment to seal the aortic tear, which increased blood flow to the true lumen [5]. However, ischemia of the organs due to superior mesenteric artery thrombus was not promptly resolved, leading to ischemic necrosis and rupture of the stomach, small intestine and colon. The inability to resect the necrotic bowel during exploratory surgery led to the patient's death. Although compensatory mechanisms in the abdominal organ blood supply exist, insufficient compensation can lead to ischemic necrosis and subsequent organ failure and death [4].

Initially, CTA indicated thrombus formation in the superior mesenteric artery [6]. Intraoperative angiography showed blood supply to the celiac trunk and renal arteries from the true lumen, with partial supply to the superior mesenteric artery. The failure to restore flow in the superior mesenteric artery resulted in disease progression and irreversible organ damage, ultimately leading to death from severe infection and multiple organ dysfunction syndrome.

Diagnosis of abdominal organ ischemia should be based on a comprehensive assessment including medical history, physical examination [7] and CTA. However, confounding factors such as sepsis or sedation may impact clinical evaluation [8]. In some cases, additional diagnostic tools like endoscopy or dynamic imaging (e.g., intravascular ultrasound, branch vessel angiography) may be necessary [9,10]. Even with early diagnosis and treatment, aortic dissection with associated mesenteric artery embolism has a high mortality rate [11]. Factors such as advanced age, prolonged onset, impaired functional status, peritonitis, bowel necrosis, bowel resection and postoperative sepsis significantly affect mortality in patients with associated bowel ischemia [12]. Physicians should carefully consider these factors and available medical resources when formulating treatment plans, particularly for elderly and critically ill patients, and tailor support and treatment accordingly.

4. Conclusion

Aortic dissection, particularly atypical types, is a common and often misdiagnosed dangerous condition. Accurate diagnosis can be achieved through thorough examination and history-taking, but early detection and timely management of organ complications are equally important. Abdominal organ ischemia may be subtle and easily masked by the pain of aortic dissection, potentially leading to diagnostic and therapeutic delays. Cases of acute aortic dissection with mesenteric artery embolism are rare and the narrow time window for thrombus re-canalization severely impacts prognosis, necessitating prompt detection and intervention.

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