

## CASE REPORT

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# Salvaging From Limb Amputation in an Acute Complicated Type B Aortic Dissection Patient

**Pham Minh Tuan<sup>1,2</sup>, Nguyen Ngoc Quang<sup>1,2</sup>, Pham Manh Hung<sup>1</sup>, Le Xuan Than<sup>2</sup>****ABSTRACT**

**Background:** Aortic dissection is a condition in which there is an intimal tear that allows the blood to pass through the tear and into the aortic media, splitting to a true lumen and a newly formed false lumen. It is associated with genetic disorders such as Marfan syndrome, Ehlers-Danlos syndrome, and Loeys-Dietz syndrome, or may result from cardiovascular risk factors including smoking, hypertension, and familial hyperlipidemia. **Objective:** The aim this article was to report a complicated Stanford B aortic dissection with acute limb ischemia and compartment syndrome, successfully managed with limb preservation and aortic repair. **Methods:** A 60s male patient with poorly controlled hypertension presented with severe chest pain radiating to the back and right leg ischemia, characterized by coldness, numbness, motor loss, and absent arterial pulses. **Case presentation:** The patient was treated with intensive medical management, including pain control, heart rate and blood pressure stabilization, while preparing for emergency intervention. A thoracic aortic endovascular stent-graft was placed to seal the entry tear and restore blood flow to the right lower limb. The intervention utilized a Relay thoracic stent-graft (32–28 mm diameter, 200 cm length, Bolton Medical), with access via the left common femoral artery Stanford Type B aortic dissection complicated by limb ischemia is a cardiovascular emergency requiring urgent intervention. **Conclusion:** Timely monitoring, insight consultation with orthopedic physician to understand the pathophysiology of acute compartment syndrome, the importance of early diagnosis and precise management of acute compartment syndrome following intervention are crucial to preserving the limb and ensuring the success of endovascular aortic repair.

**Keywords:** Aortic dissection; Acute limb ischemia; Acute compartment syndrome.

## 1. BACKGROUND

Aortic dissection is a condition in which there is an intimal tear that allows the blood to pass through the tear and into the aortic media, splitting to a true lumen and a newly formed false lumen. It is associated with genetic disorders such as Marfan syndrome, Ehlers-Danlos syndrome, and Loeys-Dietz syndrome, or may result from cardiovascular risk factors including smoking, hypertension, and familial hyperlipidemia (1, 2). The incidence of aortic dissection is approximately 5–30 cases per million population annually, with a higher prevalence in men than women. Most cases occur between the ages of 50 and 70. Type B aortic dissection with complications, as classified by Stanford, is a cardiovascular emergency requiring urgent intervention (1, 2).

## 2. OBJECTIVE

The aim this article was to report a complicated Stanford B aortic dissection with acute limb ischemia and compartment syndrome, successfully managed with limb preservation and aortic repair.

## 3. CASE PRESENTATION

### History of presentation

A 60s male patient with poorly controlled hypertension presented with severe chest pain radiating to the back and right leg ischemia, characterized by coldness, numbness, motor loss, and absent arterial pulses.

### Past Medical History

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**Figure 1.** Imaging of a Stanford Type B aortic dissection demonstrating lesions extending from the distal aortic arch to the aortoiliac bifurcation, with compression and occlusion of the right iliac artery.

The patient had a medical history of chronic hypertension, along with dyslipidemia have been poorly managed.

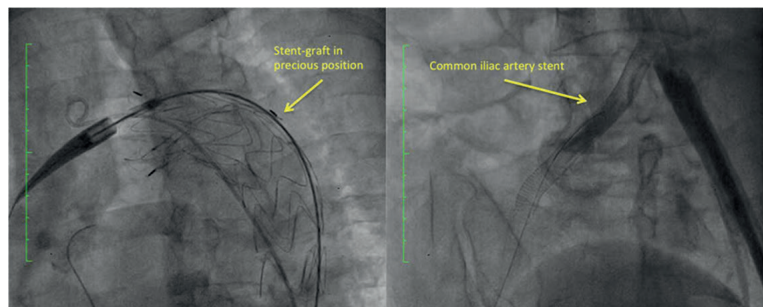
#### Investigations

On admission, his blood pressure was 200/120 mmHg in both arms. The right leg was cold, with undetectable pulsation in the femoral, popliteal, or dorsalis pedis arteries. The patient had lost motor function in the right leg, showed restricted knee joint movement, and had sensory disturbances. Emergency bedside echocardiography, computed tomography (CT) angiography of the aorta and iliac arteries, and blood tests were performed immediately to evaluate basic parameters and creatine-kinase (CK) levels.

Echocardiography findings revealed a non-dilated ascending aorta, no pericardial effusion, and normal left ventricular size and systolic function. CT angiography of the aorta and iliac arteries showed a thoracic aortic dissection extending through the descending aorta to the aortoiliac bifurcation. The true lumen was compressed by the false lumen. The dissection reduced blood flow to the celiac trunk and caused complete occlusion of the right external iliac artery (Figure 1). Laboratory blood tests showed an elevated CK level of 241 mg/dL.

#### Management

The patient was treated with intensive medical management, including pain control, heart rate and blood pressure stabilization, while preparing for emergency intervention. A thoracic aortic endovascular stent-graft was placed to seal the entry tear and restore blood flow to the right lower limb. The intervention utilized a



**Figure 2.** A thoracic aortic endovascular stent-graft was placed to seal the entry tear and restore blood flow to the right lower limb. The Supera™ Peripheral Stent 8x100 (Abbott) was successfully deployed, effectively re-establishing blood flow to the right iliac artery.

Relay thoracic stent-graft (32–28 mm diameter, 200 cm length, Bolton Medical), with access via the left common femoral artery (Figure 2).

Goals of the thoracic aortic intervention is to seal the primary entry-tear, expand the true lumen to improve perfusion of abdominal organs, and anticipate that the right common iliac artery would reopen to restore blood flow to the right leg.

Imaging revealed no blood flow to the right leg post-intervention assessment. The team decided on further limb revascularization by stenting the right iliac artery, the Supera™ Peripheral Stent 8x100 Abbot was successfully performed, achieving the desired outcome of re-establishing blood flow to the right iliac artery.

Despite the successful intervention, the patient continued to experience severe pain, swelling, loss of pulses, sensation, and motor function in the right leg (Figure 3).

The leg became tense and swollen. An emergency ultrasound of the lower limb arteries showed no evi-



**Figure 3.** Post-procedure, the patient developed compartment syndrome in the lower limb.



**Figure 4.** Image of the patient following fasciotomy and skin grafting, demonstrating recovery after 8 days.

dence of thrombotic obstruction in the bilateral lower limb vessels, an empty vascular lumen, and marked soft tissue edema in the right leg. Laboratory results showed an alarming increase in CK levels from 241 mg/dL to 194,106 mg/dL. The patient underwent complete fasciotomy of the right thigh and calf to relieve compartment

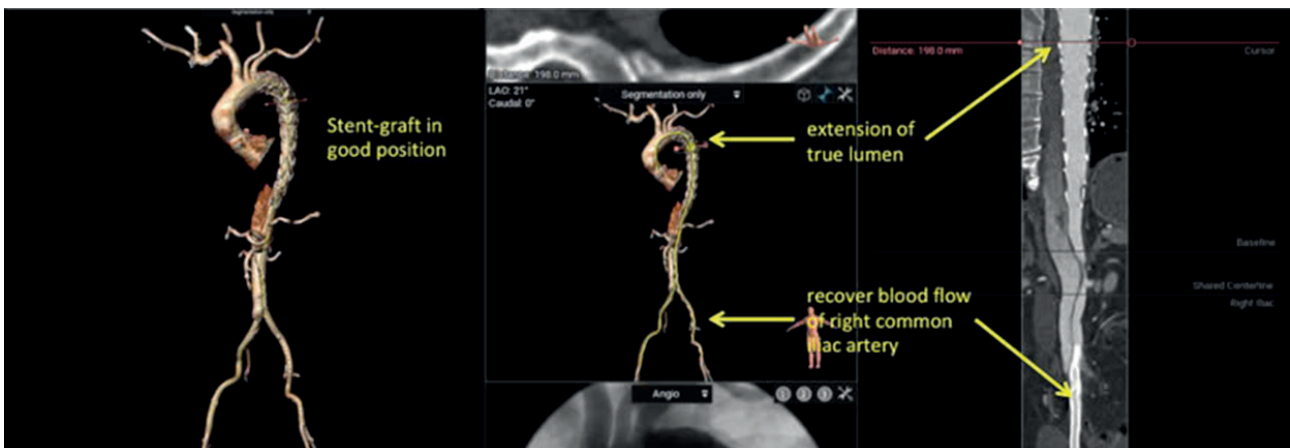
pressure, with hemostasis achieved. (Figure 4). Post-operatively, the patient received antibiotics, aggressive fluid resuscitation (4–6 liters of Natri-chlorid 0,9%/day), forced diuresis, and consideration for hemodialysis to manage rhabdomyolysis. Nutritional support was also optimized.

**Follow-up**

After eight days, once the limb had regained normal coloration, pulsations were detectable in the femoral, popliteal, and dorsalis pedis arteries, and sensory function was fully restored, the patient underwent fasciotomy wound closure. He was discharged in stable condition, with right leg muscle strength graded at 4/5 and fully restored sensation. At a one-month follow-up, the patient demonstrated independent ambulation, and the fasciotomy scars on the thigh and lower leg had healed completely. He reported no chest or leg pain, and his blood pressure was well-controlled according to prescribed recommendations. Follow-up MSCT angiography confirmed proper placement of the thoracic stent-graft without displacement. The graft maintained 50% blood flow through the left subclavian artery, ensured adequate perfusion to the abdominal arteries, and demonstrated excellent patency of the stented right common iliac artery. (Figure 5).

**4. DISCUSSION**

The management of this case highlights the complexity of acute limb ischemia secondary to Stanford B aortic dissection and the critical role of a multidisciplinary approach (1-7). The decision to perform a thoracic aortic stent-graft placement and extend the stent into the right common iliac artery was guided by thorough imaging analysis, which revealed compression of the true lumen without thrombosis (2, 4, 5). This minimally invasive approach effectively sealed the aortic tear, restored lower limb perfusion, and preserved critical vascular structures (6-8). Post-procedure complications, such as cerebral, spinal cord, and organ ischemia, as well as acute kidney injury, were significant concerns. However, the timely diagnosis and management of acute compartment syndrome,



**Figure 5.** MSCT follow-up at 1 month: good blood flow through the left subclavian artery (LSCA), adequate perfusion to the abdominal vessels, and excellent patency of the stented right common iliac artery.

a severe complication resulting from reperfusion injury, were pivotal in the patient's recovery. Understanding the pathophysiology of compartment syndrome, characterized by increased intercompartmental pressure leading to reduced perfusion and ischemic injury, allowed for early intervention with fasciotomy (9). This procedure alleviated compartmental pressure, mitigated tissue damage, and prevented progression to permanent muscle and nerve injury. Reperfusion injury, exacerbated by oxidative stress, microvascular obstruction, and interstitial edema, posed a unique challenge. By employing vascular ultrasound and CT imaging, the team accurately diagnosed the etiology of limb ischemia and identified the secondary complications of compartment syndrome (9). These findings informed a tailored therapeutic strategy involving fasciotomy, fluid resuscitation, and careful wound management. This case underscores the importance of an integrated clinical, imaging, and surgical approach in managing complex cardiovascular emergencies (10). Prompt recognition and intervention not only stabilized the patient's aortic dissection but also preserved limb function, demonstrating the value of multidisciplinary teamwork in addressing life-threatening complications effectively (1, 2).

## 5. CONCLUSION

Stanford Type B aortic dissection complicated by limb ischemia is a cardiovascular emergency requiring urgent intervention. Timely monitoring, insight consultation with orthopedic physician to understand the pathophysiology of acute compartment syndrome induced by reperfusion injury, and the importance of early diagnosis and fasciotomy to prevent irreversible tissue damage and preserve limb function bring out precise management of acute compartment syndrome following intervention are crucial to preserving the limb and ensuring the success of aortic repair.

- **Ethical statement:** Our institution does not require ethical approval for reporting individual cases or case series.
- **Author's contribution:** The all authors were involved in preparation this article. All authors read and approved the final manuscript.
- **Conflict of interest:** The authors declare that they have no competing interests.
- **Financial support and sponsorship:** Nil..

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