

Complication of Endoleak and Retrograde Type A Dissection after Stenting of a Ruptured Type B Dissection

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Abstract

Purpose: We report a case of ruptured type B aortic dissection.

Subject: A 59-year-old man with type B aortic dissection that ruptured into the left hemithorax, and was complicated by an endoleak and retrograde type A dissection after stenting.

Results: This patient was treated with thoracic endovascular aortic repair (TEVAR), but was complicated by an endoleak. The patient died from a retrograde type A dissection on the 14th postoperative day.

Conclusions: We recommend using a 200-mm stent without oversizing and avoidance of ballooning. A type II proximal endoleak must be treated in emergency aortic rupture cases.

Keywords: Ruptured aortic dissection; Thoracic endovascular aortic repair; Endoleak; Retrograde type A dissection

Introduction

Acute aortic syndromes including aortic rupture remain life-threatening, and represent a unique area in cardiovascular surgery. Thoracic endovascular aortic repair (TEVAR) has become widely accepted as a major option in the treatment of thoracic aortic diseases, particularly for emergency patients such as those with a ruptured dissection [1,2]. We report a case with type B aortic dissection that ruptured into the left hemithorax.

Case Report

A 59-year-old man with a history of hypertension was admitted to our center due to the sudden onset of pain in the interscapular region. Upon presentation his blood pressure was 106/63 mmHg. Laboratory studies revealed a hemoglobin level of 7.7 g/L. Computed tomography angiography (CTA) revealed an aortic dissection that extended from the aortic arch to both femoral arteries. CT confirmed a massive left hemothorax. The possible rupture site in the descending aorta is shown in Figure 1. The patient's blood pressure dropped to 70/40 mmHg after the CT scan, and he was immediately taken to surgery.

With the patient under general anesthesia, the right common femoral artery (CFA) was exposed. Angiography revealed the equality of both vertebral arteries and identified the position of the left subclavian artery (LSA). Via the CFA, a 36 mm diameter × 150 mm long Valent Ascending Dissection device (Medtronic, Minneapolis, MN, USA) was positioned from the LSA orifice. Slight proximal type I endoleakage was revealed on the completion angiogram (Figure 2), but balloon inflation was not performed in order to avoid injury to the wall.

After surgery, the patient was ventilated because of hypoxemia. A left chest tube was placed and 2000 mL of blood was drained within 1 h after the operation. Half an hour later, his hemoglobin level declined to 5.3 g/L, and the arterial pressure had decreased to 60/45 mmHg. The left chest tube was clamped, and the systolic pressure gradually increased to 100 mmHg after transfusion.

On the 8th postoperative day, we performed a repeat CTA, and a mild type I endoleak and massive left hemothorax were still present (Figure 3). The patient's systolic pressure ranged from 100 to 120 mmHg, and his hemoglobin level rose from 5.3 g/L to 8.6 g/L. On the 14th postoperative day, the patient's blood pressure suddenly became

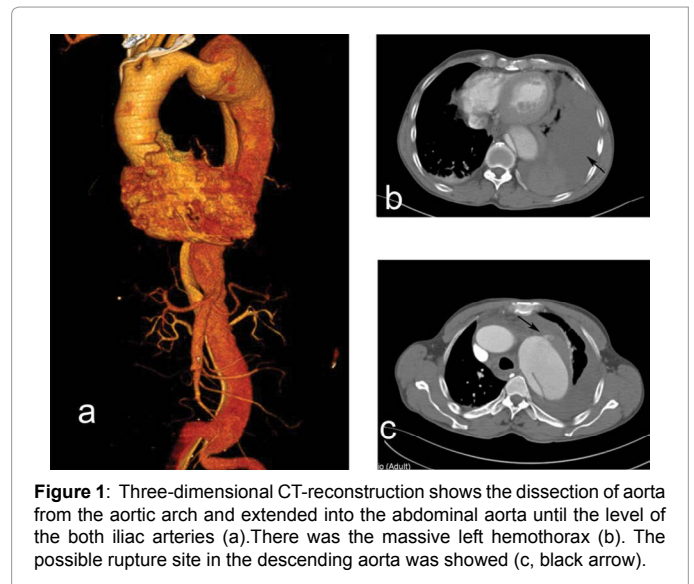


Figure 1: Three-dimensional CT-reconstruction shows the dissection of aorta from the aortic arch and extended into the abdominal aorta until the level of the both iliac arteries (a). There was the massive left hemothorax (b). The possible rupture site in the descending aorta was showed (c, black arrow).

very low (60/30 mmHg). Transthoracic echocardiography revealed a moderate pericardial effusion. Pericardiocentesis was performed, and a massive amount of uncoagulable blood was drained. Unfortunately, the patient died after half an hour. We were not able to repeat a CTA scan. No necropsy was performed.

Discussion

Aortic rupture is a frequent complication of dissection, and has

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Figure 2: After the stent-graft deployment, angiogram shows the proximal type I endoleak and the contrast media fill the false lumen (black arrow).



Figure 3: On the 8th day post operation, CTA shows the mild proximal type I endoleak (single arrow) and massive left hemothorax (double arrow).

been associated with an overall mortality rate >50% [3]. In an effort to improve the perioperative outcomes of patients, endovascular stent grafting of the thoracic aorta was introduced in the early 1990s [4]. The safety and technical feasibility of this approach were soon established and improved [5].

Although perioperative and short-term results of TEVAR were encouraging, complications unique to this treatment, such as acute or delayed retrograde type A dissection (6 and 8%, respectively) [6], stroke (3%), paraplegia (2%), and endoleaks (4%) can contribute to mortality and complications after surgery [7].

In this case, the patient was at significant risk of aortic rupture because of his massive left hemothorax and uncontrolled blood pressure. Even though the correct diagnosis was made quickly and the treatment performed properly, some issues should be discussed.

1. The diameter of the aorta proximal to the dissected segment was 36 mm. Therefore, we selected a stent graft with 36 mm diameter, according to the position statement from the European [8], with almost no oversizing, because the stronger the radial force, the greater the risk of injury to the aortic wall.

2. After stent graft deployment, perfusion into the false dissection lumen arose from retrograde flow from the LSA via the left vertebral artery (LVA), and was detected (type II proximal endoleak). In cases such as this, it should be mandatory to close the leak as quickly as possible by embolizing the LSA orifice. This might be the only way to slow down this filling and reduce the hemothorax. Ballooning was not performed because of the self-expanding nature of the stent and the time required for the remodeling process of the aorta. Moreover, retrograde dissection and rupture of the dissection membrane has been reported due to ballooning [8].

3. Placement of the stent graft at the aortic arch was probably correlated with the development of retrograde type A dissection. When passively bent at the arch, the self-expanding endoprosthesis has the inherent tendency to spring back to its initial straight shape. Such spring-back strength could create a new entry at one or both ends [9]. In this case, we speculate the patient died of retrograde type A dissection, because he suddenly deteriorated and a massive amount of uncoagulable blood was drained from the pericardium. Therefore, we recommend using a 200-mm stent, which might have less spring-back strength, and covers more thoracic aortic segments, in order to close more potential tears in rupture cases.

4. The patient was hypoxemic due to the massive left hemothorax, but an effusion should not be drained or drained too rapidly. The negative pressure in the thorax might have made the bleeding from the tear worse.

In conclusion, type B aortic dissection with rupture is a fatal condition that usually causes a hemothorax. Diagnosis must be made quickly, because treatment with TEVAR can control the bleeding effectively. In emergency cases, we recommend using a 200-mm stent without oversizing. If perfusion into the false dissection lumen from the LSA is detected, this leak must be closed as quickly as possible by embolizing the LSA orifice.

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