Case Report

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Retrograde Type A Aortic Dissection Following Thoracic Endovascular Aortic Repair

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1. Abstract

Retrograde Type A aortic dissection is a rare but potentially life-threatening complication of thoracic endovascular aortic repair (TEVAR). A 61-year-old man presented with left-sided chest pain and diaphoresis. Urgent computed tomography aortogram revealed an uncomplicated Stanford Type B dissection. TEVAR procedure was complicated by retrograde Stanford Type A dissection and he underwent emergency replacement of the ascending aorta.

2. Keywords:
Retrograde type A aortic dissection; Thoracic endovascular aortic repair

3. Introduction

Retrograde Type A aortic dissection (RTAD) is a rare complication post thoracic endovascular aortic repair (TEVAR), defined as a dissection that originates distally to the ascending aorta, with a retrograde flap progression into the ascending aorta. As TEVAR has become a mainstay treatment for dissection and other disorders of the thoracic aorta, the incidence of RTAD is expected to increase. Type A aortic dissection is associated with high morbidity and mortality. We report a case of acute RTAD post TEVAR, and present strategies to minimise the risk of RTAD.

4. Case Report

A 61-year-old Chinese male presented with left-sided chest pain and diaphoresis. He was hypertensive with blood pressure of 182/71 mmHg. Examination findings were unremarkable. An urgent computed tomography aortogram (CTA) revealed an uncomplicated Stanford type B aortic dissection extending from distal to the origin of the left subclavian artery down to the aortic bifurcation and into the bilateral common iliac arteries. The innominate, left carotid, and left subclavian arteries were normal, while there was partial stenoses at the origins of the celiac, superior and inferior mesenteric arteries. The patient was commenced on aggressive blood pressure control. The patient underwent TEVAR the next day. Bilateral femoral artery access was established via pre-closure devices. The true lumen was identified using angiography and an amplatz stiff guidewire was positioned in the ascending aorta. The TEVAR device was positioned using serial angiography, covering the left subclavian artery and subsequently deployed. However the completion aortogram showed a retrograde Stanford Type A aortic dissection. An urgent CT aortogram showed a new dissection flap originating from the ascending aorta (Figure 1), involving the proximal right brachiocephalic artery, left common carotid artery (Figure 2), and extending to the infra-renal abdominal aorta.

Figure 1: CT aortogram showing dissection of ascending aorta. TL = true lumen. FL = false lumen.

Figure 2: CT aortogram showing dissection involving right brachiocephalic trunk (black arrow) and left carotid artery (white arrow).

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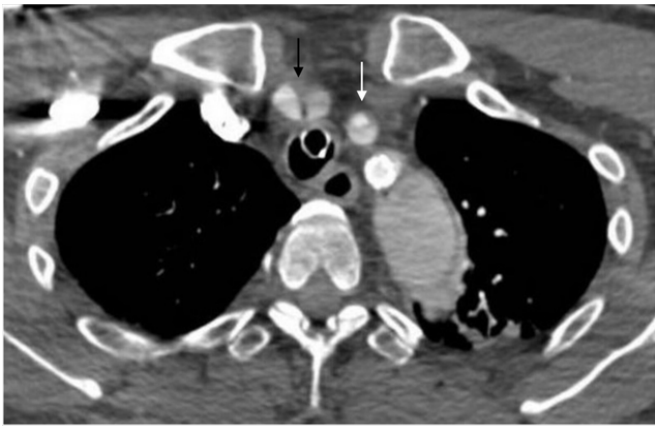

The patient underwent emergent replacement of the ascending aorta. Intraoperative findings showed a large haemorrhagic pericardial effusion, a dilated ascending aorta and congealing of the aortic wall. The right femoral artery had an arterial wall hematoma that was closed with a percutaneous suture. The patient was cooled to 18 degrees for total circulatory arrest. Total cardiopulmonary bypass time was 277 minutes. Postoperative recovery was complicated by atelectasis, acute kidney injury and hospital-acquired pneumonia. Transthoracic echocardiography showed no obvious leak or stenosis at the proximal ascending aorta and mild aortic regurgitation. The patient was discharged well on postoperative day 11.

5. Discussion

RTAD is a potentially life-threatening complication of TEVAR. Predisposing factors include underlying aortic wall disease such as dissection, intramural haematoma or connective tissue disease. There are several strategies to minimise the risk of RTAD post TEVAR.

5.1. Patient Selection:

Patients with certain anatomical or clinical characteristics may be at higher risk for RTAD. These include an aortic arch with excessive angulation (>60 degrees), an aortic diameter ≥ 40 mm, or the presence of aortic wall disease. High-risk patients may be better suited for alternative treatments or open surgery.[1,2]

5.2. Imaging and Planning:

High-quality computed tomography angiography (CTA) should be performed to measure aortic dimensions. Determining the proximal and distal landing zones are crucial in order to select the appropriate stent graft. Identifying and locating entry and exit tears allows planning for deployment of the stent graft. Advanced imaging techniques, such as 3D reconstruction, can aid in visualization.[1,2]

5.3. Minimize Manipulations:

Excessive manipulation of the catheter and guidewire can cause intimal injury and subsequent RTAD. Use techniques that reduce the need for catheter or wire manipulation, such as pre-shaped catheters and guidewires or the use of stiff guidewires to avoid unnecessary handling.[1,2]

5.4. Avoid Oversizing:

Oversizing the graft can lead to aortic wall injury and increase the risk of RTAD. Typically, a graft should be chosen with a diameter close to the aortic diameter, ideally with a small degree of oversizing (around 10%). This minimizes the risk of graft-induced injury to the aortic wall. [1,2]

5.5. Deployment:

The stent graft should cover the entire length of the entry tear, creating a complete seal. Proper alignment with the aortic arch and descending aorta is crucial. Techniques such as balloon moulding and controlled deployment can help ensure precise placement.[1,2]

5.6. Avoid Balloon Dilatation Unless Necessary:

Balloon dilatation of the stent graft should be avoided unless it is necessary to achieve an adequate seal or to address endoleaks. Overinflating the balloon can cause injury to the aortic wall and increase the risk of RTAD. [1,2]

5.7. Customize Grafts for Difficult Anatomy:

For challenging anatomies, consider using customized grafts. These grafts are tailored to fit specific patient anatomies, reducing the risk of endoleaks and complications. Custom grafts may be particularly beneficial in cases with angulated or tortuous aortas.[1,2]

5.8. Close Monitoring:

Continuous monitoring during and after the procedure is essential. Utilize intraoperative imaging, such as fluoroscopy, to confirm the correct graft position. Post-procedural follow-up with imaging, such as CTA, is crucial to detect any early signs of RTAD or other complications. [1,2]

RTAD is a serious complication after TEVAR. It is important to recognise early to allow for prompt surgical intervention. There are several strategies to minimise its risk of this potentially deadly complication.

References

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