Complete graft dehiscence 8 months after repair of acute type A aortic dissection

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Abstract

Acute type A aortic dissection is a dreaded differential diagnosis of acute chest pain. Long-term outcome mainly depends on pre-existing comorbidities and post-operative complications. We present a patient with aortic graft dehiscence and subsequent severe aortic regurgitation due to fungal graft infection 8 months after repair of acute type A aortic dissection. Redo aortic surgery had to be delayed for 28 days due to intracerebral haemorrhage caused by septic embolism and clipping of a mycotic left middle cerebral artery aneurysm. Surgery revealed a circumferentially detached graft at the site of the proximal anastomosis thereby forming a massive pseudoaneurysm. The patient underwent successful aortic root replacement using a Freestyle porcine root bioprosthesis (25 mm), followed by re-anastomosis of the coronary arteries and partial replacement of the ascending aorta with a 28 mm Dacron graft. The patient was discharged on day 67 in stable cardiac condition with persistent neurological deficits. This case highlights the challenging management of patients with aortic graft infection and neurological dysfunction after redissection of the ascending aorta who require redo cardiac surgery.

Keywords

Acute type A aortic dissection, graft dehiscence, neurological dysfunction, redo surgery

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Introduction

In acute type A aortic dissection, emergency surgery is the therapy of choice to prevent serious complications or fatal rupture. Despite advances in diagnostic and therapeutic procedures, operative morbidity and mortality remains considerably high and has been reported to be up to 25%.^{1,2} Long-term outcome primarily depends on age, comorbidities, and peri-operative complications, and in 5–39% of cases redo aortic surgery becomes necessary^{1,3,4} with secondary aortic root dilatation being the main indication.^{5,6} Operative mortality of a redo procedure is 13–41% and exceeds the mortality of the primary surgery.^{5–7} Graft dehiscence is a very rare post-operative complication occurring usually after an average time interval of more than 60 months after the initial procedure.^{1,7} We report a case of a patient with severe aortic valve regurgitation due to complete proximal graft dehiscence occurring 8 months after ascending aorta and hemi arch replacement for acute type A aortic dissection.

Clinical summary

A 40-year-old woman with a tricuspid aortic valve suffered from acute type A aortic dissection 8 months prior to the current hospitalization. Surgical repair consisted of replacement of the ascending aorta and hemiarch by a 30 mm supracoronary graft with reconstruction of the left subclavian artery and left common carotid artery with an initially uneventful post-procedural course. Four months after surgery, long-term high-dose cortisone therapy was initiated due to acute arthritis of the right ankle joint and histopathological signs of eosinophilic vasculitis. The patient was currently admitted for sudden dysarthria and severe headache. Head computed

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Figure 1. (a, b) Head computed tomography (CT) demonstrating subacute left frontal ischaemic stroke with haemorrhagic transformation (a) and ischaemic stroke with haemorrhagic transformation in the right middle cerebral artery (MCA) territory (b). (c) CT-angiography demonstrating a mycotic aneurysm of the upper trunk of the left MCA. (d) Intraoperative view of the circumferential dehiscence of the proximal part of the graft after aortotomy.

tomography (CT) revealed subacute left frontal ischaemic stroke with haemorrhagic transformation (Figure 1A). Additional thoraco-abdominal CT scan (Figure 2A and B) showed a circumferential intimal flap in the ascending aorta at the site of the proximal graft anastomosis. Transoesophageal echocardiography confirmed this finding and demonstrated severe acute aortic regurgitation (Figure 2C). Twenty-four hours after admission, the patient required inotropic support and mechanical ventilation due to progressive heart failure. Furthermore, the patient developed left-sided hemiparesis and akinetic mutism. Head CT scan revealed ischaemic stroke with haemorrhagic transformation in the right middle cerebral artery (MCA) territory (Figure 1B) and a new mycotic aneurysm of the upper trunk of the left MCA (Figure 1C). As blood cultures revealed *Candida albicans*, a septic-thromboembolic aetiology was assumed and broad-spectrum antibiotic and antimycotic therapy was initiated. The patient underwent successful clipping of the MCA aneurysm on day 21 after admission. Due to the high risk of additional

intracerebral haemorrhage, redo aortic surgery was postponed until day 28 after admission. Surgery revealed that the aortic graft was completely detached at the site of the proximal anastomosis thereby forming a massive pseudoaneurysm (Figure 1D). Moreover, a retrograde dissection membrane was seen, starting at the level of the proximal suture line and involving the sinotubular junction, non-coronary and left coronary aortic cusps, and ostia of both coronary arteries. The affected aortic segment and the proximal part of the supracoronary graft were resected, and a 28-mm Dacron graft was interposed. In order to avoid long antegrade cerebral perfusion, the distal part of the hemi-arch prosthesis was left in situ, and the 28-mm Dacron prosthesis was anastomosed into the lumen of the remaining graft. To prevent long-term anticoagulation therapy in this patient with a high-risk for cerebral bleeding complications, an aortic root replacement using a Freestyle (Medtronic, Minneapolis, MN) porcine root bioprosthesis (25 mm) followed by re-anastomosis of the coronary arteries was

Figure 2. (a) Computed tomography (CT) scan on admission: coronal image showing a large tear within the ascending aorta 1.5 cm distal to the aortic root. (b) Three-dimensional reconstruction of CT-angiogram demonstrating an abnormal configuration of the aortic root, coronary sinuses, and ascending aorta. (c) Transoesophageal long-axis view at 118° showing a dilated aortic root, parts of the intimal flap distal to the aortic annulus, and consecutive severe aortic regurgitation in colour Doppler imaging. LVOT, left ventricular outflow tract; AA, ascending aorta

performed. As antibiotic treatment had been started 8 days before surgery, culture of explanted graft tissue remained sterile. Despite a post-operative period further complicated by renal failure requiring haemodialysis, the patient was discharged from the hospital on day 67 in stable cardiac condition with persistent neurological deficits.

Predischarge transthoracic echocardiography showed a reduced left ventricular ejection fraction of 43% and normal prosthetic aortic valve function, which was also found at last echocardiographic follow up at 16 months after discharge. With long-term antimycotic therapy, inflammatory parameters

remained in a normal range; accordingly positron-emission tomography CT at 18-month follow up revealed no ongoing inflammatory activity. At the last clinical follow up (22 months after redo surgery), the patient had not presented any cardiovascular events with a slow but significant improvement of her neurological condition.

Comment

The unique feature of our case was the development of a circumferential intimal tear forming a massive

pseudoaneurysm at the proximal graft anastomosis due to fungal graft infection and subsequent complete graft detachment accompanied by aortic valvular incompetence and a septic-thromboembolic stroke. A circumferential intimal tear in acute type A aortic dissection has been reported in 20 cases⁸ and as a rare post-operative complication following graft implantation in two patients in a recent case series of 23 patients.⁹ In this report by Kobuch et al.⁹ aortic arch rupture at the distal suture line was described in two patients that led to severe cardiovascular compromise, while the majority of patients (70%) presented with localized suture line dehiscence, remained haemodynamically stable and were able to undergo operation on an elective or semi-urgent basis. Only one major stroke was noted.⁹

Neurological dysfunction complicates the course of up to 40% of patients with left heart valvular and perivalvular infection.¹⁰ Nonetheless, a clear management plan for these challenging patients is lacking, and indications for as well as optimal timing of cardiac surgery remain controversial. The risk of further cerebral injury during heart surgery is increased in patients with preoperative stroke as anticoagulation therapy with heparin may extend haemorrhagic infarction. Furthermore, hypotension during cardiopulmonary bypass may aggravate cerebral injury due to ischaemia, and induce cerebral oedema in areas of blood–brain barrier disruption.¹¹ Previous retrospective series with small numbers of patients demonstrate that an interval of at least 2–3 weeks between haemorrhagic stroke and valve replacement is advisable in stable patients¹¹ and ESC guidelines (2009) recommend postponing surgery for at least 1 month.¹²

Optimal therapy of unruptured mycotic aneurysms is controversially discussed due to absence of evidence. Cerebral mycotic aneurysms develop in about 1–12% of patients with infective endocarditis and about 10% of these aneurysms rupture,^{10,13,14} while at least 50% of mycotic aneurysms resolve with appropriate antibiotic therapy.¹³ However, it is currently impossible to predict which mycotic aneurysm will rupture and which will resolve. In our case, the mycotic aneurysm was treated surgically in order to allow the use of high-dose heparin therapy during cardiopulmonary bypass circulation. Hence, heart surgery was postponed until day 7 after clipping of the cerebral aneurysm, and until day 28 after intracerebral haemorrhage, respectively. At that point, neurological status had stabilized and head CT scan revealed no ongoing cerebral haemorrhage.

The optimal approach to redo surgery for type A aortic dissection is still a matter of debate. After careful evaluation of different surgical procedures, decision was made to resect the affected aortic segment and the proximal part of the supracoronary graft and to interpose a 28-mm Dacron graft followed by aortic root replacement using a Freestyle porcine root bioprosthesis and re-anastomosis of the coronary arteries. Recently, percutaneous endovascular stent

graft treatment of ascending aortic disease was reported in patients turned down for conventional surgery due to multiple comorbidities and high surgical risk.^{15,16} However, since this treatment can only be offered to those patients with uncompromised aortic valve function and an entry tear well above the coronary ostia in order to obtain a sufficient landing zone, this procedure was not an option in our case. As antibiotic treatment had been started 8 days before surgery and no evidence of major ongoing infection was seen during surgery (which was subsequently confirmed by negative cultures), we refrained from treatment options such as extensive mediastinal irrigation and using adjuncts such as viable omentum and muscle flaps to treat graft infection.^{17,18} The use of an antibiotic-treated aortic homograft for aortic replacement had been described previously in unstable patients and showed a mortality rate well below the documented rate in the literature. In these patients the homograft proved resistant to active infection, and no secondary infection was seen.^{19,20} However, this approach can only be used in patients with a normal native aortic valve and was therefore not applied in the present case.

Early and late-onset infections complicate prosthetic aortic graft insertion in 0.5–2% of cases and are associated with considerable morbidity and death.²¹ *Candida* infections of prosthetic aortic grafts are rare and usually are related to reduced immunocompetence, prolonged antibiotic therapy, or intravenous drug abuse.²² Previous reports presented cases of severe systemic candidiasis, which usually had fatal outcomes.²³

This case report illustrates the substantial morbidity associated with these complex procedures and emphasizes the importance of preventing post-operative weakening of graft anastomosis. The time interval between the initial procedure and the need for reoperation is highly variable.⁷ This variability justifies monitoring at close intervals and the careful evaluation of even minor symptoms to increase the chances of early detection of complications.

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