Endovascular repair of ascending aortic pseudoaneurysm in a high-risk patient

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Abstract

Mycotic ascending aortic pseudoaneurysm (AAP) is an uncommon but surgically challenging problem with high morbidity and mortality rates. We describe endovascular repair of an acute mycotic AAP in a high-risk patient. A 45-year old man, HIV serum positive, chronic hepatitis HBV and HCV related, presented, after two sternotomies, with a fast growing 11 × 6 cm AAP that was sealed with two Gore Excluder aortic cuffs, inserted from the left axillary artery. Nine months control CT continued to show no endoleak with shrinking of the AAP.

Keywords: Ascending aorta · Endovascular · Aneurysm

Ascending aortic pseudoaneurysm (AAP) is an uncommon but surgically challenging problem. Concomitant sternal wound and mediastinal infection predispose both to AAP. Traditional surgical treatment carries high morbidity and mortality rates [1, 2]. We describe endovascular repair of an acute mycotic AAP as an alternative treatment for a high-risk patient.

CASE REPORT

A 45-year old man with a history of HIV and chronic hepatitis HBV and HCV related underwent a tricuspid valve replacement for methicillin-sensitive Staphylococcus aureus endocarditis. He did well under antibiotic therapy for 8 weeks when he was readmitted for cardiogenic shock due to cardiac tamponade. A pericardiocentesis failed to solve the tamponade due to the presence of large blood clots; an emergent full re-sternotomy was performed with the recovery of his haemodynamics. He continued under antibiotic therapy for the next 4 weeks without major problems. Three months later, the patient was admitted for fever, anaemia and purulent infection at the proximal part of the sternum skin incision. A methicillin-resistant S. aureus was found in the dehiscence and in the blood culture. The patient underwent chest CT scan and echocardiography which demonstrated a large pseudoaneurysm arising on the anterior aspect of the ascending aorta measuring 6 × 5 cm; it was believed to have originated from the cardioplegia or cannulation site. The patient was transfused and started on linezolid. On the next day, the progressive deterioration of the patient and the presence of a small amount of blood coming out from the skin dehiscence induced a new CT scan and echocardiography which showed an expanding AAP of 11 × 6 cm (Fig. 1).

Because of the fast evolution of the AAP, the mycotic nature, the contiguity to the sternum and the high-risk patient, an urgent endovascular approach was attempted as an alternative to a third sternotomy, CPB and deep hypothermic circulatory arrest. After family consent was given, the patient was immediately transferred to the cath lab. A left axillary artery cut-down was performed to provide access for the device. A 18 F sheath was introduced into the aortic arch over a 300 cm super-stiff wire. The origin of the AAP was well visualized with an angiogram. After overdrive cardiac pacing dropping systolic pressure to 60 mmHg, a 26 × 33 mm Gore Excluder (W.L. Gore & Associates, Newark, USA) aortic cuff was deployed in the ascending aorta covering the origin of the pseudoaneurysm. At the control angiogram, no endoleak was seen; however, to obtain a better sealing of the endoprosthesis in a high shear stress area, a second 28.5 × 33 mm Gore Excluder aortic cuff was deployed closer to the brachiocephalic trunk. Postoperative course was uneventful, CT scan and echocardiography demonstrated exclusion and complete thrombosis of the AAP and the patient was transferred for continuing intravenous antibiotic therapy. On control CT imaging 1, 3 and 9 months after the procedure, the AAP remained excluded with progressive shrinking and with no recurrence of sternal skin dehiscence (Fig. 2).

DISCUSSION

AAP presents with an incidence varying from 2 to 13% for ascending aortic replacement, but mycotic APP is quite rare. The standard surgical treatment has a poor prognosis because of the risks involved in complex reoperations in patients with multiple comorbidities [1, 2]. Since Roux et al. [3], in 2002, published the treatment of a fistula after a Bentall operation with endoluminal...
covered stent, to our knowledge, only three mycotic AAPs have been treated endovascularly [2-5]. We used a Gore Excluder aortic cuff for several reasons. The length between the coronary ostium and the brachiocephalic trunk was 48 mm and the aortic diameter 24.6 mm; the 28.5 × 33 mm length of the Gore Excluder was considered the best choice. We preferred to use two cuffs, even though the first one sealed perfectly the origin of the AAP. However, we were afraid of the high shear stress and we still had some space before the origin of the brachiocephalic trunk. The short nose of the Gore Excluder helped to not pass or damage the aortic valve; the flexibility of the device helped to navigate from the left axillary artery through the aortic arch. We had to use the left axillary artery as vascular access because this stent graft is designed for proximal extension in the infrarenal aorta and it would have never reached the ascending aorta from the groin. For the precise positioning of the endoprosthesis, the systolic pressure was dropped to 60 mmHg with overdrive cardiac pacing; a low-controlled pressure is crucial, particularly during the fast release of the endoprosthesis close to the left ventricle. The fast growth of the AAP forced an urgent treatment of the patient, avoiding an adequate prophylactic antibiotic therapy. The risk of endoprosthesis infection in treating mycotic pseudoaneurism is high, particularly in the case of high-virulence organisms and the presence of gross purulence; good results have been reported with homemade stent-grafts with autologous venous material [6, 7]. The urgent condition, the risk of a third re- sternotomy with hypothermic circulatory arrest in a very high-risk patient was the main factor for choosing an alternative approach to standard surgical approach; moreover, the risk of graft infection, in our patient, was also high after conventional surgery due to comorbidities. Ascending aorta still remain ‘off label’ for endovascular treatment for many reasons: landing zone short and close to vital collaterals, lack of dedicated prosthesis and high shear stress. Further more, the ascending aorta is still the domain of the cardiac surgeon, but with the faster growth of catheter technology (trans-catheter valve procedures), the cardiac surgeon is becoming more an endovascular surgeon. In conclusion, we report the successful exclusion of a mycotic AAP with an endovascular approach in a high-risk patient also for conventional surgery. Longer follow-up is needed to ascertain the success of this approach, particularly concerning the risk of graft infection.

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REFERENCES


