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CASE REPORT

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VASCULAR DISEASE

Surgical explanation of an infected aortic arch endograft: a two-stage approach

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Abstract

Thoracic Endovascular Aortic Repair has become the preferred treatment for various aortic pathologies due to its minimally invasive approach. While advancements, including branched devices, have expanded the scope of endovascular repair to the aortic arch and ascending aorta, they also present challenges, particularly in managing complications like infection. We report a rare case of a branched thoracic endograft explantation. A 67-year-old male was evaluated for hemoptysis caused by an infected branched endograft with an aorta-oesophageal fistula. The patient underwent a staged approach, including preoperative left common carotid artery to left subclavian artery bypass and explantation of the endograft under circulatory arrest. Reconstruction was achieved using a self-made bovine xenopericardial tube graft. Postoperative recovery was uneventful, and the patient was discharged in good condition 23 days post-surgery.

Keywords: aorta • aortic arch • TEVAR • branched endograft

INTRODUCTION

Endovascular treatment through thoracic endovascular aortic repair (TEVAR) has become the first-line therapy for many aortic pathologies due to its minimally invasive nature. Initially developed for the descending aorta, TEVAR has now been adapted to address conditions involving the aortic arch and even the ascending aorta. This evolution has been enabled by advanced techniques, including the use of branched devices. While these innovations have greatly expanded therapeutic options, they are not without challenges. Although rare, significant issue arises when patients develop infection of their branched thoracic endograft. In this case report, we present a complex scenario: infection after TEVAR with a branch in the left subclavian artery (LSA).

PATIENT AND METHODS

Presentation

A 67-year-old man with a history of arterial hypertension and type B aortic dissection, previously treated with TEVAR (Ankura^{TM} Thoracic Stent Graft, Lifetech Scientific, Shenzhen, China) and a single branch (Futhrought Endovascular Needle System with Be Graft Aortic 12 × 39 mm) to the LSA due to post-dissection dilation, presented to the emergency department with haemoptysis. A computed tomography (CT) scan, combined with clinical and laboratory findings (c-reactive protein 140.1 mg/l), strongly suggested an infected TEVAR graft with an aorta-oesophageal fistula (see Fig. 1A). Antibiotic and antifungal therapy was initiated. The case was discussed in a multidisciplinary meeting and endograft explantation with surgical reconstruction was deemed the only durable option.

Operation

Two days prior a bypass from left common carotid artery to the LSA was performed. The main procedure, involving vascular, gastrointestinal, and cardiothoracic surgeons, began with the patient in supine position to expose the right subclavian artery for arterial access and the left femoral vein for venous access. The left femoral artery was cannulated to maintain distal perfusion during cross clamping. The patient was then positioned in a right lateral decubitus position to allow a left thoracotomy (technique previously described [1]). Cardiopulmonary bypass was initiated, and the patient was cooled to 20°C. Thoracic access was achieved through the fourth and seventh intercostal spaces. Distal clamping of the aorta was performed below the level of the endograft. After preparing the aortic arch the LSA was ligated.

Under circulatory arrest, the aorta was opened, and the endograft (Fig. 2B) with the LSA branch (Fig. 1B) was explanted.

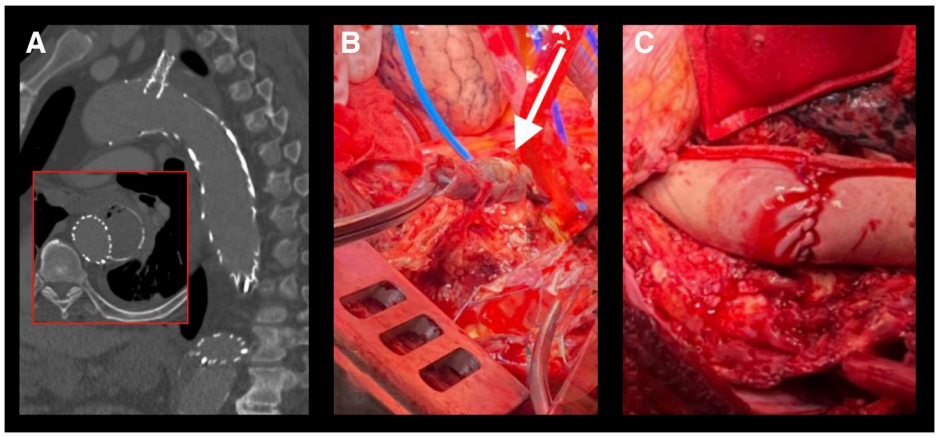

Figure 1: (A) Preoperative CT image with air in false thrombosed lumen suspect for infection. (B) Explantation of the endovascular branch out of the left subclavian artery. (C) Postoperative result after aorta reconstruction with bovine pericardial stripes

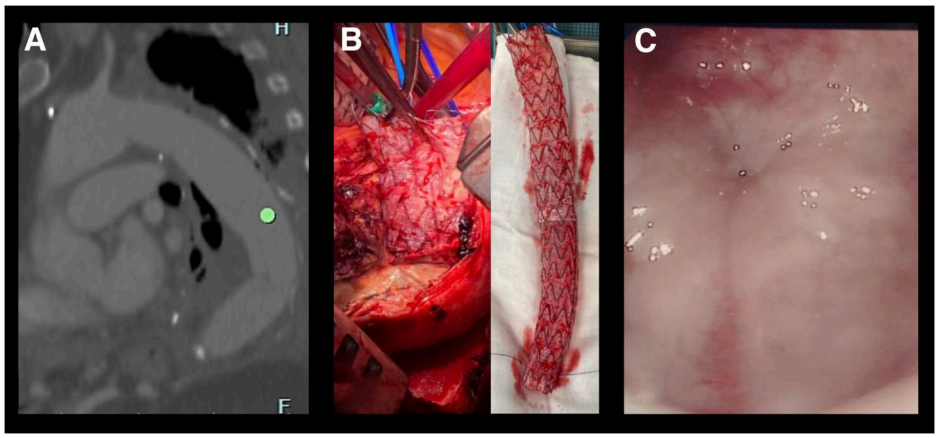

Figure 2: (A) Postoperative lateral CT image. (B) Explantation of TEVAR in vivo and ex vivo. (C) Endoscopic view of esophageal lesion covered with fibrinous exudate

Proximally, the aorta was reconstructed using bovine xenopericardium conduit. Once proximal clamping was completed, circulation was restarted, and rewarming was initiated. Distally, the aorta was also reconstructed with bovine xenopericardium, and an anastomosis was created between the proximal and distal xenopericardial tubes (Fig. 1C).

A pedicled intercostal flap was mobilized to cover the reconstruction. Oesophageal inspection, including endoscopy (Fig. 2C), showed fibrin-covered tissue suspicious for prior defect, but no perforation was found, therefore, no additional intervention was deemed necessary.

Postoperative course

Postoperatively, the patient remained in the intensive care unit for seven days before being transferred to the general ward. A follow-up CT-scan showed no postoperative abnormalities (Fig. 2A). A 'nothing by mouth' policy was maintained for 14 days. After an oral contrast X-ray revealed no signs of leakage, oral intake was cautiously reintroduced. The patient was ultimately discharged home in good condition, 23 days after surgery, with no new postoperative complications. Antibiotic therapy was guided by intraoperative cultures, which revealed Actinomyces odontolyticus, and was continued for 6 weeks postoperatively.

DISCUSSION

The explantation of infected endografts after TEVAR has been described in the literature through case reports and small series, despite it being a rare complication with an estimated prevalence of 1% to 6% [2]. Although infrequent, it is a severe condition, with reported mortality rates exceeding 20%, even in high-volume centres [3].

Recent advances in endovascular treatment have made it increasingly common to include the supra-aortic trunks, the aortic arch, and even the ascending aorta in interventions. Infection of these fenestrated and branched endografts requires a more extensive surgical solution, with additional difficulty to keep perfusion to the included branches. To the best of our knowledge, this is only the second reported case, following the one described by Catalano *et al.* [4].

The treatment for infected endografts is individualized depending on patient anatomy, graft type, infection extent, and overall health status. Treatment decisions should be made by a multidisciplinary team. According to current European guidelines, medical

management alone is typically reserved for patients unfit for open surgery [5]. In general, surgical resection and reconstruction is considered the most sustainable treatment.

Grafts used are frequently cryopreserved allografts, which carry a low risk of infection. A limitation of these grafts is the availability and the risk of rupture due to occasional low quality of the material and calcification/aneurysmal degeneration. Additionally, there are antibiotic-bonded or silver-coated grafts, which are more readily available but have a higher change of recurrent infection. In this case, a self-made xenopericardial conduit tube graft was used, which was immediately available, and has favourable outcomes in terms of patency and reinfection rates [6].

Looking ahead, similar cases may become more frequent as the use of branched thoracic endografts continues to increase. Therefore, this case highlights important lessons for future clinical practice. It demonstrates that even in high-risk scenarios, aggressive surgical management can lead to favourable outcomes when performed in a centre with the appropriate expertise and within a multidisciplinary framework.

CONCLUSION

The successful explantation of the infected branched thoracic endograft in this patient demonstrates the importance of a multidisciplinary, individualized approach to this complex and rare complication. The use of a self-made xenopericardial tube graft provided an effective and immediately available solution, ensuring patency and minimizing reinfection risk. This case adds valuable insight to the limited literature on managing infections in branched thoracic endografts and underscores the need for innovative, adaptable strategies in these complex situations.

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CONFLICT OF INTEREST

None declared.

ACKNOWLEDGMENTS

None declared.

DATA AVAILABILITY

Data underlying this article will be shared on reasonable request to the corresponding author.

AUTHOR CONTRIBUTIONS

S.T.: Conceptualization, Supervision. V.G.: Writing—Review & Editing. N.H.: Writing—Original Draft, Writing—Review & Editing. G.G.: Supervision, Writing—Review & Editing.

ETHICAL STATEMENT

Written patient informed consent was obtained.

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