

# Endovascular stent graft treatment of leaking thoracic aortic tuberculous pseudoaneurysm

Loh Y J, Tay K H, Mathew S, Tan K L, Cheah F K, Sin Y K

## ABSTRACT

**Mycobacterium tuberculosis infection is one of the leading causes of death from communicable diseases worldwide. However, the incidence of leaking thoracic aortic tuberculous pseudoaneurysms is rare as a complication. Conventional treatment of a leaking tuberculous pseudoaneurysm involves surgery with graft interposition or patch repair. With the emergence of stent graft treatment as a viable option for leaking pseudoaneurysms, we report a 63-year-old man who had his leaking thoracic aortic tuberculous pseudoaneurysm treated with endovascular stent grafting.**

**Keywords:** aortic tuberculous pseudoaneurysm, endovascular stent graft, pseudoaneurysm, thoracic aorta, tuberculosis

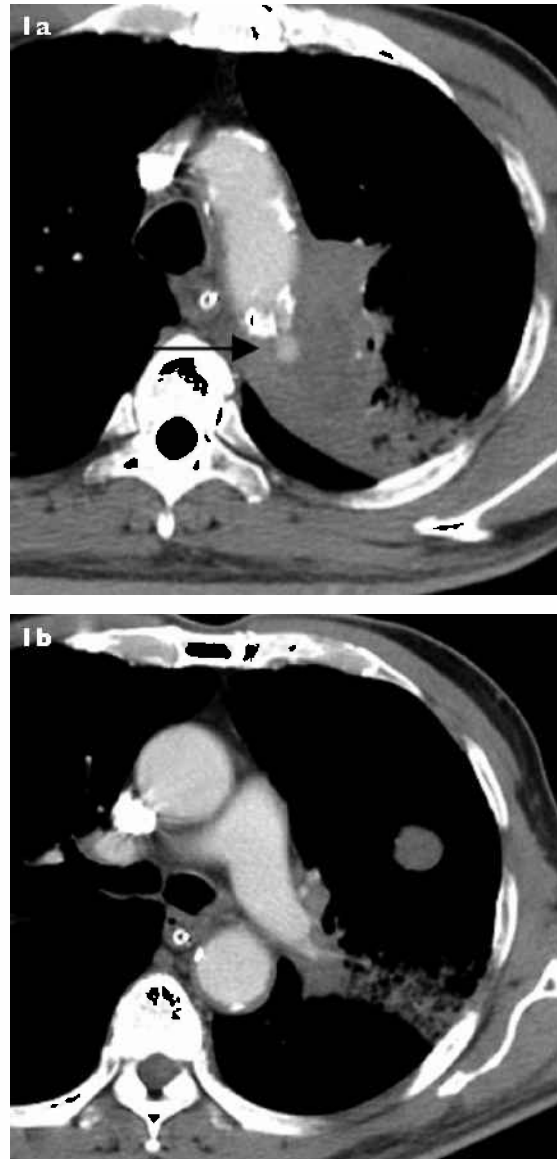
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## INTRODUCTION

Mycobacterium tuberculosis infection is one of the leading causes of death from communicable diseases worldwide. However, the incidence of leaking thoracic aortic tuberculous pseudoaneurysms is rare as a complication.

## CASE REPORT

A 63-year-old man, with a background history of smoking, peripheral vascular disease and bilateral popliteal to dorsalis pedis bypass, presented with acute massive haemoptysis requiring intubation. Bronchoscopy showed clots at the left upper lobe bronchus. Chest radiograph showed a mass at the left upper zone abutting the superior mediastinum together with an enlarged aorta. Computed tomography (CT) of the thorax revealed a contained rupture of the proximal descending thoracic aortic pseudoaneurysm about 2 cm distal to the left subclavian artery. There was also a 2.2 cm nodule in the left upper lobe with multiple mediastinal lymph nodes (Fig. 1). In view of the possibility of malignancy with tumour erosion of the adjacent aorta, we felt that the less invasive endovascular



**Fig. 1** Axial CT images show (a) leaking pseudoaneurysm (arrow) at aortic arch distal to the left subclavian artery; and (b) left pulmonary nodule at upper lobe, just inferior to the leaking aneurysm.

stent graft treatment will be the better option as malignancy will not only impair wound healing and risk erosion into the graft, life expectancy is also limited.

CT angiogram of the thoracic and abdominal aorta, as well as the iliac and femoral vessels, was performed

Department of  
Cardiothoracic  
Surgery,  
National Heart  
Centre,  
17 Third Hospital  
Avenue,  
Mistri Wing,  
Singapore 168752

Loh YJ, MBBS,  
MMed, MRCS  
Registrar

Sin YK, MBBS,  
FRCS, FAMS  
Senior Consultant

Department  
of Diagnostic  
Radiology,  
Singapore General  
Hospital,  
Outram Road,  
Singapore 169608

Tay KH, MBBS,  
FRCP, FAMS  
Senior Consultant

Cheah FK, MBChB,  
MRCP, FRCP  
Senior Consultant

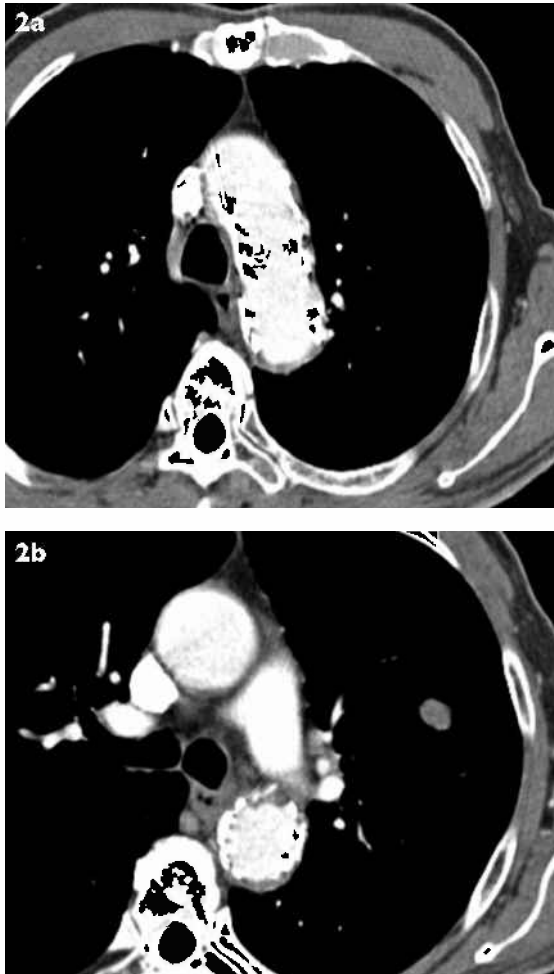
Department of  
General Surgery

Mathew S, MBBS,  
MMed, FRCS  
Senior Consultant

Department of  
Respiratory and  
Critical Care  
Medicine

Tan KL, MBBS,  
FRCP, FCCP  
Senior Consultant

**Correspondence to:**  
Dr Loh Yee Jim  
Tel: (65) 6436 7598  
Fax: (65) 6224 3632  
Email: cardioryan@  
hotmail.com



**Fig. 2** Axial CT images show (a) resolution of the leak at six months follow-up; and (b) left pulmonary nodule decreased in size from anti-TB medication.

preoperatively for stent graft sizing, as well as to assess the femoral access vessels. The common and external iliac arteries were diffusely diseased on both sides, calcified and of small calibre (maximum iliac diameter was 6 mm on the right and 7 mm on the left). The left external iliac artery was previously stented for stenotic disease. As we have had previous successes with delivering 22F devices up vessels smaller than the recommended 7.5 mm diameter, the plan was to attempt transfemoral delivery of the stent graft via the left, following balloon angioplasty of the left iliac vessels. An access graft conduit to the common iliac artery was not an option in this patient as the common iliacs were heavily calcified and their luminal diameters were not bigger than the external iliacs. The backup plan for failed transfemoral delivery was to deliver the stent graft via the abdominal aorta or the descending thoracic aorta. Unfortunately, the transfemoral approach was not successful

despite angioplasty of the iliac vessels and we were unable to advance the device beyond the common iliac artery.

A limited upper mid-line laparotomy was then performed, and a Zenith TX2 TAA endovascular graft (Cook Inc, Bloomington, IN, USA), 38 mm in diameter and 127 mm in length, was advanced into the aortic arch under image guidance through a relatively less-calcified portion of the infra-renal abdominal aorta. As the pseudoaneurysm was 2 cm away from the left subclavian artery origin, it was felt that the proximal landing zone was adequate and the left subclavian artery could be preserved. To maximise the length of the proximal landing zone for an adequate seal, the intention was to deploy the stent graft right up to, but not covering the left subclavian artery. Unfortunately, the stent was deployed a little too proximally and the completion aortogram revealed that the left subclavian artery was inadvertently covered. The stent graft was otherwise in a good position and the aortic pseudoaneurysm was successfully excluded.

Postoperatively, the patient was found to be drowsy and CT of the brain revealed bilateral cerebellar and left occipital infarcts. The infarcts were likely due to the occlusion of his left subclavian artery leading to vertebrobasilar insufficiency. There were no significant blood pressure changes during the procedure to account for the infarcts. Bronchoalveolar lavage fluid culture done preoperatively finally revealed a mycobacterium tuberculosis infection. The patient was started on rifampicin, isoniazid, pyrazinamide and ethambutol. He recovered well from his stroke with only mild (grade 4/5) residual lower limb weakness when he was transferred to an intermediate care unit for further rehabilitation. Follow-up examination and CT at three and six months showed that the pulmonary nodule had decreased in size and the pseudoaneurysm had been sealed (Fig. 2).

## DISCUSSION

Mycobacterium tuberculosis infection is the second leading cause of death from communicable diseases worldwide.<sup>(1)</sup> Choudhary et al reviewed the literature in his paper and found that there were only 88 reported cases of tubercular pseudoaneurysms in the aorta over the past century.<sup>(2)</sup> As in our patient, the majority of reported tubercular thoracic aortic pseudoaneurysms described a contiguous focus, such as mediastinal lymph nodes,<sup>(3)</sup> as a possible source of infection for the pseudoaneurysm. Other routes that have been described include direct implantation of the tubercle bacilli on a diseased aortic intima,<sup>(4)</sup> carriage to the adventitia or media by the vasa vasorum, and indirectly via lymphatics.

Multiple reports have confirmed the role of surgery in the treatment of ruptured aortic pseudoaneurysms.<sup>(4)</sup> Jones et al reported nine patients with mycotic aneurysms treated with endoluminal grafts with good results.<sup>(5)</sup> However, as far as we know, there are no reported cases of endovascular stent graft treatment for leaking thoracic aortic tuberculous pseudoaneurysm. With the development of thoracic stenting devices, the indications for endovascular treatment for aortic diseases have been expanding. The concomitant discovery of a nodule in the left upper lobe bearing suspicions of lung malignancy, with likely limited postoperative long-term survival, prompted our decision to proceed with endovascular repair, despite an unfavourable arterial access due to the severe aorto-iliac disease. It was fortuitous for this patient that the eventual diagnosis was tuberculosis.

Hausegger et al reported that overstenting of the left subclavian artery is a feasible and well-tolerated procedure for fixation of the stent graft.<sup>(6)</sup> Although some experts recommend that the carotid and vertebral circulation be evaluated before stent grafting over the left subclavian artery, this practice is not universally adopted. We did not evaluate the cranial circulation in our patient as we did not intend to cover the left

subclavian artery in the first place. It was unfortunate that in the attempt to maximise the proximal seal zone, the left subclavian artery was inadvertently occluded. Though our patient suffered a stroke as a result, he recovered sufficiently to undergo rehabilitation. We conclude that endovascular stent graft placement is a feasible and effective method of treatment of a leaking tuberculous pseudoaneurysm, and alternative routes of insertion (transabdominal or transthoracic) may be considered in patients with difficult access, but there are strong contraindications for open surgery.

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