

Endovascular stent-graft for thoracic aorta aneurysm caused by *Salmonella*

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Abstract

We describe the placement of an endovascular stent-graft in a patient with mycotic aneurysm of the descending thoracic aorta caused by *Salmonella*. Endovascular grafting combined with antibiotic therapy in thoracic mycotic aneurysms might represent an alternative to conventional surgery in patients with high operative risk.

Keywords: thoracic aorta ; *Salmonella* ; stentgrafting

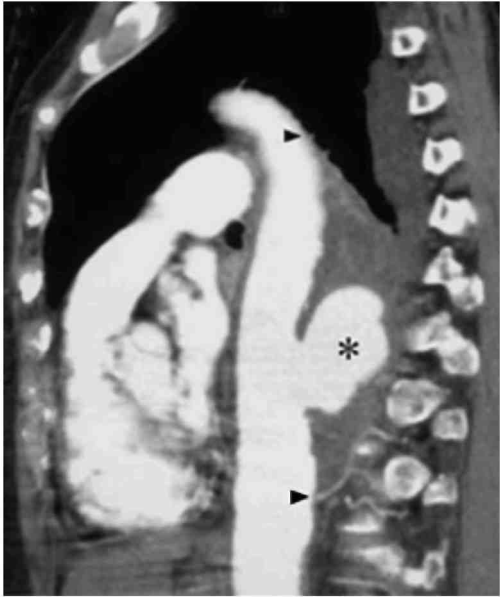
1. Introduction

Aortic mycotic aneurysm is a rare pathology with a high mortality rate. Conventional treatment is surgical intervention followed by long-term antibiotic therapy. In patients with high operative risk, surgery may become prohibitive. Endoluminally placed stent-graft as an alternative to open surgery has gained interest to treat thoracic aortic aneurysms.

2. Case report

A 84-year-old female was admitted to the emergency room for dyspnea, *haemoptoic expectoration*, chills and sweating. The patient reported backache for a week and episodes of diarrhea. Clinical examination showed blood pressure of 90/50 mmHg, regular pulse rate of 56/min and rectal body temperature of 38.4°C. Relevant laboratory results showed a leukocytosis of 23.19/mm³ (normal range: 4.3-11.9) and a C-reactive protein of 249 mg/l (normal range: 0-6). Chest radiograph demonstrated a retrocardiac opacity suggestive of aneurysm of the descending thoracic aorta. Spiral contrast enhanced CT confirmed an aneurysm of the descending thoracic aorta, 13 cm in length with a maximum diameter of 8 cm, compressing moderately the heart chambers and reducing to 80% the lumen of the lower lobe bronchus (Fig. 1). Diameter of normal aorta was 29 mm. Sputum and blood cultures were positive for *Salmonella enteritidis*. An aorto-bronchial fistula could be suspected but bronchoscopy was not realized due to an emergency state. Intravenous therapy with new quinolones was started. Age and debilitated condition of the patient precluded thoracic surgery. As an alternative, endovascular stentgrafting was performed by right femoral arteriotomy five days after admission. Peroperative arteriography showed an aneurysm with an adequate landing zone for stent graft, anchored distal to the ostium of the left subclavian artery (Fig. 2). Three stentgrafts (Talent®, Medtronic, Minneapolis, USA) with an expanded diameter of 38 mm and a length of 114 mm were placed in an overlapping position, from the ostium of the left subclavian artery to 15 mm proximal to the origin of the celiac artery. Antibiotic therapy was stopped after 6 weeks. CT at 3 months follow-up showed complete exclusion of the thrombosed aneurysmal sac without visible endoleak. There was no postoperative complication. Laboratory results showed a white blood cell count and a C-reactive protein in the normal range. The patient was alive and well at 6-months follow-up. Haemoptoic expectoration did not recur after the intervention.

Fig. 1. Multislice CT (MSCT) obtained after i.v. contrast injection shows in a coronal reformatted plane (a) and in 3D In Space view (Siemens) (b) the mycotic aneurysm of the descending thoracic aorta and extensive peripheral thrombosis of the aneurysmal sac [asterisk]. Multiplanar reconstruction (MPR) images show proximal extension of the thrombosed aneurysm to the aortic isthmus and distal extension to the abdominal aorta [arrow-head].

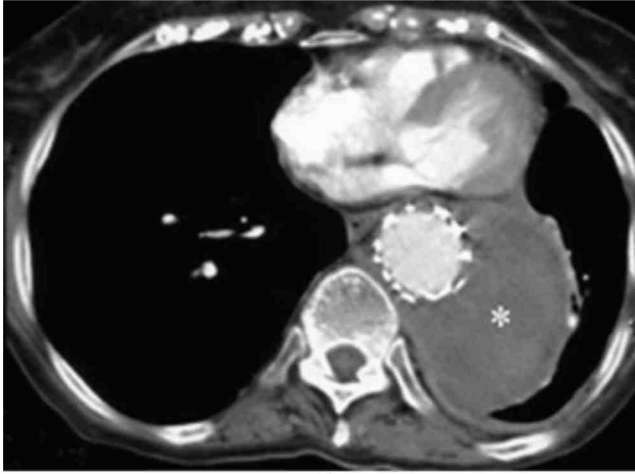


(a)



(b)

Fig. 2. (a) Multislice CT (MSCT) obtained one month after endoluminal stentgrafting shows exclusion of the mycotic aneurysm [asterisk] without endoleak. (b) Oblique multiplanar reconstruction (MPR) view in maximum intensity projection (MIP) shows correct position of the aortic stentgraft deployed from distal to the left subclavian artery to the distal thoracic aorta.



(a)



(b)

3. Discussion

Mycotic aneurysms are aneurysms caused by arterial infection while aneurysms that have become secondarily infected are infected aneurysms. Most common pathogens involved in infected aorta are *Salmonella*, *Staphylococcus* and *Streptococcus*, responsible of microbial arthritis which results in aneurysm formation. There is a predilection for atherosclerotic lesions, aneurysms, vascular prosthetic reconstructions and sites of penetrating arterial trauma. *Salmonella* species are the most frequent pathogens found in mycotic aneurysm involving the aorta, accounting for 35% of cases [1-2]. Involvement of the thoracic aorta is rare, and few cases have been reported previously [1-4].

Clinical symptoms and findings of vascular infection are varied and often subtle. Chest X-ray may show saccular widening of the aorta. CT is a major diagnostic modality to demonstrate mycotic aortic aneurysm [5]. Magnetic resonance imaging gives similar diagnostic results to CT, without ionizing radiation and less nephrotoxic effects induced by MR contrast agents, but availability may be more limited. Pet-scan may suggest an infectious etiology of aneurysmal lesions, but does not identify the microbial etiology.

Untreated mycotic thoracic aneurysm caused by *Salmonella* is invariably fatal [1-3]. Standard treatment combines surgical correction and antibiotic therapy. Surgical options are aortic exclusion and extra-anatomic bypass or surgical placement of in situ graft [1-3,6].

Extra-anatomic bypass grafting may be difficult or technically impossible because of location of the aneurysm. For these reasons, in situ graft placement is recommended with resection of the aneurysm and insertion on end-to-end tube graft, either woven polyester or preserved human cadaveric allograft. In situ insertion of an aortic conduit allograft might reduce late post-operative infection and improve survival in high-risk patients [6]. Hsu et al. suggest that surgical treatment has to be considered after 4-6 weeks, in patient who have a good response to antibiotic therapy. Early surgical intervention should be performed only for uncontrolled infection or risk of rupture, as in our case [1]. In all cases, a prolonged antibiotic therapy is necessary ranging from 6 weeks to life time. Ampicillin, chloramphenicol and thrimethoprim-sulfamethoxazole have been the standard treatments of systemic *salmonella* infection. Third generation cephalosporins and new quinolones have been documented to be more effective against *Salmonella* species [1 -3].

In patients with high operative risk, such as *coronary arteriopathy*, emphysema, or poor general condition, surgical treatment may become prohibitive. Repair of thoracic aortic aneurysms by endoluminal stentgrafting is an emerging alternative to open surgical intervention, including treatment of mycotic aneurysm [4,7-9]. The incidence of most serious postoperative morbid events, including paraplegia/paraparesis, myocardial infarction and respiratory insufficiency is approximately what is expected after open surgical treatment [7]. Strict anatomic inclusion criteria for endovascular treatment include aneurysms located distal to the origin of the left subclavian artery and proximal to the celiac trunk with a landing zone, equal or longer than 15 mm in length and aortic diameter not exceeding 40 mm [8].

Semba et al. successfully treated three patients with a mycotic thoracic aortic aneurysm, including one patient with a ruptured aneurysm, using endoluminal stent-graft placement. Responsible pathogens were *Proteus mirabilis* in one case and *Clostridium septicum* in another case. There were no perioperative death or life-threatening complications during follow-up, periods of 4, 24 and 25 months, respectively. Lifelong antibiotic therapy was given [8]. Ishida et al. noticed a major endoleak after successful stent-graft placement in a patient with ruptured mycotic thoracic aneurysm caused by *Staphylococcus aureus*. The patient died despite emergent surgical treatment [9]. Berchtold et al. reported a case of successful endovascular treatment of an infected abdominal aortic aneurysm following septicaemia related to *Salmonella*. Antibiotics were given for 2 months and patient was doing well 2 years after procedure [10]. Stoica et al. reported a case of a patient with contained rupture of the descending aorta and positive culture for *Salmonella enteritidis* successfully treated by stent-graft. Antibiotics were given for 6 months. Patient was doing well 2 years after procedure [4].

To the best of our knowledge this is the second case of endovascular stentgrafting reported as a treatment of thoracic aneurysm caused by *Salmonella*. Although the need for multiple stentgrafts increases the cost, overall cost-benefit ratio might still be in favour of endoluminal therapy, as hospital stay and postoperative care is reduced. This treatment may offer an alternative in patient with high operative risk. Long term postoperative antibiotherapy and regular follow-up are crucial.

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