SHORT REPORT

Endovascular Treatment of a Mycotic Subclavian Artery Aneurysm Using Stent-graft

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We report a case of an immuno-suppressed 49-year-old man with mycotic aneurysm of left subclavian artery. The aneurysm was diagnosed by computed tomography and digital subtraction angiography. Our choice for treatment was endovascular stent-graft implantation. After stent-graft implantation, type I endoleak was present because of the aneurysm had broad neck and, so, we implanted second stent-graft proximally to the first stent. The end of the procedure, there was a minimal type III endoleak into the aneurysm sac. The patient was well and free of symptoms after 1 week. A control CT angiography, after 5 months, showed a completely thrombosed aneurysm without an endoleak. Endovascular repair of a mycotic subclavian artery aneurysm may be an alternative to open surgery.

Keywords: Mycotic aneurysm; Subclavian artery; Stent-graft; Endovascular; CT angiography.

Introduction

The subclavian artery is unusual site for mycotic aneurysm. The aneurysm must be repaired promptly because of the risks of complications. Although the conventional treatment of subclavian artery aneurysm is open surgery. Open surgical procedure may require thoracotomy or a transsternal approach to treat an aneurysm extending beyond the thoracic inlet. Endovascular stent-graft implantation may, therefore, be a good minimal invasive alternative. Endovascular approach eliminates the need for surgical dissection, decreasing the risk for injuring important adjacent structures such as the vagus nerve, recurrent laryngeal nerve, and phrenic nerve, and the innominate vein. Additionally, surgical treatment of mycotic aneurysm has a risk for sepsis, which can be seen in up to 80% in of urgent operations. Therefore, endovascular therapy of an infected aneurysm could be good treatment choice in urgent cases. In the literature, a few articles about endovascular treatment of subclavian artery aneurysms have been reported. We found one publication about endovascular treatment of a mycotic subclavian artery aneurysm.

We present an endovascular stent-graft treatment for a mycotic subclavian artery aneurysm.

Case Report

A 49-year-old man was admitted to hospital with pain, paresthesia and coldness of left forearm, ptosis of left eyelid and a fever. He had a history of uncontrolled type II diabetes mellitus for 11 years. He also underwent left supraclavicular lymph node biopsy 4 months earlier. This biopsy was not thought to be the cause of aneurysm because the biopsy site was not close to the aneurysm. On examination, we found crepitus and tenderness over the sternum, paresthesia and weakness left hand and forearm, and miosis and ptosis of left eye. He had a body temperature 39 °C. Blood cultures were negative. Laboratory tests showed a white blood cell count of 12,800/μl and a C-reactive protein level of 54 mg/l. The erythrocyte sedimentation was 57 mm/h and fasting plasma glucose was
184 mg/dl. Electromyography demonstrated brachial plexus damage on the left side.

The posterior–anterior and lateral chest X-ray showed wide left upper mediastinum in relation to a vascular abnormality in the supra-aortic trunks and a retrosternal soft tissue mass adjacent to sternum. Computed tomography (CT) of the chest revealed a large left sided subclavian artery aneurysm measuring 4.2 cm in diameter and abscess formation adjacent to sternum and left rib (Fig. 1). Three-dimensional CT angiography (3D-CTA) confirmed an aneurysm in middle third of the left subclavian artery without any sign of rupture. There were two nipple-shaped blebs on the superior border of the aneurysm. Selective angiography of the left subclavian artery demonstrated that the aneurysm had a broad neck. The other arteries of the aortic arch were normal (Fig. 2). A bone scan showed an ostomyelitis of the manibrium sterni and the anterior parts of the adjacent ribs on the left. We thought that the aneurysm was mycotic, because of the patient was immuno-compromised and had infectious changes around the aneurysm. Broad-spectrum antibiotics were given to the patient. After 3 days, body temperature was normal and we planned to treat the aneurysm by endovascular approach.

The right femoral artery was cannulated with a Seldinger technique after local anesthesia. An 11 F introducer was placed into right femoral artery in

Fig. 1. There are seen several CT section of upper thorax. A thick walled aneurysm (arrow) of left subclavian artery is seen on contrast enhanced CT. A cavitary lesion (arrow head) adjacent to aneurysm in the anterior lobe of left lung and anterior thorax wall is seen on level of aortic arc on CT images.

Fig. 2. (A) CT angiography demonstrated a broad necked aneurysm (arrow) of left subclavian artery. (B) Selective left subclavian artery catheter angiography clearly showed the parent artery and the aneurysm (arrow). There is also seen thin left vertebral artery (arrow head).
order to advance large sized stent-graft and a 5 F introducer was placed into left femoral artery in order to control the stent-graft position. An exchange—length glide wire was advanced through a diagnostic catheter to the distal end of the aneurysm. This wire was then exchanged with 0.035 in. Amplatz stiff wire. At the same time, 5000 IU heparin was given. After that, a 10×70 mm covered stent (Wallgraft, Boston-Scientific) was deployed in the aneurysm. A 9 mm balloon was inflated to seal the stent at the proximal neck of the aneurysm. Control angiography showed proximal endoleak into aneurysm sac (type I endoleak). So, we implanted a second 10×50 mm covered stent, which was positioned proximally to the previous stent. At the end of the procedure, there was a minimal endoleak (type III endoleak) at the site of stent conjunction (Fig. 3). The procedure was ended and anti-platelet treatment was given. A Doppler US after 1 day confirmed a persistent minimal endoleak into the aneurysm, but a control Doppler US a week later showed diminishing of the endoleak (Fig. 4). The Horner syndrome disappeared 1 week later and the patient became symptom free. We planned a follow up CT angiography after 6 and 12 months to check for distal ischemia or re-aneurysm formation. In case of stent-graft infection, surgical intervention and homograft interposition could be a good treatment choice.

After 5 months from stent-graft implantation, control CT angiography demonstrated that the aneurysm of subclavian artery was totally thrombosed and there was no endoleak into the aneurysm (Fig. 5). The lumen of stent-graft was patent.

Discussion

The incidence of true subclavian artery aneurysms (SAA) is rare; it is only 0.13% of all aneurysms. The

Fig. 3. (A) Native angiographic image of stent-grafts after balloon angioplasty shows the patency of parent artery and minimal filling due to endoleak (arrowhead) into the aneurysm sac. (B) Subtracted image clearly shows the type III endoleak (arrow).

Fig. 4. One day after, Doppler US of left subclavian artery shows the endoleak (arrow) arising from a hole of stent-graft. There is also seen thrombosed aneurysm sac (arrow head).
usual etiological factors associated with aneurysm formation in the subclavian arteries are atherosclerosis, thoracic outlet compression syndrome, trauma; less common factors are cystic medial necrosis, pulmonary tuberculosis, syphilitic arteritis, Marfan syndrome, Turner’s disease, Behcet’s disease, aortitis syndrome and congenital arterial disease. Right-sided aneurysms are more common, the male to female ratio is 2:1 and the mean age is 49 years. Mycotic (infectious) aneurysms may be caused by direct invasion of vessel wall from an adjacent infection via the vasa vasorum. Mycotic aneurysms of SAA are extremely rare and the prognosis of patients with mycotic aneurysms appears to be substantially worse than uninfected aneurysms.

Etiologic factors of mycotic aneurysm include drug abuse, alcohol, endocarditis, septicemia, immunocompromised state, and poorly controlled soft-tissue infection. The most common organisms are Staphylococcus aureus and Salmonella species. Positive blood culture is found in 50–70% of patients.

The aneurysm of the proximal part of subclavian artery may be asymptomatic for a long time, but they may cause dysphagia or dyspnea. Peripheral embolism of the upper limb is the most frequent clinical manifestation of an aneurysm situated in the middle and distal part of the subclavian artery. The aneurysm can compress the subclavian vein and lead to arm edema. Neurological symptoms from the pressure of the aneurysm to the brachial plexus may cause dysesthesias in the ulnar nerve area and Raynaud’s phenomenon.

The diagnosis can be made by Doppler US, angiography, CT and MRI. Angiography is mandatory for planning of the treatment of an extrathoracic SAA. In cases of intrathoracic aneurysms, CT and MRI scans are necessary. Actual nature of aneurysm is better defined by angiography. Perivascular soft tissue can be examined by CT and MRI.

Almost all subclavian artery aneurysms should be repaired because of the complication risk. The conventional treatment of subclavian artery aneurysm is surgery. Surgery involves repair of the aneurysm with a vein or synthetic graft material. A number of surgical approaches, including clavicular resection, median sternotomy and thoracotomy have been advocated, but each carries its own risks and complications. The complication risk of surgery is related to experience and skill of the surgeon, hospital expertise and the basic underlying health of the patient.

Interventional endovascular techniques such as stent-graft implantation have been introduced for aortic and peripheral artery aneurysms. The endoleaks are common encountered problems in the endovascular treatment of aneurysms. There are several types of endoleak. Type I endoleaks are caused by incomplete sealing of the stent-graft in the proximal or distal implantation zones. These types endoleaks are usually treated with extension of stent-graft by adding second stent or stent-graft. Type III endoleaks may occur due to graft related factors such as graft component disconnection or fabric tears or disintegration. In our case, we overcame the type I endoleak with extending the stent-graft. Also, minimal type III endoleak, which was noticed after balloon dilatation, settled spontaneously.

In conclusion, surgical intervention in the subclavian artery aneurysmal disease is not without serious risks. Our case showed that the endovascular exclusion of a mycotic subclavian aneurysms aneurysm with a stent-graft could be an successful treatment alternative.

Fig. 5. Five months after the endovascular treatment, CT images (A) and CT angiography (B) show that there is no filling into aneurysm sac (arrow) and the parent artery is patent.
References


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