

Surgical Treatment for Iatrogenic Intrathoracic Subclavian Artery Aneurysm

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1. Abstract

Subclavian artery aneurysms (SAAs) are not common but with possible limb and life threatening complications. The present report describes a case of a large right iatrogenic subclavian artery aneurysm presenting with back pain, successfully treated with aneurysmectomy and graft interposition through a median sternotomy.

2. Key words

Subclavian artery; Sternotomy; endovascular repair

3. Introduction

Subclavian artery aneurysms (SAAs) are rare but with possible life and upper limb threatening complications. We describe a case of a large right iatrogenic subclavian artery aneurysm presenting with back pain, successfully treated with aneurysmectomy and graft interposition through a median sternotomy.

4. Case Report

A 63 year old male, presented to the emergency department because of acute onset of back cervical and thoracic pain. He also referred occasional nonspecific chest pain, but no other symptoms. Past medical history was positive for acute myocardial infarction and angioplasty 13 years earlier. Regarding that procedure patient referred that a right radial approach was initially attempted but failed because of the tortuous anatomy of the right subclavian artery. The procedure was finally performed through a femoral access. Other comorbidities included hypertension and dyslipidemia. An ECG was performed and demonstrated normal sinus rhythm without any acute ST changes. The physical examination excluded a muscular etiology of the pain, no differences of arterial pressure were observed between the upper limbs, as for radial pulses. Computed tomography angiogram revealed a 60x55 mm right proximal subclavian artery aneurysm, located in the anterior-superior side of the right mediastinum (Figures 1A,1B). The aneurysm determined compression of the superior vena cava and slight left deviation of the trachea. A surgical treatment was performed under general anesthesia. A median sternotomy then prolonged laterally to the right supraclavicular region was performed in order to obtain a better exposure and control of the aneurysm (Figure 2). The aneurysm

was arising 3 cm from the origin of the subclavian artery and the proximal and distal segments of the subclavian artery presented a tortuous anatomy, identified as a coiling. Prior proximal and distal clamping of the subclavian artery, the aneurysm was removed en block and artery was reconstructed with the interposition of a 8mm ePTFE Propaten vascular graft (Figure 3). Postoperatively patient presented hoarseness that required vocal rehabilitation and medical treatment with steroids and Vitamin B complex. No other neurological deficits at the right upper limb were observed. Patient was discharged on day 10 and underwent follow-up in the outpatient laboratory with clinical and ultrasound examination after 1 month and CT angiogram at 12 months. At the follow-up patency of the subclavian artery was confirmed and no signs of pseudoaneurysm formation or any haemodynamic modifications were observed. Hoarseness significantly improved after rehabilitation. Histopathologic examination of the resected aneurysm showed the presence of all three arterial layers with atherosclerotic arterial walls and chronic adventitial inflammation.

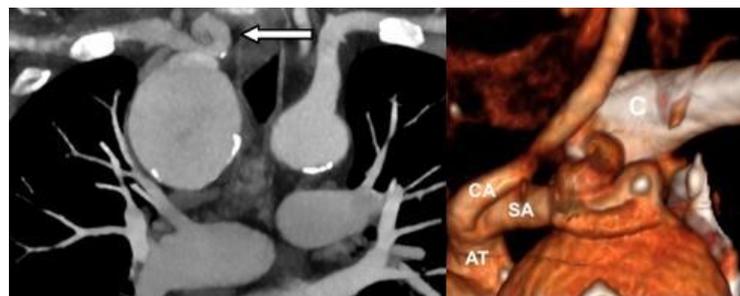


Figure 1A, 1B: CT angiogram showing the severe tortuosity of the distal subclavian artery (arrow)1A. multiplanar reconstruction of the SAA, 1B: postero-lateral view, 3D reconstruction. C=clavicle; SA=subclavian artery; CA=carotid artery; AT=anonymus trunk

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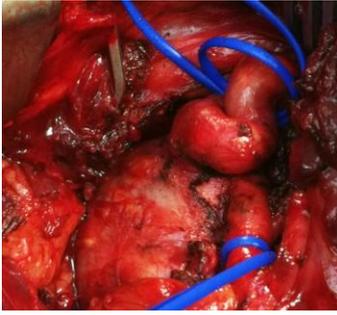


Figure 2: SAA in situ, showing the proximal linear segment of the subclavian artery and the distal tortuous segment

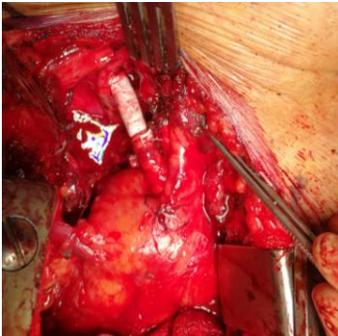


Figure 3: Artery reconstruction after SAA resection. This picture evidences the subversion of the anatomy of the superior mediastinum made by the SAA

5. Discussion

Subclavian artery aneurysms (SAAs) are very rare [1-6] as represent the 0,13% of atherosclerotic aneurysms [7, 8] and 1% of peripheral aneurysms and may cause life- and limb-threatening complications. They can be classified by their location in intra and extrathoracic, by their position in proximal (the most common), medial and distal third of the subclavian artery. The evoking mechanisms of SAA formation seems to differ between each region of the SA. Proximal aneurysms are mostly caused by atherosclerosis (19%), collagen disorders (18%), trauma (15%), infection (13%) and in-hospital procedures (12%). The middle segment SAAs are mainly caused by collagen disorders (23%) [9-11], trauma (15%), in-hospital procedures (10%), infection (10%) and thoracic outlet syndrome (TOS) (15%). Distal SAA are mostly described in relation to TOS (46%) or as a consequence of blunt or penetrating trauma (23%) [12, 13]. Less frequent causes are represented by vasculitis, cystic medial necrosis and tuberculosis [13]. Most SAAs are asymptomatic, symptoms, when present, are related to local compression and include chest or back pain, venous congestion and hoarseness. Distal embolization is rare. Finally, rupture represents a life threatening complication and is more frequent in proximal SAAs [7]. Since the natural history of SAAs is unknown and no guidelines regarding the timing of intervention are available, early treatment is necessary in order to prevent potential complications. The therapeutic possibilities for these aneurysms include endovascular, hybrid and open surgical options. Currently the endovascu-

lar repair, being less invasive, represents the treatment of choice for SAA [14]. Selection criteria for this treatment include adequate landing zones and the absence of severe subclavian artery tortuosity [15]. In our case the distal landing zone of the subclavian artery presented a complete coiling. Placement of a covered stent was initially hypothesized to manage the lesion even though arterial catheterization would be not easy. However the presence of severe vessel curvature would determine an increased risk of artery subsequent kinking or thrombosis. Additionally, the possibility of stent fracture was a possible complication due to the mechanical stress produced by the clavicle and muscles of this area. Therefore, considering patients' good clinical condition, the young age and the necessity of aneurysmectomy in order to decompress the nearby structures, we preferred the surgical repair. Postoperatively hoarseness was the only complication observed and was successfully managed with rehabilitation. Regarding the etiology of the lesion an artery perforation was initially hypothesized occurring during the cardiological procedure by the advance of the guide catheter in the tortuous subclavian artery. However a true aneurysm was revealed at the histopathological examination and did not confirm the first hypothesis.

6. Conclusions

Subclavian artery aneurysms are currently treated with endovascular techniques. Patients' comorbidities and arterial anatomy influence the choice of repair therefore experience in surgical techniques is still mandatory in case endovascular treatment is not feasible.

7. Conflict of Interest

The authors declare that no competing interests exist.

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