A Case of Atherosclerotic Aneurysm of the Right Subclavian Artery with the Right Axillary Arterial Stenosis and Enlargement of the Ascending Aorta

Mitsuru Iida, MD, PhD, Hiroaki Hata, MD, PhD, and Haruka Kimura

A 54-year-old man presented with neck pain and hoarseness. Angiography showed a rare right subclavian artery aneurysm, enlargement of the ascending aortic aneurysm, and axillary artery stenosis. These aneurysms would normally be treated with end-to-end anastomosis, but due to the complexity of the lesion in this case, we performed more extensive surgery. This consisted of successful reconstruction of the subclavian artery and replacement of the ascending aorta and aortic arch.

Introduction

The incidence of atherosclerotic peripheral artery aneurysms has recently increased, with several cases reported in the literature. Among aneurysms involving the peripheral arteries, subclavian artery aneurysms are relatively rare and have various causes. We report here the successful surgical repair of a right subclavian artery aneurysm and replacement of the dilated ascending aorta and aortic arch in a patient who also had right axillary artery stenosis.

Case

A 54-year-old man presented to an otorhinolaryngology clinic with right neck pain and hoarseness. Computed tomography (CT) revealed a brachiocephalic artery aneurysm and he was referred to our hospital for more detailed examinations. His past medical history was significant for hypertension, which had been treated medically for 20 years. His grandfather had died because of a ruptured aneurysm of the thoracic aorta. Blood laboratory work was unremarkable. On chest X-ray, the cardio-thoracic ratio was 47.3% without cardiac enlargement, and the right first arch was protuberant. A CT scan demonstrated an abnormal shadow measuring 41 mm in diameter at the bifurcation of the right subclavian and common carotid arteries (Fig. 1). Angiography showed an aneurysm of the right subclavian artery with an arteriosclerotic lesion extending from the brachiocephalic to the right common carotid artery. The angiogram also revealed stenosis of the distal right axillary artery (Fig. 2), and dilatation of the ascending aorta and aortic annulus to 50 mm in diameter. A partial dissection of the aneurysm was also suspected. Considering possible future problems, we planned surgical excision of the aneurysm with a reconstruction of the affected arteries, and the replacement of the ascending aorta and aortic arch. With the patient under general anesthesia, we performed a median sternotomy, followed by an oblique incision of about 10 cm toward the area above the right clavicle. We also made small incisions in the subclavian and axillary regions. The integrity of the right subclavian artery was ascertained at the periphery of the aneurysm. Cardiopulmonary bypass was performed under deep hypothermic circulatory arrest with antegrade selective cerebral perfusion. The left common carotid artery and left subclavian artery were not touched. The ascending aortic arch was replaced with a four branched woven Dacron prosthesis (InterGard® 24 × 10 mm, MAQUET, la ciotat, France).
The brachiocephalic artery was opened to confirm the location of the bifurcation of the right subclavian artery. The aneurysm was located at this bifurcation, where it was obstructing the lumen of the artery. A polytetrafluoroethylene prosthesis (Advanta™ VS 8mm, ATRIUM Medical Company, New Hampshire, US) was anastomosed end-to-end to a lateral branch of the vascular prosthesis. The Advanta VS prosthesis was then led through a tunnel from the subclavian to the axillary region. The axillary artery was transected at its distal end and anastomosed end-to-end to this prosthesis.

The patient’s postoperative course was uneventful. On the postoperative day 1, the patient was weaned from the respirator and on postoperative day 2, he was started on oral medication and intake was resumed. Subsequent rehabilitation programs were conducted according to the usual manner. Postoperative examinations confirmed that he was free of complications. He was discharged on the postoperative day 33 and was well at the 36-month follow-up evaluation.

**Discussion**

Among aneurysms affecting the peripheral arteries,
isolated aneurysms of the subclavian artery are relatively rare. Dent et al. reported that the incidence was only 2 (0.13%) among 1,488 cases of aneurysms. Lawrence et al. reported 257 (0.5%) among 51,949 cases of aneurysms. Reported etiologies include arteriosclerosis, trauma, thoracic outlet syndrome, and infection (e.g., syphilis and other bacterial infections). Other reported causes have included genetic diseases: congenital abnormalities, such as anomalous origin of the subclavian artery; Marfan’s syndrome with cystic medial necrosis; and Turner’s syndrome. Subclavian artery aneurysms occur more frequently on the right side but may also develop bilaterally. Frequent symptoms are upper chest and shoulder pain, numbness, and coldness of the upper extremity due to ischemia. Less common signs and symptoms include hypesthesia due to compression of the brachiocephalic plexus, hoarseness due to recurrent laryngeal nerve paralysis, Horner’s syndrome caused by compression of the cervical or thoracic sympathetic chain, a palpable, pulsatile tumor, and hemoptysis. In some cases, no sign or symptoms are present. Our patient initially experienced pain extending from the neck to the head, followed by hoarseness. However, aside from this hoarseness, his physical examination was unremarkable. Because the aneurysm developed within the thoracic cavity, hoarseness occurred, but no mass was palpable.

The spectrum of surgical treatment ranges from simple ligation to tumor resection and placement of a vascular prosthesis. Various surgical approaches for subclavian aneurysms have been reported and include axillary incision, supraclavicular incision, median sternotomy, anterolateral incision, postero-lateral incision, and endovascular and hybrid procedures. In the present case, the complexity of the lesion required a procedure involving multiple stages. CT was effective for diagnosing the aneurysm but insufficient for diagnosing the other vascular abnormalities. Angiography detected dilatation of the ascending aorta, an enlarged aortic annulus and stenosis of the peripheral axillary artery, substantiating the importance of this radiographic procedure in planning the surgical procedure. The essential elements of surgical repair of aneurysms involving circulation to the extremities are aneurysmectomy and reconstruction with a vascular prosthesis. In the present case, the brachiocephalic artery was calcified, suggesting the development of an atherosclerotic lesion. In addition, the aneurysm was located near the bifurcation of the subclavian and common carotid arteries, with dilatation of the ascending aorta and stenosis of the peripheral arteries. Therefore, after discussion with the patient and his family, the decision was made to replace all the arteries involved, especially given that his grandfather had died of a ruptured thoracic aneurysm. Fortunately, the patient’s clinical course was uneventful. The aneurysm was ligated without excision and the hoarseness resolved after the aneurysmal blood flow was eliminated. Currently at 3 years after surgery, the aneurysm on the CT appears to have been completely eliminated (Fig. 3), and the patient’s continues to be followed.
Conclusion

This case demonstrates the successful surgical repair of a subclavian artery aneurysm with accompanying central and peripheral lesions. The revascularization procedure consisted of replacement of the ascending aorta and aortic arch, ligation of the aneurysm, and the use of a vascular prosthesis.

References