Case report

Two-stage surgical and endovascular treatment of an aneurysmal aberrant right subclavian (Lusoria) artery

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Abstract

We report a case of a 75-year-old male patient with an asymptomatic aneurysm of an aberrant right subclavian artery (ARSA). Timely elective therapy of this entity is indicated due to the high risk of rupture. Because of the patient’s reduced physical state, we performed an interdisciplinary endovascular aortic stent-grafting for the exclusion of the ARSA aneurysm. However, the proximal landing zone for the thoracic stent had to be chosen proximal to the origin of the left subclavian artery. Thus, 2 days before the endovascular procedure, a left-sided carotido-subclavian bypass was accomplished. The peri- and postoperative course was uneventful. The technical results in our patient were excellent, no leakage was visible so far.

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1. Introduction

An aneurysm of an aberrant right subclavian artery (ARSA), also called arteria lusoria, is a rare entity of this congenital aortic arch anomaly, with a reported prevalence up to 2% [1,2]. ARSA aneurysms present with a pronounced risk of rupture. So, timely elective treatment is indicated. Endovascular stent-grafting has become an alternative to open aortic arch surgery which is associated with high rates of neurologic complications and mortality, especially when circulatory arrest is required [3,4].

2. Case report

A 75-year-old obese male patient with severe hypertensive cardiomyopathy was admitted to a peripheral hospital due to gastrointestinal hemorrhage from a cecal carcinoid tumor. Routine chest X-ray allowed presumptive diagnosis of a sizeable aneurysm of the aortic arch. GI-bleeding was controlled and priority was given to further diagnostics and possible therapy of the suspected thoracic aneurysm. Therefore, the GI-operation was postponed and the patient was referred to our hospital. Contrast enhanced CT (Sensation, Siemens, Erlangen, Germany) scan demonstrated a bicuspid trunk and a 6.6 × 5.5 cm measuring saccular-type aneurysm of an ARSA located directly at its origin from the aorta. The ARSA passed posterior the esophagus. Intraarterial angiography confirmed these findings and revealed a stenosis of the right vertebral artery near its origin. Both vertebral arteries showed antegrade flow. The origin of the bicuspid trunk was 1.2 cm proximal of the left subclavian artery’s origin which appeared to be directly proximal to the ARSA’s origin (Fig. 1). Regarding his aneurysmatic disease the patient was asymptomatic: there were no signs of dysphagia, shortness of breath or peripheral embolization.

Because of the patient’s reduced physical state, we recommended an interdisciplinary endovascular aortic stent-grafting for the exclusion of the ARSA aneurysm. However, the proximal landing zone for the thoracic stent had to be chosen proximal to the left subclavian artery to securely obtain total exclusion. Thus, 2 days before the endovascular procedure a left-sided carotido-subclavian bypass (Propaten, Gore-Tex, Flagstaff, AZ, 8 mm in diameter) through a supraclavicular approach was performed.

The thoracic stent-graft (Talent, Medtronic, Santa Rosa, CA) was custom designed. The diameter of the thoracic stent-graft was 36/32 mm, approximately 20% greater than the aortic arch diameter, to achieve optimal friction seal. The entire length of the stent-graft was 130 mm and of the covered part 112 mm. The stent-graft was introduced through a right femoral artery cut down. The stent delivery device measured 24 French. The proximal landing zone of the uncovered part (bare stent) was located at the origin of the bicuspid trunk, the left subclavian artery and the ARSA.
were occluded by the covered part. A second stent-graft (diameter: 32/32 mm, length: 130/115 mm, delivery device: 22 French) was inserted for extension. The grafts were balloon dilated after deployment to optimize graft fixation. To avoid retrograde perfusion of the aneurysm sac, two occluders (diameter: 16 and 18 mm, Talent, Medtronic, Santa Rosa, CA) were deployed into the ARSA through a right-sided subclavian approach. The occluders were positioned between the origin of the right vertebral artery and the junction with the esophagus. Completion aortography confirmed complete aneurysm exclusion and a good perfusion of the bicuspid trunk and the carotid-subclavian bypass (Fig. 1).

The peri- and postoperative course was uneventful. In particular, no significant hypoperfusion and no motoric or sensory disorders of the upper limbs occurred. There were only passing signs of ischemia of the right arm during greater exercise. Postprocedural non-invasively measured systolic blood pressures in the left and right arm were 150 and 70 mmHg, respectively.

The 3-day follow-up CT scan demonstrated exact position of the stent-graft without evidence of endoleakage (Fig. 2).

After the patient had recovered from the vascular procedures, he was re-admitted to the peripheral hospital where a right-sided hemicolectomy was performed. Histological examination of the tumor revealed a highly differentiated neuroendocrine carcinoma (pT1, pN1, pM0). The tumor could be entirely resected and no adjuvant therapy was indicated.

The 6-month follow-up CT scan confirmed good stent-graft position and showed a completely thrombosed aneurysm sac. Results of the clinical examination after 6 months were equal with those direct postoperatively. Extended follow-up will be undertaken to exclude the occurrence of late complications such as graft migration or endoleaks.

3. Discussion

Percutaneous stent-grafting has become an established treatment for abdominal aortic aneurysms and aneurysms of the descending aorta [5,6]. There is also a limited number of studies or case reports dealing with stent-graft placement in the aortic arch. Endovascular treatment of aortic arch aneurysms is highly desirable due to the significant incidence of neurologic complications and mortality rates of conventional operations [4].

Lacroix et al. could demonstrate that combined endovascular and surgical treatment of an aneurysmal ARSA is feasible, safe, and effective. And that this less invasive approach could be the treatment of choice in high-risk patients [7].

Although experience in combined surgical and endovascular treatment of aneurysmal ARSA is limited to only two single case reports [7,8], the technical results in our patient were excellent. So far, no peri- and postoperative complications can be reported.

For the total exclusion of the ARSA aneurysm in our patient the origin of the left subclavian artery had to be occluded by the covered part of the stent-graft. Mok et al.
reported of gangrene and subclavian steal after operations for correction of dysphagia lusoria [9]. Recently, Hutton et al. described a case of intentional occlusion of an ARSA during endovascular stent-graft repair of a descending aortic aneurysm [10]. Although their patient developed subclavian steal initially, the symptoms have settled 1 week after the procedure. Taking this inconsistency into account, we decided to revascularize one subclavian artery to avoid potential ischemia of both upper extremities and to secure posterior cerebral perfusion. Therefore, we performed a left-sided carotido-subclavian bypass, leaving the right arm dependent on collateral circulation.

To our knowledge this is the first report of an intentional occlusion of both subclavian arteries during endovascular stent-grafting procedures. Our case shows that intentional occlusion of an ARSA is possible without major signs of upper limb ischemia or subclavian steal syndrome. Nevertheless, in case of deliberate occlusion of both subclavian arteries, we recommend the revascularization of one subclavian artery to prevent bilateral ischemic complications. This revascularization becomes even more significant if the cerebral perfusion depends on vertebral flow.

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References