Anomalous Right Subclavian Artery and Coarctation-Related Aneurysm Repaired with Bilateral Subclavian-to-Carotid Transposition and Exclusion Stent-Grafting


Keywords: Anomalous subclavian artery; Coarctation; Aortic aneurysm

Introduction: Aortic arch anomalies are common; however, the presence of concomitant pathology may present a complex management problem.

Report: A 42 year old lady with anomalous right subclavian artery was found to have recurrent coarctation of the aorta and an aneurysm related to the previous repair. Management of the aneurysm was complicated by the proximity of subclavian artery origins. Bilateral subclavian-to-carotid transposition was undertaken to preserve antegrade vertebral artery flow, with subsequent exclusion stent-grafting of the aneurysm and coarctation.

Discussion: This case illustrates combined surgical and interventional radiological repair to deal with a complex thoracic aortic clinical problem.

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During her 4th pregnancy, the patient was treated with bisoprolol, 5 mg daily, for hypertension (BP 140/80 mm Hg). Evidence of recurrent coarctation, reflected by an aortic pressure gradient of 56 mm Hg, was discovered during transthoracic echocardiography. Re-coarctation was confirmed by MRI, which also demonstrated the presence of a saccular aneurysm, measuring 1.5 × 1.4 cm, immediately distal to the abnormal right subclavian artery in the supero-posterior aspect of the aortic arch (Fig. 1).

No intervention was undertaken during the pregnancy and a healthy baby girl was delivered.

Report

Subsequently, a multidisciplinary, staged approach to intervention was adopted by congenital cardiologists, radiologists, cardiac and vascular surgeons. Initial bilateral subclavian-to-carotid artery transposition, followed by placement of a covered stent, to exclude the aneurysm, and dilatation of the re-coarctation was planned.

The surgical procedure, as described by Cooley, was performed using bilateral cervical approaches. The subclavian arteries were ligated retrosternally, divided and oversewn. Distally, the vessels were implanted end-to-side into the carotid arteries, preserving vertebrobasilar.

Subsequently, stent-grafting of the aortic arch, to exclude the aneurysm, was undertaken via a 14 Fr sheath in the right femoral artery. A 45 mm ePTFE-covered Cheatham Platinum stent was deployed, using an 18 mm BIB balloon inflated to 5 atmospheres, to exclude the redundant subclavian artery origins and to span the re-coarctation (Fig. 2). Some residual waisting of the stent graft was evident but the aortic pressure gradient was reduced by 41 mm Hg to 15 mm Hg. Post-procedural blood pressure was reduced to 105/75 mm Hg. Surveillance follow-up with potential re-dilatation of the stent is planned within one year.

Discussion

Coarctation of the aorta occurs in 3.2/10000 births, with partial involution of the left dorsal aortic arch. Coarctation is isolated in 82% of cases but can be associated with a VSD (11%), and other cardiac anomalies (8%). Aberrant right subclavian artery occurs in 1% of patients.1

Where ARSA occurs, the aorta between the left common carotid and left subclavian arteries is shortened, the abnormal right subclavian artery crossing the midline behind the oesophagus to reach the right arm. Extrinsic compression of the oesophagus may lead to dysphagia lusoria. The patient described in this case required medical control of mild hypertension, but did not suffer from intermittent claudication, or from dysphagia.

Untreated life expectancy of patients with coarctation of the aorta is less than 40 years.2 Resection of the coarctation with end-to-end anastomosis had a historical
recurrence rate of 20—40%, although, newer techniques have reduced this to 10—15%. A large proportion of patients still suffer from late postoperative complications. Lifelong follow-up is recommended. Female patients are at particular risk during pregnancy and childbirth.

The aneurysm described in this case represented a true, rather than an anastomotic, false aneurysm. Aneurysms may affect 9% of patients following coarctation surgery and carry inherent risk of rupture and death.

Endovascular stent-grafting has been used for secondary repair of post-surgical aneurysm formation and recoarctation. This case was complicated by the anatomical anomaly of the aberrant right subclavian artery and the proximity of the origins of both subclavian arteries to the aneurysm. Aortic stent placement, alone, would have excluded subclavian and vertebral arteries. The patient had declined further open thoracic surgery which would have involved resection of the re-coarctation and bypass to the subclavian arteries. Stent graft placement, with transposition of both subclavian arteries to the carotid arteries, was felt more likely to confer long term patency than carotico-subclavian bypass. A combined surgical and radiological approach was therefore adopted in this young patient, although use of a tailored fenestrated stent graft with subclavian limbs could have been considered as an alternative interventional technique.

References