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Type A aortic dissection repair with a dissection stent in presence of aberrant subclavian artery

Razan Salem *, Tomas Holubec, Thomas Walther and Arnaud Van Linden

Department of Cardiovascular Surgery, University Hospital Frankfurt, Frankfurt, Germany

* Corresponding author. Department of Cardiac and Vascular Surgery, University Hospital Frankfurt, Theodor-Stern-Kai 7, 60596 Frankfurt, Germany. Tel: +49 69 6301 80499; e-mail: razan.salem@kgu.de (R. Salem).

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Abstract

Aberrant right subclavian artery is a rare congenital aortic arch anomaly. We report on a case of type A aortic dissection and aberrant right subclavian artery. The 65-year-old female patient received a replacement of the ascending aorta and arch repair using an uncovered AMDS (Ascyrus Medical Dissection Stent; CryoLife Inc., Kennesaw, GA, USA) with debranching of both common carotid arteries. Postoperative computed tomography scan revealed regular aortic blood flow with the unrestricted carotid artery and aberrant right subclavian artery perfusion.

Keywords: Aberrant right subclavian artery • Aortic dissection • Ascyrus Medical Dissection Stent • Arteria lusoria

INTRODUCTION

Aberrant right subclavian artery (ARSA), arising from the proximal portion of the descending thoracic aorta, is a rare aortic arch anomaly [1]. Cases of acute type A aortic dissection (ATAAD) in the presence of ARSA have been rarely described. We herein report on a modern hybrid repair technique for a patient with ATAAD and ARSA.

CASE REPORT

A 65-year-old female patient was referred to our centre with computed tomography (CT) confirmed ATAAD from the ascending to the abdominal aorta without any sign of visceral malperfusion. Additionally, CT scan revealed an ARSA out of the true lumen (Fig. 1). The initial surgical strategy was resecting the ARSA from the descending aorta, performing arch replacement in the frozen elephant technique and transposition of the ARSA into the ascending aortic prosthesis.

In the operating room, the patient lost consciousness and became unstable due to pericardial tamponade. Emergent surgery was started, using percutaneous cannulation of the right femoral vein and open cannulation of the left axillary artery. After pericardiotomy, free rupture of the ventral wall of the ascending aorta was confirmed. The aorta was blindly cross-clamped. Thus, the surgical strategy was changed to a less invasive hybrid procedure.

To ensure cerebral perfusion antegrade cerebral perfusion (ACP), the right common carotid artery was debranched and cannulated with a perfusion catheter.

Moderate hypothermic circulatory arrest was achieved with initially ACP via the right common carotid artery, while left common carotid artery (LCCA) and left subclavian artery were cross-clamped. When opening the aortic arch, the distal entry was located close to the ostium of the LCCA. It was also debranched and cannulated with a perfusion catheter to initiate trilateral ACP. An uncovered AMDS was placed into the arch in Zone 0. The AMDS was anastomosed with a 28 mm straight vascular graft (Jotec, Hechingen, Germany). The vascular graft was then cannulated for full body reperfusion. After securing the sinutubular junction, supracoronary replacement of the ascending aorta was performed. After declamping, heavy bleeding occurred from the aortic root indicating progressive rupture. Thus, a second pump run for full aortic root replacement was required. The next steps were performed beating heart. The right common carotid artery and LCCA were reimplanted in the aortic prosthesis using 8-mm vascular grafts in a 'Y'-anastomosis fashion.

Postoperative CT scan revealed stabilized true lumen by the AMDS and the ARSA had unrestricted flow with normal perfusion of all supra-aortic vessels (Fig. 2). The patient recovered well postoperatively without any neurological deficit and was discharged to a rehabilitation clinic.

DISCUSSION

ARSA is an uncommon congenital aortic arch anomaly that is often asymptomatic and is frequently discovered through incidental findings. In the coincidence of ATAAD and ARSA, several

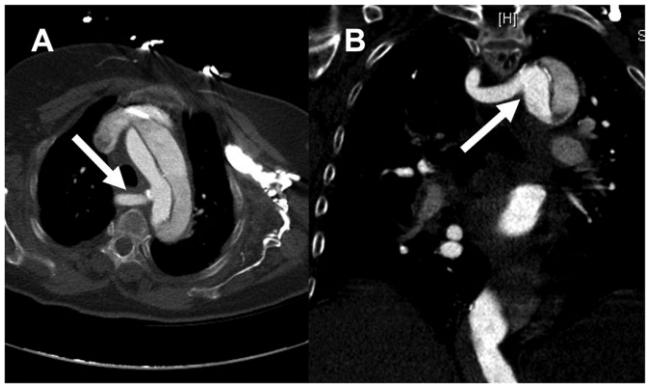

Figure 1: Preoperative computed tomography scan in axial (**A**) and coronal (**B**) plane with an aberrant right subclavian artery arising from the true lumen (arrow).

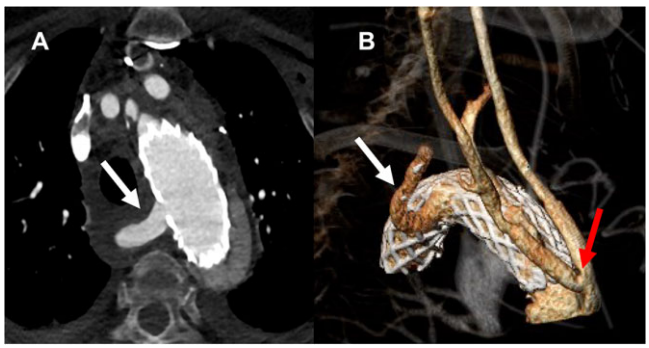

Figure 2: Postoperative computed tomography scan with axial plane (**A**) and 3-dimensional reconstruction (**B**) revealed unrestricted flow of the aberrant right subclavian artery out of the true lumen (white arrow). Computed tomography also showed regular perfusion of the common carotid arteries Y-anastomoses from the ascending aorta prosthesis (red arrow).

approaches have been described, such as thoracic endovascular aortic repair and frozen elephant trunk. More than half of the reported cases showed an entry of the dissection near the offspring of the ARSA [2], which consequently required revascularization of the ARSA.

The emergency situation of spontaneous intraoperative rupture of the ascending aorta led to a change in our strategy. The AMDS is a relatively new device for open surgery stenting of the aortic arch when there is no entry in this region [3]. In our patient, ARSA originated out of the true lumen and did not cause any symptoms prior to admission. Subsequently, we decided to perform replacement of the ascending aorta with arch repair using an AMDS, while leaving the ARSA *in situ*. The advantage of the AMDS in this scenario is the uncovered stent, which allows unobstructed perfusion of aortic branches, eliminating the need for transposition and facilitating a much easier anastomosis in Zone 0. In this case, we chose to perform debranching of both common carotid arteries due to the intraoperatively diagnosed extent of the dissection towards both their offsprings. Traditionally, cannulation of the right axillary artery is our method of choice during emergent aortic repair. As it was not possible to initiate cerebral perfusion by cross-clamping the innominate artery, we chose to cannulate the left axillary artery to initiate cardiopulmonary bypass. An additional cannulation of the debranched LCCA was necessary to establish selective cerebral perfusion.

ATAAD in the presence of ARSA poses challenges unique to every case. Aortic arch repair using the uncovered AMDS device and preserving the natural course of the ARSA in ATAAD seems to be safe and feasible. It allows for a simpler arch repair in a high-risk emergent patient.

Conflict of interest: none declared.

Reviewer information

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