

Hybrid treatment of type A aortic dissection with a type 2 right-sided aortic arch

Tip A aort diseksiyonunun tip 2 sağ taraflı aortik ark ile hibrit tedavisi

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Right-sided aortic arch is a rare anatomic anomaly found in <0.1% of the adult population due to the continuation of the right fourth embryologic aortic arch and folding inward of the left aortic arch, and only half of the cases (0.05%) are associated with an abnormal left subclavian artery.^[1]

A 45-year-old male patient presented to our clinic with complaints of chronic cough and dyspnea for the past six months. His history revealed that he was receiving asthma treatment at an external center and antiviral treatment for chronic viral hepatitis B and had increasing dysphagia and hoarseness for the last one month. Physical examination findings were normal except for marked dyspnea, stridor, and cough. Transthoracic echocardiography revealed that the aorta was anteriorly located on the right side, the ventricular ejection fraction was 55%, and Grade 3 aortic regurgitation was present. Moreover, the diameter of the ascending aorta at the level of the sinotubular junction was 40 mm, and a suspicious appearance in terms of dissection was observed. Due to severe dyspnea that increased when the patient lay flat, conventional coronary angiography could not be performed. Contrast-enhanced cardiac and coronary computed tomography was performed to further evaluate the cardiac morphology and coronary anatomy. The definitive diagnosis was Stanford type A aortic dissection, right aortic arch, Kommerell diverticulum with anomalous left subclavian artery with retroesophageal course, and an aneurysm reaching 75-mm in diameter in the descending aorta (Figures 1 and 2). Radiological images showed a compression of the right main bronchus and esophagus by the aneurysmatic descending aorta.

Cardiopulmonary bypass was achieved with left axillary artery cannulation-right atrial (two-stage) venous cannulation. A 28-mm Dacron® graft was placed at the supracoronary level. The right subclavian artery, left common carotid artery, and right common carotid artery were cannulated selectively and antegrade selective cerebral perfusion (ASSP) was achieved (Figure 3a). The legs of a 7×14 mm trouser Dacron® graft were anastomosed in an end-to-end fashion to the right subclavian and right common carotid artery, an 8-mm Dacron® graft was anastomosed in an end-to-end fashion to the left common carotid artery, and another 8-mm graft was anastomosed in an end-to-side fashion to the left subclavian artery. These grafts were sutured to another 24-mm diameter main Dacron® graft and total arch replacement was performed. The distal 24-mm neo-arch graft was suspended into the aneurysm sac in the descending aorta and the elephant trunk technique was applied. The neo-arch graft was end-to-end anastomosed to a 28-mm diameter graft located supracoronary (Figure-3b).

The patient woke up consciously and was able to cooperate within the first 24 h postoperatively and neurological examination findings were normal. Due to significant tracheal and esophageal compression, exsufflation was performed for early planned endovascular intervention. His hemodynamics was stable. On postoperative Day 1, a 28×28×120-mm Ankura™ (Lifetech Scientific, Shenzhen, China) stent graft and a 30×30×100-mm Ankura™ (Lifetech Scientific, Shenzhen, China) extension stent graft were applied into the 24-mm Dacron® elephant tube graft in the descending aortic aneurysm. However, the

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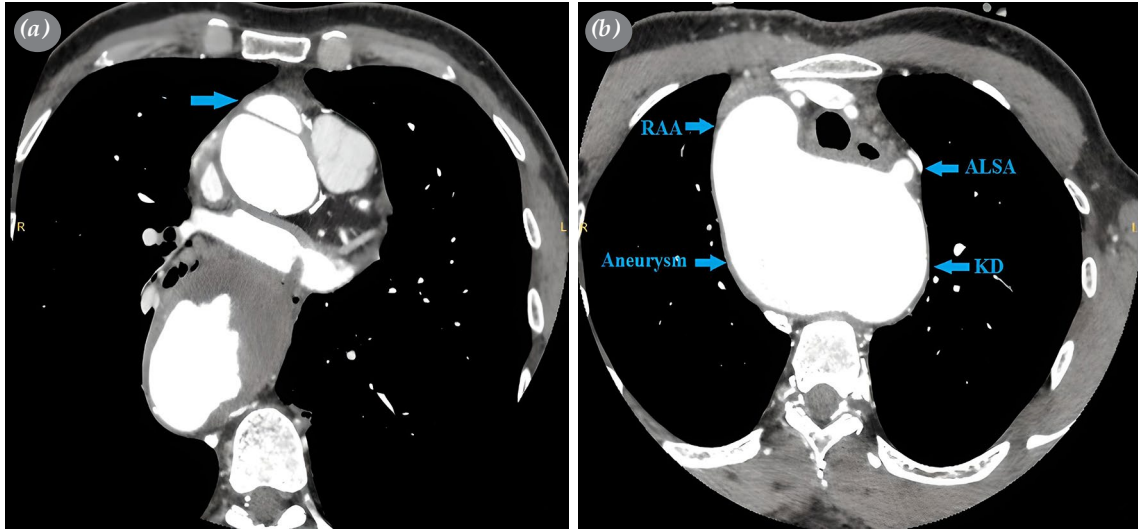


Figure 1. (a) Stanford type A aortic dissection. (b) Right aortic arch (RAA), anomalous left subclavian artery (ALSA), Kommerell diverticulum (KD), and descending aortic aneurysm.

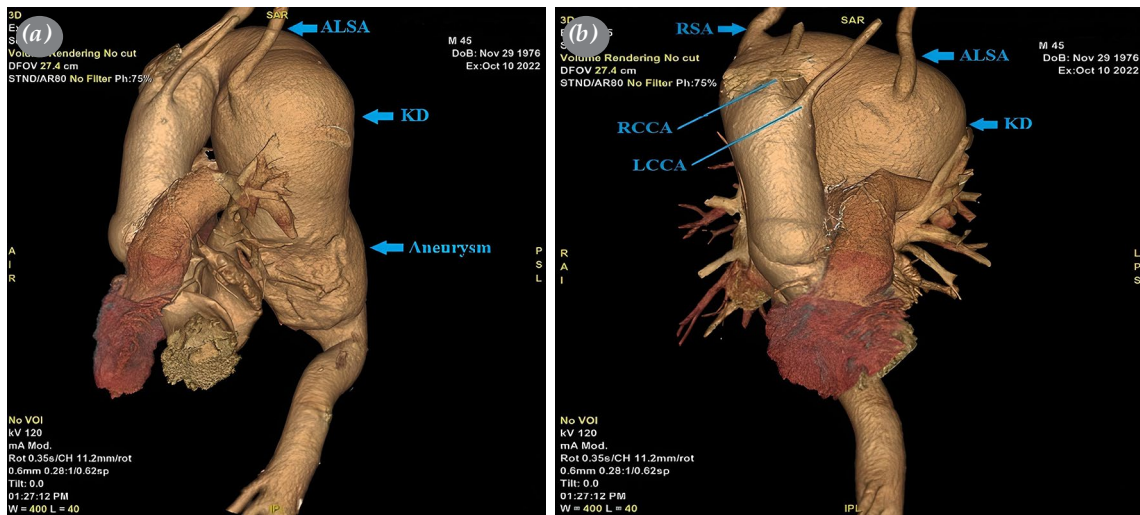


Figure 2. (a) Abnormal left subclavian artery (ALSA), Kommerell diverticulum (KD), (b) Right subclavian artery (RSA), Right common carotid artery (RCCA), Left common carotid artery (LCCA).

patient recovered from the sedation effect after the thoracic endovascular aortic repair application, and paraplegia developed at 8 h. Sepsis and multi-organ failure developed in the patient, who was found to have bacterial pneumonia in the intensive care follow-up, and was accepted as exitus approximately 25 days after the initial surgery.

To the best of our medical knowledge, 13 cases of right-sided aortic arch and dissection regardless of typing were reported in a review by Cina et al.^[2] in 2004. It was also reported by He et al.^[3] in 2015

that there have been five cases of type A dissection, whereas Barr et al.^[4] reported nine cases of type A dissection in the right-sided aortic arch in 2016. In our recent PubMed-based search, we could identify only eight cases. We report our case as the ninth case in the literature with type A dissection and right-sided aortic arch coexistence, and as the second case that underwent a hybrid procedure.

Contrary to the standard placement where the trachea and esophagus are anterior as in our case, it may be retroesophageal where it passes behind the

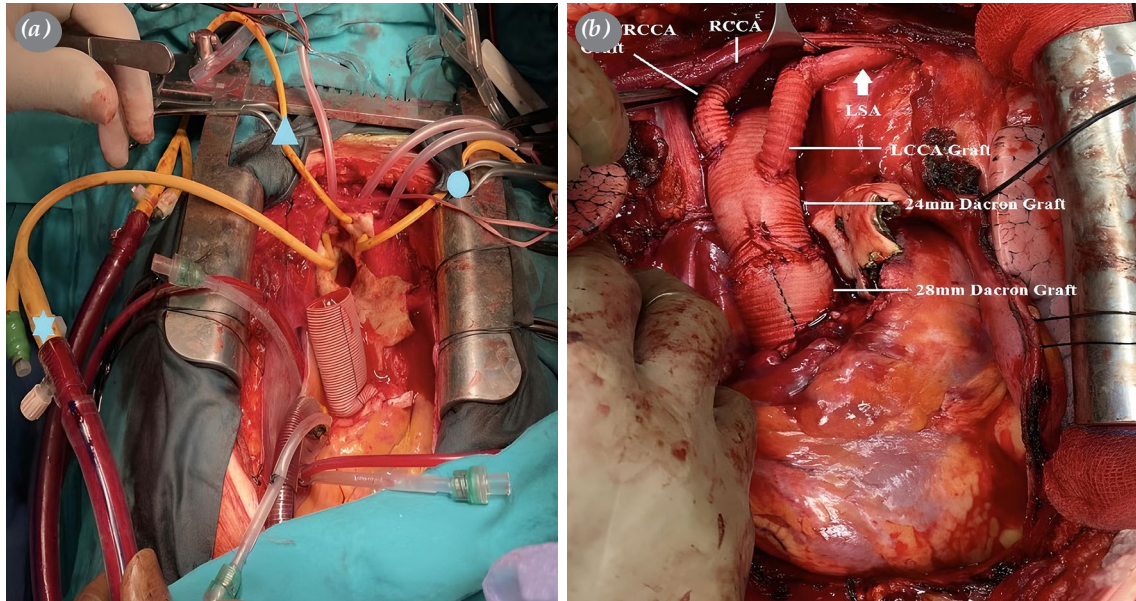


Figure 3. (a) Selective cannulation image of the intraoperative right subclavian artery (marked with a blue star), left common carotid (marked with a blue triangle), and right common carotid artery (marked with a blue circle). (b) Intraoperative total arch replacement image. RSA: Right subclavian artery; RCCA: Right common carotid artery; LSA: Left subclavian artery; LCCA: Left common carotid artery

right aortic arch. Right thoracotomy provides better access to the right arch behind the esophagus, but the distal arch and descending aorta may be difficult to access. In our case, the median sternotomy was preferred due to type A dissection and a large aneurysm involving the distal arch and proximal descending aorta. Median sternotomy has the advantage of allowing hybrid procedures in which simultaneous central bypass techniques can be used safely. In such rare cases with complex anatomy, preoperative planning and a good knowledge of anatomy is vital.

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Data Sharing Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

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