

# TEVAR Procedure in a Patient with Descending Aortic Aneurysm Accompanying Right Aortic Arch Anomaly: Case Report

## Sağ Arkus Aorta Anomalisine Eşlik Eden Desendan Aort Anevrizmalı Hastada TEVAR Uygulaması

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**ABSTRACT** Abnormal right aortic arch is a rare condition. It is commonly symptomatic in childhood, but sometimes it is diagnosed in asymptomatic adults by means of radiologic examination which is done for other causes. Although aortic aneurysms are seen in the abdominal aorta most of the time, they can be seen in any segment of aorta. We aimed to represent a case who underwent a thoracic endovascular aneurysm repair of abnormal right aortic arch, since such an operation is rare in the literature.

**Key Words:** Aortic aneurysm, thoracic; vascular grafting

**ÖZET** Sağ aortik ark anomalisi nadir görülen bir durumdur. Genellikle çocukluk çağında semptomatik olmakla birlikte bazen asemptomatik olan erişkinlerde başka nedenlerle yapılan radyolojik tetkiklerde tanı konulur. Aort anevrizmaları en sık abdominal aortada görülmekle birlikte, aortanın herhangi bir segmentinde görülebilir. Bir yıl önce koroner arter bypass cerrahisi yapılan ve rutin kontrollerde tele akciğer grafisinde mediasten genişliği olması üzerine çekilen çok kesitli bilgisayarlı tomografik anjiyografide sağ aortik ark anomalisi ve desendan aort anevrizması tespit edildi. Literatürde nadir olan sağ aortik ark anomalili torasik endovasküler anevrizma tamiri yapılan hastayı sunmayı amaçladık.

**Anahtar Kelimeler:** Aort anevrizması, torasik; damar greftleme

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**A**bnormal right aortic arc is a rare congenital anomaly. The mirror scene type arcus aorta is seen with intracardiac congenital abnormalities. It is seen commonly with tetralogy of Fallot and persistent truncus arteriosus. In addition, it is seen commonly with right arcus aorta and aberrant left subclavian artery opening in adulthood. An accompanying cardiac abnormality is rare. Diagnosis is generally made while detecting another pathology.<sup>1,2</sup> The most common aortic arc abnormality is right aortic arc. It is reported as it seen in 0.1% to 0.2% of population. Right aortic arc is asymptomatic and rarely symptomatic which is reported as common in adult population.<sup>3</sup> Aneurysms of aorta can be seen in any part of the aorta. It is most seen in abdominal aorta. In addition, it is seen in thoracic or thoracoabdominal parts. Thoracic aortic aneurysms may be in ascending aorta or descending aorta. Aortic aneurysms are commonly silent, but may cause mortality by rupture or bleeding. Thoracic endovascular aneurysm

repair (TEVAR) is an alternative method of minimally invasive surgery.<sup>4</sup>

## CASE REPORT

An operation was planned in a 75 years old male who had undergone a coronary artery bypass grafting surgery for dehiscence of sternum a year ago. An intervention was not considered a year ago, when an aneurysm with a 52 mm diameter was encountered during coronary artery bypass grafting surgery. Multislice computerized tomography (CT) was performed for mediastinum dilatation diagnosed in a peroperative chest radiography (Figure 1). It was observed that left internal mammary artery was not used during coronary artery bypass grafting. There was a thoracic aneurysm in thoracic aorta along 320 mm length segment including left subclavian artery, with a 58 mm diameter in its widest part. TEVAR was planned. After general anesthesia, right femoral incision was performed and femoral artery was hanged. Left brachial artery cannulation was performed. Over right femoral artery, "Valiant Captivia Thoracic Stent Graft" (VCTSG) 40 mm x 224 mm was put in descending aorta including left subclavian artery (Figure 2, 3). A VCTSG 40 mm x 157 mm was added examining continuing aneurysm. Left brachial pulse was palpable postoperatively, no circulation failure was examined. Patient was discharged without any complication in 5<sup>th</sup> day of the operation. On CT angiography in 1<sup>st</sup> month after surgery, there was a patent endostent and no endoleak.



FIGURE 1: Right aortic arch and thoracic aortic aneurysm, chest X-ray.

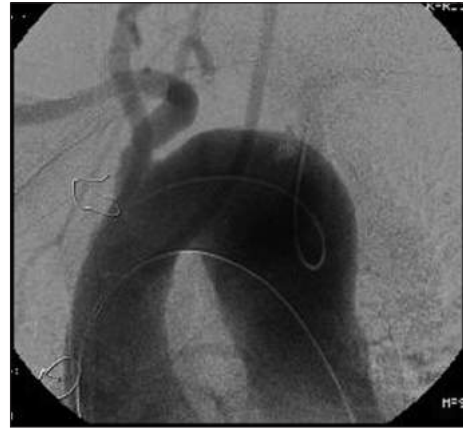


FIGURE 2: The right aortic arch and descending aortic aneurysm, DSA.

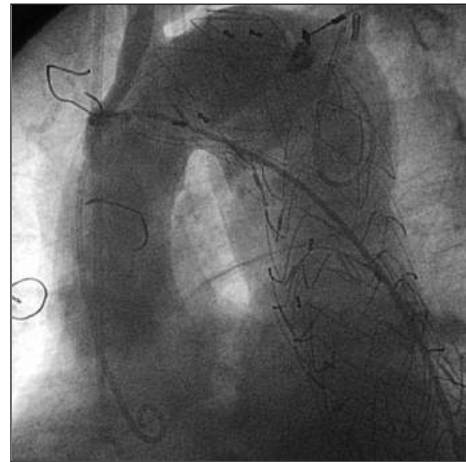


FIGURE 3: Descending aortic aneurysm and TEVAR.

## DISCUSSION

Vascular abnormalities of superior mediastinum occurs due to patency or incomplete regression or atrophy of embryonic vessels. The most common seen abnormal aortic arc in patients without congenital heart disease is right aortic arc and aberrant left subclavian artery. In this abnormal condition, left common carotid artery is rooted as first branch, the last and fourth branch is left subclavian artery rooted distal part of right subclavian artery.

Abnormal left subclavian artery reaches left arm behind the esophagus.<sup>5</sup> Right aortic arc may be diagnosed with chest radiography, but accurate diagnosis can be done with CT or magnetic resonance imaging (MRI) by diagnosing type of right aortic

arc and accompanying abnormalities.<sup>6</sup> Venous abnormalities, congenital heart diseases and tracheal abnormalities may accompany aortic abnormalities. Angiographic images or sectional MRI are not always enough to detect those complicated images. CT angiography is the best imaging modality to detect main vascular morphology and morphology of congenital abnormalities.<sup>7</sup> TEVAR and endovascular aneurysm repair (EVAR) methods were first used by Parodi et al. in treatment of thoracic and abdominal aortic aneurysms and dissections in human beings.<sup>8</sup> Thirty-day mortality was less in TEVAR group, in a survey comparing open surgery and TEVAR in 351 patients.<sup>9</sup> Mortality during operation, days of hospitalization and use of blood supplements were significantly less in TEVAR group in a survey performed in 1082 patients.<sup>10</sup> Mortality and morbidity were significantly high in open surgery in a survey comparing open surgery with TEVAR in patients operated for type B aortic dissection.<sup>11</sup> Complications of device and implementation may occur during thoracic endovascular aortic surgery. Complications about surgery may be identified as neurologic, ischemic and vascular penetration.<sup>12,13</sup> Risk factors about vascular penetration are female gender, thoracic aneurysm (when compared to abdominal), a narrow artery, bigger transportation than 22-25 F in thoracic operation. Neurologic complications are problems about stroke and spinal cord. Spinal cord ischemia was reported as 3-10%

in a survey.<sup>14</sup> Risk factors are noted as previous abdominal surgery, pelvic obstructing disease, aorta obstructing with stent, perioperative hypotension and kidney failure. Traditional way in spinal cord injury prevention is augmentation of spinal pressure with spinal drainage.<sup>15</sup> Besides collapse, migration of graft, infection of endoleak and prosthesis may be seen after implantation.<sup>16</sup> As a surgical technique, 2 cm long aorta wall thickness is essential for prevention of endoleak. Sometimes, left subclavian artery opening may be closed to maintain this length. In a survey, no ischemic changes were seen after closing subclavian artery opening totally in 9 of 14 patients.<sup>17</sup> TEVAR operation was easy in a patient who has thoracic aneurysm with right arcus aorta abnormality. Beginning of left carotid artery as first branch of aorta provided a wider area to open a stent. Generally, a stent could be opened including left subclavian artery and there seemed to be no problem with left subclavian artery perfusion. We placed endostent to close the left subclavian artery opening because of aberrantly located left subclavian artery heading through the thoracic aneurysm in our case. There was no problem in left subclavian artery perfusion in a control after 1 month.

### **Conflict of Interest**

*Authors declared no conflict of interest or financial support.*

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