Case Report

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Percutaneous thoracic endovascular aortic repair of an ascending aortic pseudoaneurysm: A case report

Çıkan aort psödoanevrizmasının perkütan torasik endovasküler aortik onarımı: Olgu sunumu

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ABSTRACT

Treatment of ascending aortic aneurysms is currently based on either surgical approach or hybrid surgery. Type A dissections can be treated by endovascular interventions. Herein, we report a case of percutaneous thoracic endovascular aortic repair of an ascending aortic pseudoaneurysm using a physician-modified 80 mm Zenith TX2 TAA endograft.

Keywords: Ascending aortic pseudoaneurysm; percutaneous thoracic endovascular aortic repair; thoracic endovascular aortic repair.

ÖZ

Günümüzde çıkan aort anevrizmalarının tedavisi cerrahi yaklaşım veya hibrid cerrahi esasına dayanmaktadır. Tip A diseksiyonlar endovasküler girişimler ile tedavi edilebilmektedir. Bu yazıda, hekim tarafından modifiye edilen 80 mm Zenith TX2 TAA endogrefti kullanılarak çıkan aort psödoanevrizmanın perkütan torasik endovasküler aort tamiri yapılan bir olgu sunuldu.

Anahtar sözcükler: Çıkan aort psödoanevrizması; perkütan torasik endovasküler aort tamiri; torasik endovasküler aort tamiri.

Thoracic aortic pseudoaneurysms are uncommon pathologies which require an intervention to avoid rupture. They are usually the result of significant thoracic trauma, both penetrating and blunt.[1] An ascending aortic pseudoaneurysm has a high mortality rate ranging from 29-46% up to 80-90%, if ruptured.[1,2]

Open surgical approach or hybrid surgery remain the mainstay of treatment for aneurysms related to the ascending aorta. Although endovascular repair of the descending thoracic aortic and abdominal aortic aneurysms has been well-established, using this approach to repair ascending aortic aneurysms remains challenging due to its complex anatomy.[3] In the literature, a few case series were reported on the endovascular treatment of Type A dissection and pseudoaneurysm in the ascending aorta.[4-7] Herein, we report a case of percutaneous thoracic endovascular aortic repair (TEVAR) of an ascending aortic pseudoaneurysm using a physician-modified 80 mm Zenith TX2 TAA endograft (Cook Inc., Bloomington, IN, USA).

CASE REPORT

A 40-year-old man was admitted with a past medical history of hypertension and a large aneurysm of the left anterior descending artery (LAD) treated with coronary artery bypass grafting (CABG) with a saphenous vein graft (SVG) to LAD. He was previously admitted for non-ST elevation myocardial infarction, when he underwent left and right heart

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catheterization and was found to have a large LAD aneurysm (7 cm aneurysm) with a mass effect on the LAD without obstructive coronary artery disease. He underwent an emergent CABG and the aneurysm separating the proximal and distal LAD was excised followed by SVG to LAD. This defect was repaired by closing the proximal LAD and putting a saphenous vein graft (SVG) to the distal LAD. He presented two years later with deep vein thrombosis (DVT) and thoracic computed tomography angiography showed a large pseudoaneurysm of the ascending aorta measuring 4.2×3.6 cm in size with a 9 mm neck (Figure 1). Then, he underwent placement of a retrievable inferior vena cava filter and thoracic aortography to better visualize the pseudoaneurysm. The pseudoaneurysm was considered to be a complication of the previous CABG. Eventually, an endovascular approach was decided upon the request of the patient.

A written informed consent was obtained from the patient. The procedure was performed under general anesthesia. A 5F introducer sheath (Cook Medical Inc., Bloomington, IN, USA) was placed into the right radial artery, followed by passage of a 5F graduated pigtail catheter (Mallinckrodt Medical, Inc., St. Louis, MO, USA) into the ascending aorta under fluoroscopic guidance. Thoracic arch aortography delineated a large saccular aneurysm emanating from the anterior surface of the ascending thoracic aorta 4 cm above the sinus of Valsalva (Figure 2). The right and left common femoral arteries (CFAs) were accessed utilizing a 5F micro-puncture system (Cook Medical Inc., Bloomington, IN, USA), followed by the placement of a 6F introducer sheath (Cook Medical Inc., Bloomington, IN, USA) into the right

Figure 1. Thoracic computed tomography angiography scan showing ascending aortic pseudoaneurysm.

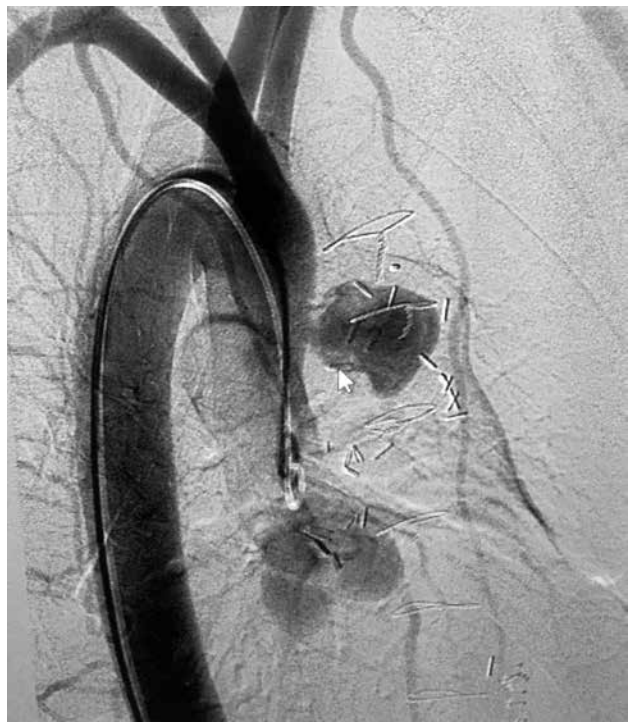

Figure 2. Aortogram showing ascending aortic pseudoaneurysm.

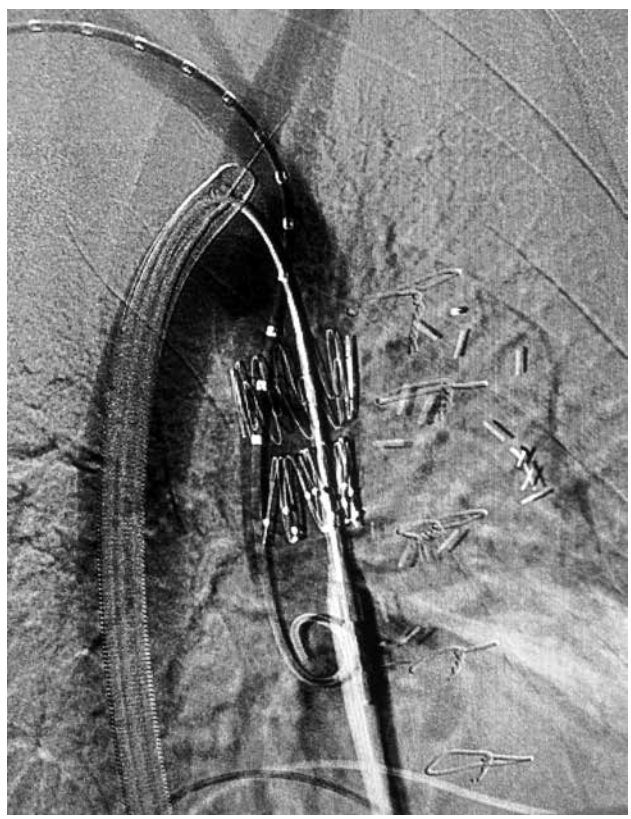

Figure 3. Post-procedural view with successful endograft deployment.

CFA. Two 10F Prostar® closure devices (Abbott Vascular Inc., Santa Clara, CA, USA) were placed into the left CFA, followed by a 22F introducer sheath (Cook Medical Inc., Bloomington, IN, USA) after appropriate predilatation. The sutures were, then, secured to the sterile field. A temporary transvenous pacemaker was placed via the right common femoral vein for controlled right ventricular pacing.

As endografts designed for the ascending aorta pathology were not available, an off-label 30×80 mm Zenith TX2 TAA endograft (Cook Medical Inc., Bloomington, IN, USA) was modified to fit the ascending aorta. Modification was achieved by deploying the graft onto the sterile table and cutting off 4 cm of the proximal segment, followed by cauterizing the edges to minimize fraying. The graft was then re-inserted into the delivery system and passed over a 0.035 cm Lunderquist® wire (Cook Medical Inc., Bloomington, IN, USA) through the 22F introducer sheath and into the ascending aorta. After carefully aligning the endograft in the ascending aorta, the patient was given 18 mg intravenous adenosine, followed by the deployment of the endograft. Once the graft was deployed, right ventricular pacing was implemented, until the patient regained his intrinsic rhythm. The endograft was post-dilated with a 9 Fr. Coda® LP balloon (Cook Medical Inc., Bloomington, IN, USA) to minimize any potential graft endoleaks. Post-intervention aortography revealed successful exclusion of the aneurysm with no endoleaks (Figure 3). This was followed by the removal of the delivery system and percutaneous closure/repair of the left common femoral arteriotomy site utilizing the pre-close technique. The patient was successfully extubated. He had an uneventful postoperative course and was discharged the following morning. The patient has been stable during clinical follow-up for two and a half years without any re-intervention or aorta-related events.

DISCUSSION

Our case report represents a purely endovascular approach in the treatment of an ascending aortic pseudoaneurysm with technical success of manually modifying an endograft designed for the descending aorta to fit the ascending aorta anatomy.

The treatment of ascending aortic pseudoaneurysms is recommended, irrespective of the size or rate of expansion, due to its higher mortality and morbidity.[1] Open surgical repair has been the standard treatment for ascending thoracic aortic pathologies.[8,9] However, endovascular approaches have been proven feasible in different reports, despite the challenging nature of the procedure.[10,11]

The successful repair of different ascending aorta pathologies using the left ventricular (LV) apical approach has been reported occasionally. This was reported previously for the repair of a ruptured aortic arch using LV apical approach,[12] and repair of an ascending thoracic pseudoaneurysm.[5] Mussa et al.[13] reported the endovascular repair of an ascending aortic pseudoaneurysm in a poor surgical candidate using external iliac artery access via a retroperitoneal incision. Mewhort et al.[4] used a custom device to repair an ascending aortic pseudoaneurysm with access obtained through surgical exposure and cut down of the femoral artery. Roselli et al.[7] reported the endovascular repair of 39 different ascending aortic pathologies with reasonable results in 2018. Older age and the closer the pathology to the annulus were independent predictors of mortality.[7] Endovascular repair of Type A dissections has also been reported with good success rates.[14]

In our report, we used a pure percutaneous approach which is usually preferred thanks to its shorter operation time, shorter length of stay, and less wound complications. There were no immediate complications associated with the procedure such as stroke, spinal cord ischemia, or paraplegia. In addition, no long-term complications were observed clinically during two and a half years, and no re-interventions were required.

In conclusion, endovascular approach in the treatment of ascending aortic pseudoaneurysm is feasible. However, further randomized trials and technical advancements in the grafts design are required to evaluate the clinical utility of ascending endovascular grafts and consolidate the evidence of the growing new techniques.

Declaration of conflicting interests

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