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■ Case Report

Life-saving endovascular aortic repair in spontaneous ruptures: Report of two emergency cases

Spontan aort rüptürlerinde hayat kurtaran endovasküler aortik onarım: İki acil olgu

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Abstract

Aortic aneurysm rupture is still a life threatening situation despite the advancements in cardiovascular surgery field. Today, endovascular treatment is an option for these patients. In the case of an aortic rupture, urgent evaluation of the patient and planning the patient specific treatment are crucial. Herein, we represent two cases who survived after successful treatments of aortic ruptures.

Keywords: Endovascular aortic repair; spontaneous aortic rupture; life-saving treatment

Öz

Kardiyovasküler cerrahideki ilerlemelere rağmen, aortik rüptürler, halen, yaşamı tehdit ederek morbidite veya mortalite nedeni oluşturmaktadır. Son zamanlarda, endovasküler yaklaşım, bu hastalar için de alternatif bir tedavi seçeneği haline gelmiştir. Ancak, aortik rüptürlerde hızlı değerlendirme ve hastaya özel tedavi planının uygulanması şarttır. Yazımızda bu şekilde müdahale edilen ve sağkalım sağlanan iki olgumuzu sunmayı amaçladık.

Anahtar kelimeler: endovasküler aortik onarım; spontan aortik rüptür; hayat kurtarıcı tedavi

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Introduction

The general management of aortic ruptures include emergency surgical repair or medical treatment but advancement of covered stent grafts provided a third option in treatment of these patients. However, anatomy of the pathology should be suitable for this kind of intervention. The advancements in this technology and increased experience of cardiovascular surgeons in this treatment technique, broadens the anatomical spectrum of this pathology that can be treated with endovascular interventions. Herein, we represent a case of spontaneous rupture in the aneurysm of arcus aorta and a case of spontaneous rupture in the abdominal aortic aneurysm which were successfully treated with endovascular interventions.

Case 1

A 81-year-old male patient presented with acute back pain and was referred to our center with the diagnosis of rupture in the arcus aorta aneurysm. He had chronic primary hypertension under medical treatment. In the laboratory findings urea 118 mg/dL, creatinine 3,2 mg/dL, potassium 6,7 mmol/L, hemoglobin 7,6 mg/dL. The patient was in delirium state and no respiratory sounds were present in auscultation of his left hemi-thorax. In the initial thorax computerized tomography (CT) angiography, opaque medium extravasation was observed in the posterior caudal segment of the arcus aorta (Figure 1).

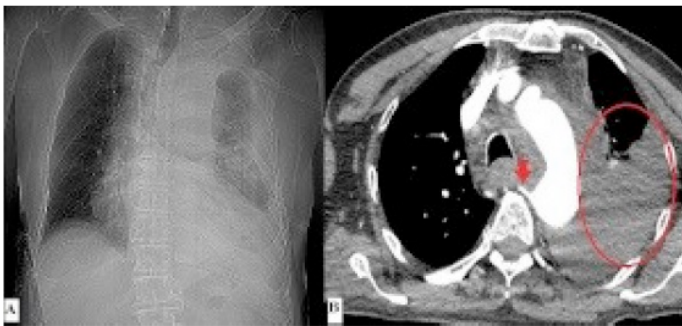


Figure-1. (A) Sagittal CT angiography image. (B) Transverse CT angiography image. The rupture in the aorta wall (arrow) and hemothorax (circle)

Also opaque agent filling defects of the arcus aorta wall were present which were interpreted as intramural ulcerated plaques. The anatomy of the thoracic aorta and the pathology were suitable for a thoracic endovascular aortic repair (TEVAR) procedure so an urgent TEVAR procedure was planned.

Operative technique

Right common femoral artery (CFA) and superficial femoral artery (SFA) were explored under general anesthesia after 1 cc intravenous (IV) heparin administration. A 6F introducer sheath (Terumo, Tokyo, Japan) was placed into the CFA artery.

A 300 cm long stiff Meier guidewire (Boston Scientific, USA) was introduced into the ascending aorta. A 32 x 32 x 100 mm thoracic endovascular stent graft (Valiant, Medtronic, Minneapolis, USA) was placed in the proximal descending aorta beginning from the orifice of the left subclavian artery to cover the ruptured segment (Figure 2).



Figure-2. Digital subtraction angiography image after the TEVAR procedure.

No occlusion of the left subclavian artery and no endoleak were observed in the post-procedural digital subtraction angiography (DSA) imaging. The patient was transferred to the intensive care unit and a thoracic drainage tube was placed to the left hemi-thorax. Also an urgent hemodialysis was performed. The patient was weaned from respiratory support in the postoperative third day.

Case 2

A 47-year-old male patient presented with abdominal pain and hematuria for a week to the outpatient clinic. He had previous pulmonary thromboembolism (PTE) 5 years ago and was under medical treatment with apixaban 5 mg tablets once a day. He had chronic obstructive pulmonary disease (COPD) and was still a smoker. Also he had previous below-the-knee left lower extremity amputation after a burn injury 15 years ago. The patient had rebound tenderness and rigidity in the physical examination of the abdomen. In the laboratory findings, white blood cell (WBC) $12,7 \times 10^3/\text{mm}^3$, erythrocyte sedimentation rate (ESR) 86 mm/hr, C-reactive protein (CRP) 144 mg/dL. In his initial thoraco-abdominal CT angiography, a 67x71 cm abdominal aortic aneurysm in the infra-renal segment and a rupture in the aneurysm wall were observed (Figure 3). An urgent endovascular aortic repair (EVAR) procedure was planned.

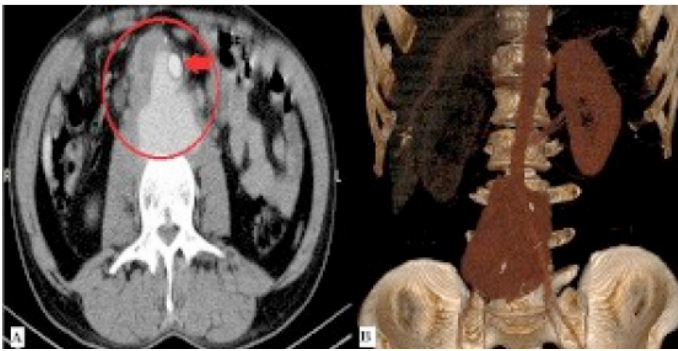


Figure-3. (A)The hematoma caused by the rupture in the abdominal aortic aneurysm (circle) and the abdominal aorta (arrow). (B)The 3D image of the rupture in the infra-renal abdominal aortic aneurysm wall.

Operative technique

A written informed consent was taken from the patient. Right CFA and SFA were explored under local anesthesia after proper dose IV heparin administration. An 8F introducer sheath (Terumo, Tokyo, Japan) was placed. A 300 cm long stiff Meier guidewire (Boston Scientific, USA) was placed into the abdominal aorta. In the DSA imaging, the rupture site in the infra-renal abdominal aorta was observed as described previously. The 25 x 60 mm main body of the endovascular abdominal stent graft (Endologix AFX, Endovascular AAA System, Endologix Inc, Irvine, California, USA) was placed. Then 16 x 40 mm bifurcated stent graft was placed through the contralateral extremity. In the post-procedural DSA imaging, no endoleak or occlusion of the main arterial branches were observed and total exclusion of the aneurysm sac was proved (Figure 4).



Figure-4. Digital subtraction angiography image after the EVAR procedure.

The patient was transferred to the ICU and discharged at postoperative 9th day.

Discussion

The main goal of the treatment of aortic aneurysm rupture is to stabilize the patient as quickly as possible and achieve maximum survival with minimum morbidity. There are some publications about the effectivity and the reliability of stent grafts in ruptured aortic aneurysms in the literature.

In their meta-analysis including 41 studies, Antonio et al reported a significant decrease in the in-hospital mortality of patients with ruptured abdominal aortic aneurysm (AAA) who were treated with EVAR [1] when compared with open surgical repair.

In another meta-analysis, it was reported that EVAR treatment had lower 30-day mortality and post-procedural myocardial infarction rates and lower in-hospital length of stay times in both elective and ruptured AAA patients. [2]

In the IMPROVE study, the results of open surgical repair and endovascular treatment of ruptured aortic aneurysms were compared. [3] The 30-day mortality rates were similar in both groups but the in-hospital length of stay times were lower in the endovascular treatment group. The general 30-day cost of treatment in both groups were also similar. In the subgroup analysis, it was shown that the endovascular treatment may be more effective in male patients than female patients.

In another meta-analysis including 63 studies, no significant difference was found in the 30-day mortality after EVAR and open surgical repair. [4]

In another meta-analysis including 16 studies, the stroke rate after TEVAR procedure was found to be significantly higher when compared to medical treatment. It was reported that the 30 day and long term mortality rates after TEVAR procedure were lower when compared to open surgical repair.[5]

In another meta-analysis including 27 studies, the 30-day mortality rates of ruptured and un-ruptured aortic aneurysms after TEVAR procedure were reported to be lower. The risks of paraplegia or spinal chorda ischemia and pulmonary complications were lower in these patients after TEVAR procedure but the risk of stroke was still the same when compared to open surgery. Also in-hospital and ICU length of stay times were found to be lower in the patient group treated with TEVAR procedure. [6]

In a meta-analysis including eleven studies with a total of 673 patients, it was reported that TEVAR procedure could be done with high technical success rates, low postoperative morbidity rates and good 3-year survival rates. [7]



In a meta-analysis including 143 TEVAR and 81 open repair cases, it was reported that the 30-day mortality rate after TEVAR was significantly lower. The 30-day mortality rate was 19% after TEVAR and 33% after open surgery. The 3-year mortality rate after TEVAR was projected as 70.6% but it could not be calculated for open surgery because of the lack of sufficient follow-up data. [8]

In our center, we have done 32 EVAR, 15 TEVAR and 4 EVAR and TEVAR procedures in the last one- and-a-half year period. We have promising results in the high risk patients with multiple comorbidities.

Conclusion

In conclusion, the endovascular treatment option is chosen in 'selected patients' in many recent studies. We believe that endovascular or hybrid procedures will be more common as the technology of these products advances.

*The study was performed in accordance with the Declaration of Helsinki's Good Clinical Practice guidelines and approved by the local ethical committee. Written informed consents was provided from patients.

Declaration of conflict of interest

The authors received no financial support for the research and/or authorship of this article. There is no conflict of interest.

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