Successful Urgent Endovascular Treatment of Acute Thoracoabdominal Aortic Type B Dissection in a Young Patient: Case Presentation and Findings at Late Follow-up

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Abstract
Aortic dissection is a critical condition leading to significant mortality and morbidity. Urgent endovascular treatment is an attractive treatment option in selected Patients. A 46-year-old woman was admitted to the emergency room for sudden onset of severe abdominal pain radiating to the lower back with paresthesia of the right lower limb. CT scan revealed an acute thoracic aortic dissection at the level of the left subclavian artery descending into the abdominal aorta and both iliac arteries, with a compressed and thrombosed true lumen causing vascular infarcts in the right kidney. A stent-graft was deployed as soon as the patient’s vital signs were stabilized. CT and clinical follow-up revealed no signs of complication and a complete resolution of symptoms. In the presented case the endovascular approach resulted in a prompt and durable resolution of symptoms and underlying causes, which also allowed substantial renal parenchyma salvage.

Keywords: aortic dissection, TEVAR, interventional radiology


1. Introduction
Aortic dissection is a critical condition leading to significant mortality and morbidity.

It is generally suspected on the basis of the patient’s description of pain, being typically referred to as a severe and “tearing” back or chest pain.

Leading risk factors are hypertension, connective tissue disease, past cardiovascular surgery, vascular malformation and trauma [1,2].

Patients presenting with a Stanford type-B dissection can be managed by medical therapy, while cases presenting with complications such as rupture or organ ischemia require surgical intervention, which suffers from a significant mortality range [3].

Endovascular treatment is an attractive and well established alternative in selected Patients. In particular endovascular stent grafts have been used successfully as a less invasive procedure for patients with surgical indications for chronic type B aortic dissections [4].

2. Case Presentation

A 46-year-old woman was admitted to the emergency room for sudden onset of severe abdominal pain radiating to the lower back with paresthesia of the right lower limb.

Her past medical history included arterial hypertension, asthma, smoking and HCV infection. Blood pressure on arrival was 185/100 mmHg, other vital signs were stable.

After routine laboratory investigations, Doppler-ultrasound examination of the groins showed a monophasic, pandiastolic, post-occlusive blood flow in the left common femoral artery. An urgent Computed Tomography Angiography (CTA) was prescribed.

CTA scan revealed an acute thoracic aortic dissection at the level of the left subclavian artery (LSA) descending into the abdominal aorta and both iliac arteries, with a markedly compressed and thrombosed true lumen at the visceral level [Figure 1]. The true lumen was extremely reduced in the abdominal area with the celiac, superior mesenteric and right renal arteries originating from it. The left renal and inferior mesenteric arteries arose from the false lumen. About 70% of the left renal parenchyma was poorly vascularized and there were minimal peripheral infarcts in the right kidney [Figure 2].
Infusion of clonidine and uradipil was begun followed by labetalol.

When clinically stabilized she was taken to the Angiographic room to perform the endovascular treatment. No more than 18 hours passed since the diagnosis. General anesthesia was induced. Transesophageal echocardiography confirmed the absence of an ascending aortic dissection flap as previously reported at CT. The patient was placed in the supine position with access to the right upper extremity.

A diagnostic study of aorta and its main branches was performed using a percutaneous right axillary access.

A retrograde access to the true lumen of the aortic dissection was attempted but failed because of the high grade reduction of its diameter.

An anterograde access to the true lumen was obtained by means of an hydrophilic catheter (Vertebral Radifocus Glidecath, 4F, Terumo, Tokyo, Japan) over a 0.035” hydrophilic guidewire (Radifocus Guidewire, J-shaped M, Terumo, Tokyo, Japan)

A left common femoral arteriotomy was performed. Aortography confirmed the findings at CTA.

A right axillary percutaneous access was required because the anatomic alterations induced by the dissection made it impossible to cannulate the true lumen from below.

A Relay NBS Plus (Bolton Medical, Sunrise, FL, USA) stent-graft was chosen because of availability and preference of the surgical team.

When the leading edge of the endograft reached the left subclavian artery, the stent-graft was deployed by pulling back the sheath [Figure 3]. Subsequent aortography showed the tear was completely covered and that there was complete restoration of flow into the visceral and lower-extremity arteries [Figure 4]. Thrombosis of the left...
superior polar renal artery was noted while the inferior polar renal artery on that side was well perfused. No immediate type-1 endoleak was observed. The arteriotomy site was sutured after sheath removal and the axillary access was closed using a closure device (Angioseal, St. Jude Medical, Minnetonka, MN, USA).

Postoperative examination revealed immediate complete resolution of lower-extremity paresthesia.

On postoperative day 6, contrast CT-scan demonstrated the correct positioning of the endo-graft with no signs of endoleak. The true lumen had enlarged, however, the false lumen seemed to be replenished by the distal tear. Left renal vascularization was still poor. There were no signs of intestinal infarct.

Surveillance CT angiography performed at one month showed filling defects determined by proximal intimal tears covered by the endograft. There was a slight reduction of the true lumen especially in the segment between the origin of the superior mesenteric and the renal arteries. The left kidney appeared even further reduced in volume. False lumen showed initial signs of reduction, while a distal tear originating from the proximal segment of the left common femoral artery was better visualized.

Surveillance CT angiography performed at 6 months showed further narrowing of the false lumen which was extensively thrombosed.

The patient quit the follow-up, moved to Kenya, and suspended all medications.

At 20 months after the procedure, during an occasional return to the home country, she accessed the same ER because of a new irradiating pain in the left flank.

Because of the history of the patient an emergent CT-Angiography was performed.
The exam showed recent costal fractures but no signs of acute vascular lesions.

In particular there were no signs of recent aortic dissection, while the false lumen appeared almost completely thrombosed. An overview of the evolution of the true and false lumens at follow-up CT scans is portrayed in Figure 5.

The patient was discharged the same day with a diagnosis of costal fractures.

![Figure 5. Evolution of B-type aortic dissection at follow-up CTA. Upper row: lumen view of thoracic and abdominal aorta. Lower row: axial view of the anterior true lumen and posterior false lumen at the level of the renal arteries ostia. First column: at one month. Second column: at 6 months. Third column: at 20 months.](image)

### 3. Discussion

Endovascular techniques for repair of aortic Type B dissections have rapidly developed since its introduction to a point that indications for operative repair of aortic dissection has been limited [5] in selected patients. In particular a manageable proximal “landing zone” and a reliable arterial access site have to be assured before planning.

Once contraindications have been ruled out the patient is admitted to endovascular repair of the aortic dissection, which is mainly based on the exclusion of the proximal entry tear from the circulation by means of a stent-graft.

Successful proximal exclusion of the entry tear leads to lowered blood flow into the false lumen, allowing for its reduction.

In our case the false lumen was also alimented by distal tears, with stent-graft placement determining slow but constant narrowing of the false lumen.

Almost complete thrombosis of the false lumen was documented only at 20 months after the procedure.

### 4. Conclusion

Urgent endovascular repair of aortic dissection is a feasible and appealing option for patients with suitable anatomy.

In the presented case the endovascular approach resulted in a prompt and durable resolution of symptoms and underlying causes, which also allowed substantial renal parenchyma salvage.

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### References