

Late Lumen Loss in Thoracic Aortic Graft after Endovascular Treatment of a Traumatic Pseudoaneurysm

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ABSTRACT

We report the case of a 23-year-old woman who died due to endograft stenosis 20 months after thoracic endovascular aortic repair. The patient presented with the pseudocoarctation syndrome. Although angioplasty of stenosis endograft was successfully performed, severe metabolic complications were lethal.

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Introduction

Thoracic endovascular aortic repair (TEVAR) has emerged as a less-invasive alternative to open surgical repair with acceptable outcomes (1). TEVAR was originally developed to treat thoracic aortic aneurysms (TAA) (2); however, the endovascular treatment of acute aortic syndromes such as aortic transection, dissection, intramural hematoma, and penetrating ulcer has also been associated with encouraging results compared to traditional surgical repair (3). Despite early promising clinical results in many trials, its effect on the long-term durability of aortic repair has not been yet established (4-6).

The use of this method in younger cohort of patients brings concerns as to its long-term durability and efficacy. Long-term follow up is

essential in all patients to monitor endograft failure. Computed tomography (CT) scanning is an ideal imaging modality to monitor for TEVAR-related complications (2).

We report a case of death due to endograft stenosis 20 months following thoracic aortic pseudoaneurysm repair with endovascular stent graft implantation.

Case Presentation

A 23-year-old woman was admitted to our hospital in a comatose state, respiratory distress, hypoxia (O₂ saturation=50%), and tachycardia. Her blood pressure was 120/70 mmHg on admission. Therefore, intubation and mechanical ventilation were immediately performed.

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On physical examination, the lower extremities were cold and cyanotic and lower extremity pulses were undetectable; femoral pulses still palpable. Electrocardiography (ECG) showed sinus tachycardia.

According to her family members, she had complained of chest pain, lower extremity weakness, pallor, and coldness in feet from two days prior to admission. Also, she had had symptoms of intermittent claudicating over the past year.

She had undergone TEVAR 20 months earlier for thoracic aorta pseudoaneurysm, which had been diagnosed in evaluations after a blunt

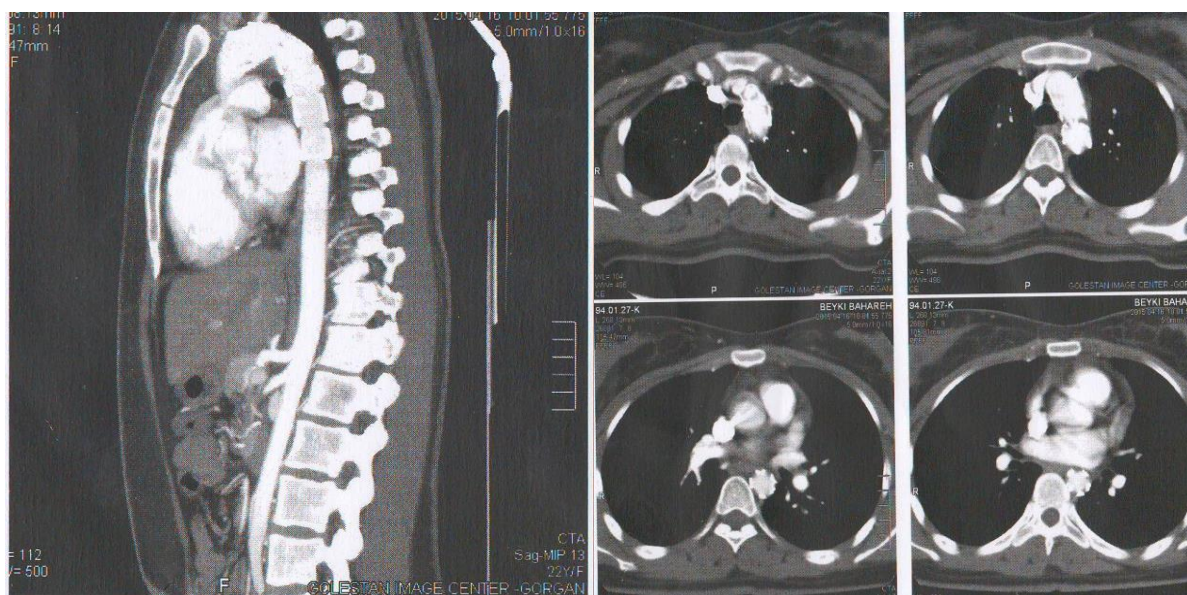
trauma from car accident.

Her medical records revealed a successful implantation of a Zenith Tx2 TAA endovascular stent graft in December 2014, which was very patent in follow-up imaging in April 2015 (Figure 1). However, no further follow-up evaluations had been performed ever since.

Therefore, urgent spiral thoracic aortic CT angiography with contrast was performed to control the stent, where the stent was observed in the upper thoracic aorta and its arch. Severe stenosis (more than 90%) of the thoracic aortic lumen at the distal end of the stent was reported (Figure 2). Also, mild bilateral pleural effusion



Figure 1. Computed tomography angiography, successful implantation of a Zenith Tx2 TAA endovascular stent graft in December 2014, which was very patent in follow-up imaging in April 2015.



Figures 1A and B. Spiral thoracic and abdominal aortic computed tomography angiography with contrast; scan was performed with 16-slice MSCT. The stent is noted in the aortic arch and proximal descending aorta. No aneurysm or dissection is seen, and there is no significant stenosis.

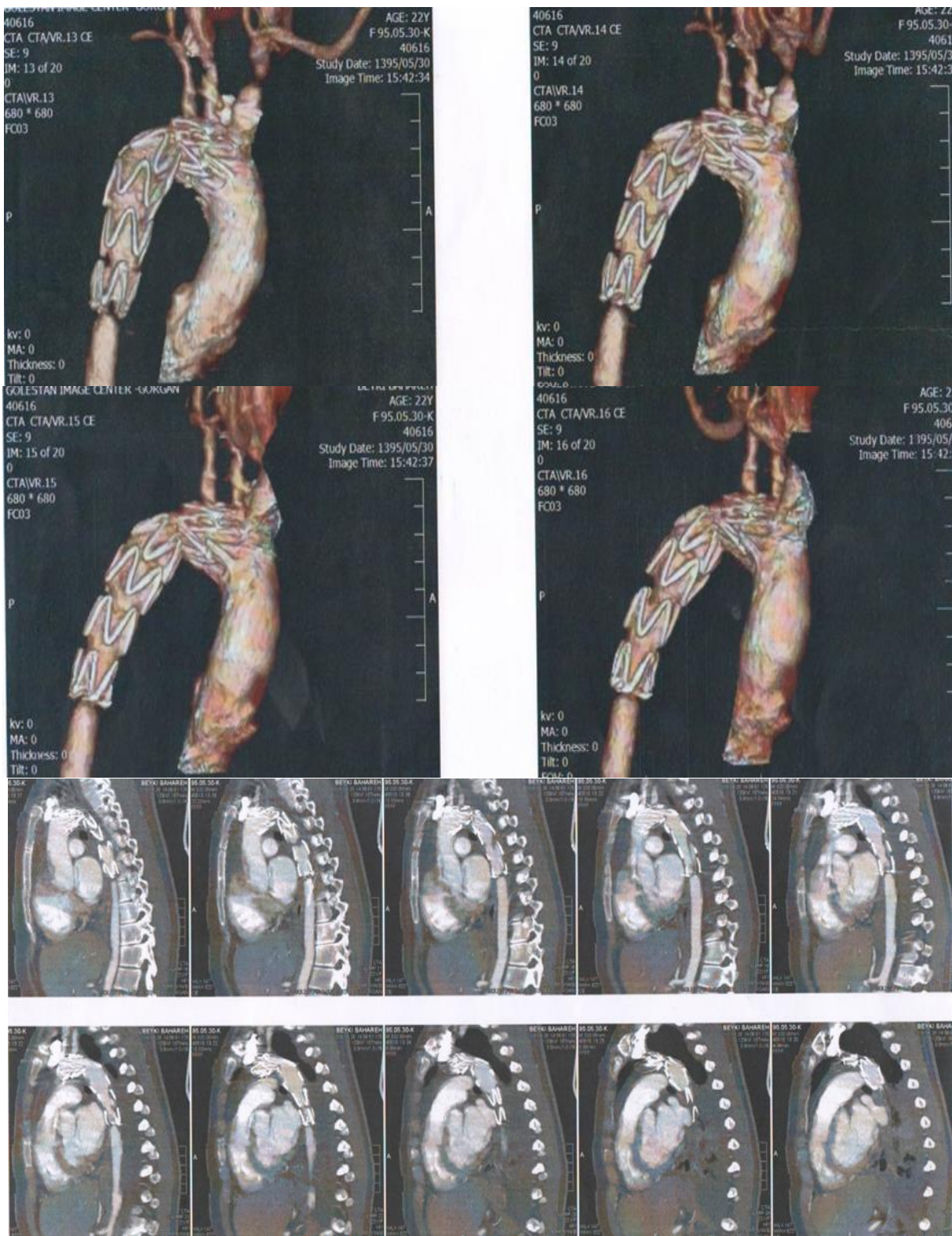


Figure 2. Spiral thoracic aortic computed tomography angiography with contrast. Scan was performed with 16-slice MSCT. Severe stenosis (>90%) of the thoracic aortic lumen at the distal end of the stent has occurred.

and subpleural atelectasis were seen. Patchy alveolar infiltrates mostly involving mid to lower zones were also visible, which were mostly in favor of pulmonary edema.

The next plan was urgent angiography, but unfortunately, before performing that the patient

became bradycard on monitoring, carotid pulse was undetectable, therefore, cardiopulmonary resuscitation (CPR) was started, during which one episode of ventricular tachycardia occurred that was converted with direct current shock. Laboratory data were available by the time and

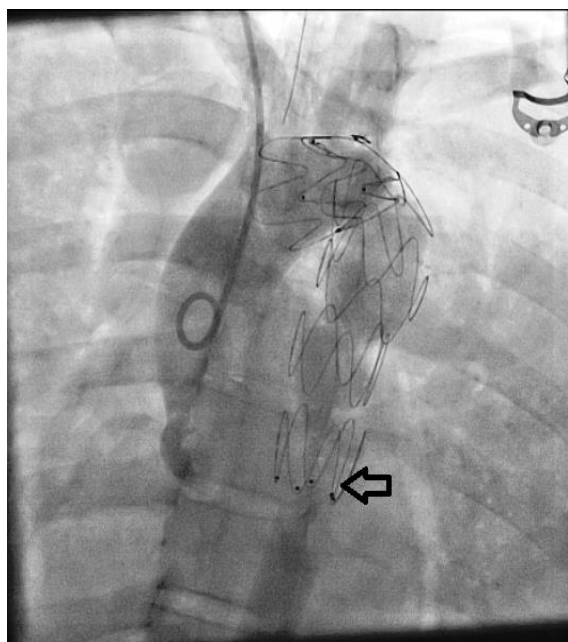


Figure 3. Aortic injection angiogram showing in-graft stenosis

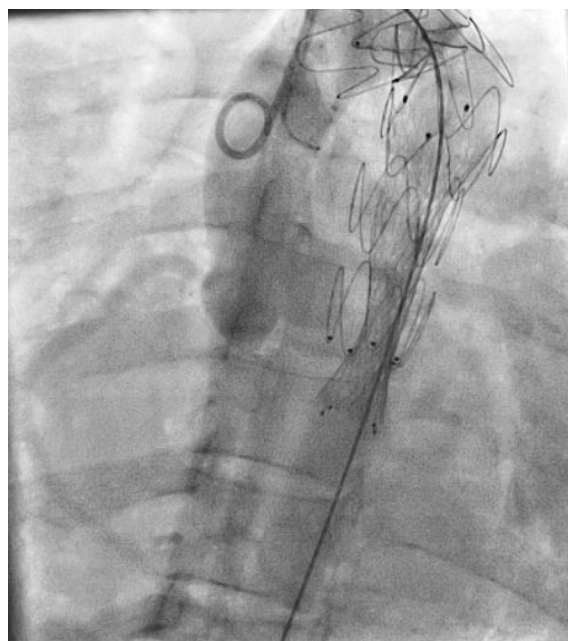


Figure 4A. Stent implantation inside the distal part of the stenotic endograft

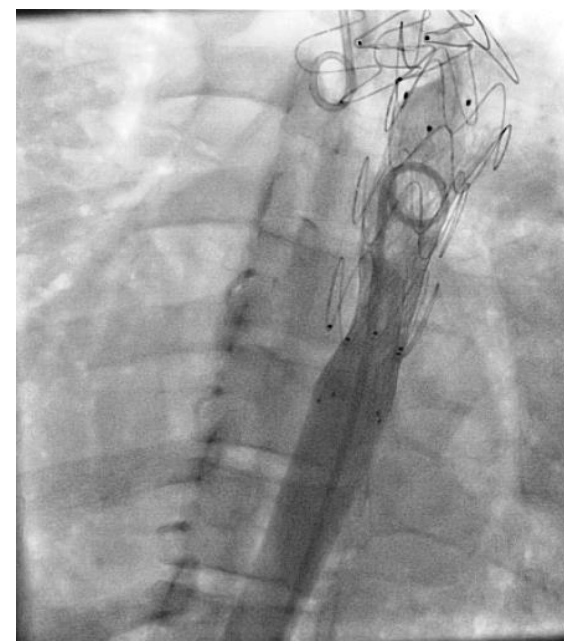


Figure 4B. Descending aortic injection after post-dilation

post-dilated with a 20 × 40 mm Zelose balloon with good technical results. An inner lumen was restored to allow continuous blood flow to the descending aorta (figures 4A and B).

The patient was admitted to intensive care unit. On the following days, her condition progressively deteriorated. Eventually, progressive severe metabolic and respiratory acidosis due to renal failure and acute respiratory distress syndrome in combination with disseminated intravascular coagulation led to death on the tenth day.

Discussion

Meta-analysis studies have revealed exponential

one vial of calcium gluconate was given because of hyperkalemia in laboratory tests. After 8 minutes of CPR, cardiac rhythm returned to sinus tachycardia, and pulses were detectable. Laboratory data also demonstrated severe metabolic and respiratory acidosis (pH=7.07, PCO₂=72.7, HCO₃=21.1, Cr=3.5, Urea=91, Na=132, K=5/6, Hb=12, plt=262000, WBC=34000, INR=1.4, Tpi=0.1, CK-MB=41).

The patient was immediately taken to cardiac catheterization lab and angiography was performed from the right brachial artery. Aortic injection angiograms demonstrated in-graft stenosis at the distal part, confirming the sub-occlusion of the central tract of its lumen (Figure 3).

Urgent angioplasty of the stenosis area was performed by OptiMed 24 × 60 mm stent implantation. The stent was deployed inside the stenotic graft at the distal part, the stent was

improvements in short-term outcomes with TEVAR compared to surgical repair (7, 8). However, long-term data regarding possible late complications, safety, and durability of TEVAR are limited (9).

Various complications may follow endovascular aortic repair such as procedural failure, cerebrovascular accident, ischemic complications, graft and systemic infections, endoleaks, stent graft collapse, intraoperative rupture, and iliac artery injury (10).

Since more young patients with aortic trauma are treated with TEVAR, the long-term interaction between stent grafts and aortic

tissue is of great importance. An experimental study showed intimal hyperplasia and fibrosis limited to the region where stent graft was implemented (11).

Graft migration and graft collapse are late postoperative complications (2 or 3 years after stent graft implantation), which can cause late morbidity and mortality after aortic aneurysm repair. TEVAR surveillance is necessary for the early detection and treatment of graft-related complications. Early intervention in the case of these complications may reduce mortality (2).

Despite the recommended protocols for postoperative surveillance of these patients, a considerable number of patients are lost to follow up, for example, in a monocentric study evaluating follow-up after endovascular aneurysm repair, one-third of patients were lost to follow-up, which was associated with a significantly increased rate of late major complications (12).

In our case and according to the patient history and symptoms, progressive stenosis of the graft stent had happened approximately one year after TEVAR, and after 20 months, it had become severe enough to cause pseudocoarctation syndrome and severe visceral and limb ischemia. Stenosis was revealed with both CT scan and angiography. Percutaneous angioplasty of the stenosis area would have been a suitable treatment if it were performed earlier.

Conclusion

Graft stenosis is a very rare event after TEVAR, and when it grows severe, it can cause serious consequences; thus, it should be recognized and managed urgently. Delayed management and treatment of TEVAR leads lethal complications due to visceral and limb ischemia. This case also showed the importance of long-term surveillance. Probably TEVAR can be avoided in noncompliant patients with critical care follow-ups.

Acknowledgments

None.

Conflict of Interest

The authors declare no conflict of interest.

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