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Aortoesophageal Fistula Secondary to Thoracic Endovascular Aortic Repair of a Descending Aortic Aneurysm Rupture

Sadan Yavuz,[1] Muhip Kanko,[1] Ercument Ciftci,[2] Hakan Parlar,[1] Huseyin Agirbas,[1] Turan Berki[1]

Departments of [1]Cardiovascular Surgery and [2]Invasive Radiology – Angiology Unit, Kocaeli University School of Medicine, Kocaeli, Turkey

ABSTRACT

Purpose: We present the case of a patient who developed an aortoesophageal fistula (AEF) 4 years after thoracic endovascular aortic repair (TEVAR) of a descending thoracic aortic aneurysm rupture.

Case Report: A 60-year-old female patient underwent emergency stent graft placement in December 2006 because of rupture of a distal descending aortic aneurysm. The patient was discharged uneventfully. Four years later, the patient was readmitted because of recurrent hematemesis, weight loss, and malaise. A computed tomography scan and an upper gastrointestinal system (GIS) endoscopy examination revealed an AEF located at the midportion of the esophagus and at the caudal end of the stent graft. An emergency stent graft was re-replaced into the previous graft. The patient died from hemorrhagic shock due to massive GIS bleeding while she was being prepared for secondary major esophageal surgery.

Conclusion: AEF is a catastrophic complication of TEVAR. Conservative treatment is often associated with fatal results. If possible, these patients should be treated with secondary major surgical procedures.

INTRODUCTION

For an aging population, endovascular techniques are appealing because they are minimally invasive. Many investigators have predicted that >80% of all vascular interventions will be replaced by endovascular techniques. Currently, the Achilles heel of this technology is the duration of the repairs. Endovascular treatment of the descending thoracic aorta has become the most important therapeutic option for high-risk patients with thoracic aortic disease. Although the long-term results of thoracic endovascular aortic repair (TEVAR) are still unknown, the limitations and complications associated with endovascular therapy have become increasingly evident [Eggebrecht 2004; Flores 2005; Porcu 2005; Girdauskas 2008].

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Correspondence: Sadan Yavuz, MD, Kocaeli University, School of Medicine, Department of Cardiovascular Surgery, 41100, Kocaeli, Turkey (e-mail: Sadanyavuz67@yahoo.com.tr).

CASE REPORT

A 60-year-old female patient was admitted to the emergency service in December 2006 because of rupture of a descending aortic aneurysm. A computed tomography scan revealed an aneurysm (5 × 4.5 cm) located 5 cm above the diaphragm and extravasation in the para-aortic region. The patient was in a shock state and underwent TEVAR into the descending aorta with a Talent Stent Graft System (Medtronic Vascular, Santa Rosa CA, USA), which was sized according to the manufacturer's instructions for use. The patient was discharged uneventfully. The patient was readmitted 4 years later because of recurring hematemesis, weight loss, and malaise. An upper gastrointestinal endoscopy examination and a thoracic computed tomography scan revealed an aortoesophageal fistula (AEF) located between the midportion of the esophagus and the caudal edge of the stent graft (Figures 1-4). With the patient under general anesthesia, a second covered endovascular Talent Stent Graft System (Medtronic Vascular) was deployed inside the previous one. A control endoscopy evaluation revealed that the fistula tract was closed but that a lesion of 1 × 1.5 cm persisted on the mucosa of the esophagus. Repair of the AEF was planned, and the patient was transferred to the cardiovascular intensive care unit. The patient died from exsanguination caused by episodes of massive gastrointestinal system (GIS) bleeding in the next few hours before the AEF could be repaired.

DISCUSSION

With the growing number of TEVAR and expansion of their indications, late complications of long-term follow-up have recently been reported. Several surgical groups have reported their initial experience with open repair of different diseases of the thoracic aorta after TEVAR. AEF is an uncommon but well-described lethal complication after thoracic aortic stenting. AEF has been reported to occur in approximately in 1.7% to 1.9 % of descending aortic TEVAR procedures [Eggebrecht 2009; Chiesa 2010].

The suggested mechanisms leading to AEF formation include the following: chronic endoleakage into the residual aneurysm sac; direct erosion of the relatively rigid stent graft through the aorta into the esophagus; pressure necrosis

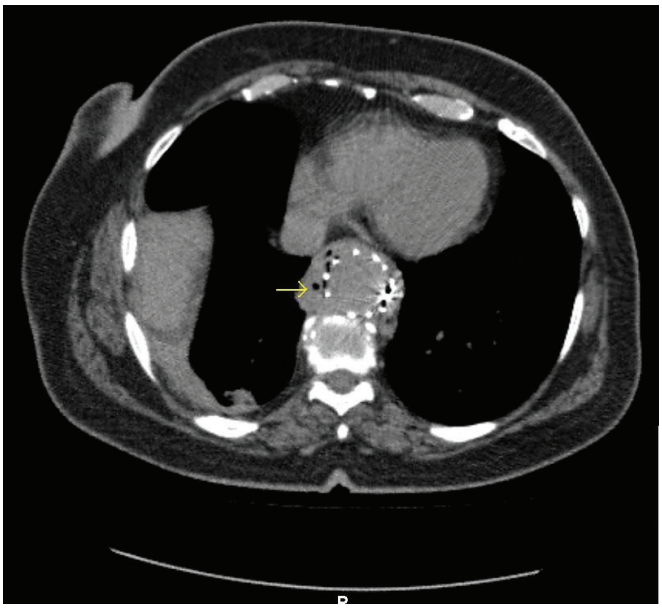

Figure 1. Computed tomography scan showing the presence of air bubbles (arrow) in the mural thrombus of the thoracoabdominal aorta that ruptured into the esophagus.

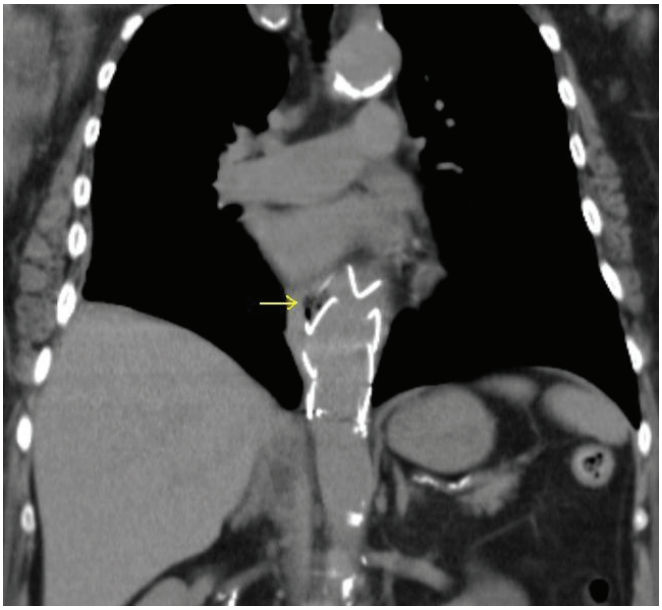

Figure 2. Computed tomography scan showing the presence of air bubbles (arrow) in the mural thrombus of the thoracoabdominal aorta that ruptured into the esophagus.

of the esophageal wall due to the continuing forces of the self-expanding endoprosthesis (pseudoaneurysm); ischemic esophageal necrosis due to stent graft coverage of aortic side branches that feed the esophagus; and infection of the stent graft prosthesis that eventually extends to the esophagus, eroding its wall [Eggebrecht 2004; Riesenman 2005; Girdauskas 2008; Midulla 2008; Eggebrecht 2009; Chiesa 2010].

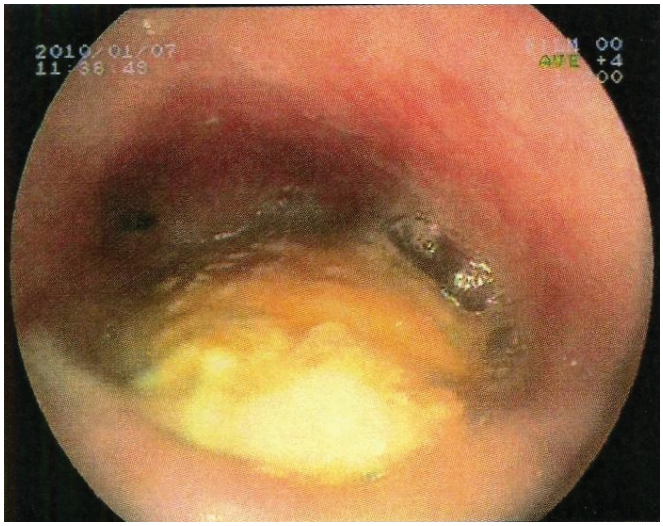

Figure 3. Imaging of the esophageal ulcer and fistula via endoscopy of the esophagus.

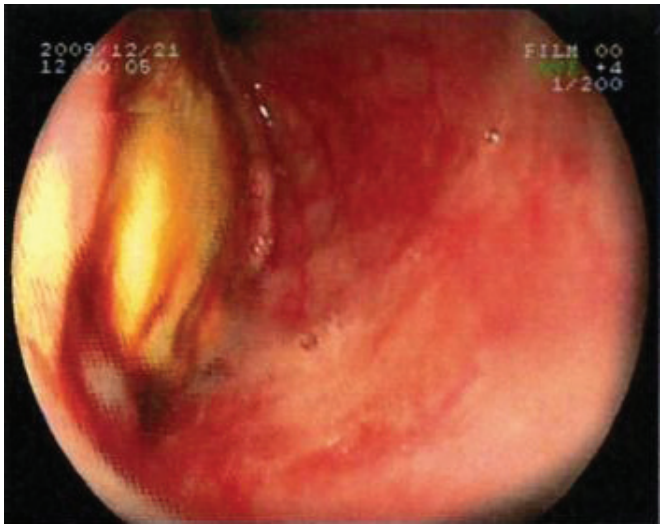

Figure 4. Imaging of the esophageal ulcer and fistula via endoscopy of the esophagus.

In our case, the relatively long period of follow-up without fever and inflammation markers excluded the possibility of a stent graft infection.

Multiple combinations of treatment modalities have been described to deal with AEF. Published reports have confirmed that conservative management to control rebleeding and prevent mediastinitis has almost invariably a fatal outcome, potentially justifying a more aggressive surgical strategy involving esophageal resection [Girdauskas 2008; Isasti 2009]. Recently described procedures include transarterial/thoracic coil embolization [Riesenman 2005] in situ arterial reconstruction, extra-anatomic bypass with concomitant esophageal repair, replacement of the descending thoracic aorta with a prosthetic graft under cardiopulmonary bypass

and hypothermic circulatory arrest, and esophagectomy with cervical esophagostomy and secondary restoration of the gastrointestinal tract with a isoperistaltic transverse colon conduit or a gastric pull-up procedure in 2 stages [Czerny 2005; Riesenman 2005; Girdauskas 2008; Eggebrecht 2009]. Major operative management of AEF carries a significant mortality risk, however, and is frequently complicated by mediastinitis, sepsis, hemorrhage, and multiorgan failure. It is important to recognize that the majority of patients initially undergo TEVAR because their general health status and comorbidities preclude open-surgery repair. Therefore, the majority of AEF patients are usually treated conservatively, because surgical repair is prohibitive because of their general health condition. Recently, endovascular stent graft placement also has been claimed to have been successfully used to treat secondary AEF after surgery, but the subject remains questionable [Metz 2006; Jonker 2009].

Conservative nonsurgical therapy usually produces a fatal outcome due to massive hemorrhage and/or mediastinitis. Conservative management has not yet been defined but has mainly consisted of medical blockade of gastric acid with pump inhibitors and total enteral feeding via percutaneous gastrotomy; antibiotics are applied to fight mediastinitis. Nevertheless, conservative therapy is almost always fatal because of recurrent GIS hemorrhage or chronic mediastinitis [Girdauskas 2008; Isasti 2009]. In our case, the patient was in a shock state, and the first aim was to stop the recurrent hemorrhage. The only way to do this was to repeat the TEVAR procedure, and it was successful for a time. After detecting the AEF with upper gastrointestinal endoscopy, we planned a major surgical intervention directed to the AEF. While the patient was being prepared in the cardiovascular intensive care unit, she died after recurrent episodes of massive GIS hemorrhage.

Endovascular stent grafting is an established treatment modality for the thoracic aorta, especially in emergency situations. After accumulated experience, chronic type B dissections have been identified as the most challenging modality for endovascular therapy. In such cases, the need to cover the aortic arch most of the time, the subtotally narrowed true lumen, and a rigid intimal membrane prevent expansion of the true lumen, leaving the untreated dissected aorta between the celiac trunk and renal arteries with potentially distally located re-entry sites that are prone to persistent endoleaks and endovascular reinterventions. It has recently been stated that it may therefore be necessary to reexamine the indications for endovascular therapy in cases of chronic type B dissections, considering that conventional surgical therapy may still be the choice for a significant proportion of these patients. Although endovascular repair has revolutionized aortic surgery, careful evaluation and an appropriate indication remain essential for this treatment modality [Hansen 2004; Böckler 2006; Fattori 2006; Girdauskas 2008; Fanelli 2009].

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