Complex two-stage open surgical repair of an aortoesophageal fistula after thoracic endovascular aortic repair

Cassius Iyad Ochoa Chaar, MD, MS, RPVI,[a] Mohammad A. Zafar, MD,[b] Camilo Velasquez, MD,[b] Ayman Saeyeldin, MD,[b] *and* John A. Elefteriades, MD, PhD (hon),[b] *New Haven, Conn*

ABSTRACT

Aortoesophageal fistula after thoracic endovascular aortic repair is a rare but fatal complication, and no clear guidelines exist in the literature for optimal management. Herein, we report a complex case of a patient with an infected thoracic endograft that led to an aortoesophageal fistula. The treatment comprised a two-stage open surgical approach—an extra-anatomic aortic bypass in the first stage, followed by explantation of the infected endograft with ligation of the descending thoracic aorta in the second. This approach controls the focus of infection while allowing flow to the aorta distal to the infected endograft, minimizing visceral ischemia time. (J Vasc Surg Cases and Innovative Techniques 2019;5:261-3.)

Keywords: Thoracic endovascular aortic repair (TEVAR); Aorta; Complication; Aortoesophageal fistula; Operative technique

Thoracic endovascular aortic repair (TEVAR) has become the preferred modality for treatment of a wide array of pathologic processes of the descending thoracic aorta, especially in high-risk patients.[1,2] The increasing use of TEVAR in recent years has been associated with recognition of various unusual but fatal complications, such as aortoesophageal fistula (AEF),[3-6] which has an incidence ranging from 1.5% to 2.6%.[4,5,7,8] This case report presents a technical video of a two-stage open surgical approach to treat the AEF with an extra-anatomic aortic bypass, followed by explantation of the infected endograft. The patient consented to this report.

CASE REPORT

A 71-year-old female active smoker with past medical history of hypertension underwent emergent TEVAR at an outside institution for the treatment of an acute penetrating atherosclerotic aortic ulcer in the descending thoracic aorta that was complicated by a groin wound infection with methicillin-resistant *Staphylococcus aureus* (MRSA) requiring surgical debridement. Three months after the index TEVAR procedure, the patient presented to our facility with long-standing melena and a hemoglobin level of 6.3 g/dL; she had a 1-week history of lethargy, nausea, and abdominal pain radiating to the lower back. Computed tomography (CT) of the chest and abdomen revealed air around the endograft (Video), and endoscopy demonstrated penetration of the struts of the endograft into the esophagus. In light of her diagnosis, she was scheduled for urgent and extensive two-stage open surgical correction of the AEF (Video). She was treated with vancomycin and piperacillin-tazobactam (Zosyn).

In the first stage, an extra-anatomic bypass from the ascending aorta to the infrarenal abdominal aorta was performed through midline sternotomy and laparotomy. The aorta in the abdomen was found to be heavily calcified. A tunnel was fashioned by entering the lesser sac through the lesser omentum and exiting through the transverse mesocolon. The aorta was controlled with a side-biting clamp, and a 14-mm Hemashield graft (Maquet Cardiovascular LLC, Wayne, NJ) was used for the bypass.

The second stage was carried out 5 days later and involved explantation of the thoracic endograft and ligation of the descending aorta. A left posterolateral thoracotomy was performed. The phlegmon was immediately apparent, and adhesions to the lung parenchyma were noted. After location of the endograft using epiaortic ultrasound, the descending thoracic aorta was divided with proximal and distal control. The proximal aortic stump was ligated, and the descending thoracic aorta was opened. The distal clamp was placed just above the celiac axis and held satisfactorily.

After removal of the endograft, the distal stump, above the celiac axis, was difficult to close because of fibrosis of the tissues in an "open" position. All the visibly infected tissue was excised. Large, heavy sutures were required to bring the stump together into a secure closure. There was no visible communication with the esophagus. The neighboring scar tissues were approximated over this area. As no direct esophageal opening or fluid leak was noted, no esophageal resection was performed. Large drains were placed in this area.

The patient had a prolonged postoperative course complicated by respiratory failure necessitating reintubation, atrial

From the Section of Vascular and Endovascular Surgery,[a] and Aortic Institute at Yale-New Haven Hospital,[b] Yale University School of Medicine.

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Correspondence: John A. Elefteriades, MD, PhD (hon), Aortic Institute at Yale-New Haven, Yale University School of Medicine, Clinic Bldg CB 317, 789 Howard Ave, New Haven, CT 06519 (e-mail: john.elefteriades@yale.edu).

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fibrillation controlled with amiodarone, and general weakness managed with physical therapy. She was kept on parenteral nutrition. Operating room culture specimens from the infected TEVAR graft grew MRSA, *Candida glabrata*, and *Lactobacillus*. She was therefore treated with a multiantibiotic regimen (vancomycin, ampicillin-sulbactam [Unasyn], and anidulafungin) for 6 weeks. She improved over time and was eventually discharged to a rehabilitation facility after 23 days.

After discharge, the patient continued to recover with a patent extra-anatomic graft as visualized by CT scan, and she resumed oral intake after normal findings on a barium swallow study. She did have two additional admissions in the following period. The first was at 2 months for hypoxia secondary to fluid overload and atelectasis, and the second was 7 months postoperatively for an episode of minor hematemesis. During the second admission, CT scan did not appear to show any extravasation of oral contrast material from the esophagus, and the gastroenterology service's clinical supposition was that the hematemesis was due to a Mallory-Weiss tear. She did not experience further episodes of hematemesis or vomiting and was therefore discharged home.

She then presented at 9 months postoperatively with left flank pain radiating to the left lower abdomen and hematemesis. A CT scan showed a large pseudoaneurysm or contained rupture in the region of the distal aortic stump. After multiple discussions, the patient elected to be made comfortable. She died shortly after. No autopsy was performed.

DISCUSSION

This case report and Video highlight the technical aspects of a surgical repair of an AEF after TEVAR. CT and endoscopy are the mainstays for the definitive diagnosis of AEF as the patient's clinical presentation may be variable and nonspecific.[7,8] Direct visualization and temporary management can be accomplished by endoscopy, especially in patients who are actively bleeding. However, caution must be exercised as endoscopy may itself precipitate hemorrhage.[4]

Because of its rarity, no consensus exists in the literature for the optimal management of AEF after TEVAR. However, there is general agreement that conservative/medical management is invariably fatal, and most specialized aortic centers advocate an aggressive staged open surgical approach as the only successful and durable repair option; in the first stage, radical debridement, stent graft and esophageal excision, and aortic reconstruction are performed, followed by esophageal reconstruction in a delayed second stage.[4,5,7-10] The outlook for AEF patients is generally poor, with a 1-year mortality ranging from 30% to 64%, even at specialized centers.[7-9]

We believe the AEF was probably related to oversizing of the graft, with erosion of the struts. The early MRSA groin infection may have contributed through seeding of the graft. There was no history of underlying esophageal disease.

The staged approach with extra-anatomic grafting decreases the impact of explantation and reconstruction at the same time and places the new graft out of the infected field. Also, having an extra-anatomic bypass in place at the time of explantation minimizes the systemic effect of aortic cross-clamping because the visceral segment and lower body are fully perfused.

We could have used a rifampin-impregnated graft for extra infection protection. Despite the theoretical possibility of new infection of the extra-anatomic graft, there was no clinical evidence for this. We believe that the recurrent infection and subsequent pseudoaneurysm rupture occurred at the distal aortic stump, which eventually terminally ruptured into the esophagus.

There is no agreement as to what should be the ideal aortic substitute in the setting of AEF after TEVAR. The main options are an extra-anatomic aortic bypass (first described in 1969 and used with initial success in the case described), a rifampin-soaked gelatin-impregnated Dacron graft, a bovine pericardial patch fashioned into a neoaorta, and a cryopreserved aortic homograft.[11-14] However, homografts may not always be readily available and may not be of sufficient length for this application.

CONCLUSIONS

AEF is an uncommon but well-recognized and fatal complication after TEVAR. Only an aggressive staged open surgical approach confers any chance of survival. The optimal surgical strategy must be formulated on a case-by-case basis, with the goal of eradicating the infection and reconstructing the aorta and (if indicated) esophagus.

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