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Case Report

Stomach for esophageal replacement after two-stage surgeries of aortoesophageal fistula

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Abstract: A 45-year-old man with Stanford B aortic dissection developed aortoesophageal fistula despite thoracic endovascular aortic repair and esophageal stent implantation. He underwent two-stage surgeries but the esophagus was not reconstructed. Here we present a rare case of stomach for esophageal replacement after two-stage surgeries.

Keywords: Aortic dissection, aortoesophageal fistula, thoracic endovascular aortic repair, stomach for esophageal replacement

Introduction

Aortoesophageal fistula (AEF) is a rare but deadly complication of thoracic endovascular aortic repair (TEVAR) with an incidence rate of 1.9% [1]. It occurs at 1 to 16 months after TEVAR when the enlarged aorta continually compresses the esophagus to cause local ischemia and necrosis. Once diagnosed, AEF should be surgically treated immediately either by esophageal repair or replacement. However, either surgical repair or replacement has been achieved in a very low proportion of patients because most patients usually lose their chances in-hospital or out-of-hospital due to massive bleeding, comorbidities, or multi-organ system failure [1-3].

Thirty-two months ago, a 45-year-old man with Stanford B aortic dissection developed AEF despite TEVAR and esophageal stent implantation. He then underwent two-stage surgeries including 1) a series of extra-anatomic bypass procedures, and 2) removal of the infected TEVAR stent and the ruptured esophagus, followed by gastrostomy, without the reconstruction of esophagus (**Figure 1**). He was admitted to our hospital with the chief complaint of inability to eat. After admission, contrast agents were injected via the gastrostomy tube but the stomach was not visualized (**Figure 2A**). One week later, gastrostomy was performed and the gastrostomy tube was found to have shifted into the jejunum and the size of stomach had markedly shrunk, so the gastrostomy tube was replaced by a new one. At 1 week and 3 months postoperative, the patient underwent gastric radiography to evaluate the size of stomach (**Figure 2B**). Of note, the gastric capacity significantly increased from 200 ml to 1000 ml. Four months after placement of the gastrostomy tube, the patient underwent cervical esophagogastrostomy, resection of esophageal remnant, open adhesiolysis and pleurodesis, through a cervical-thoracic-abdominal incision which had been operated twice previously. During surgery, extensive adhesions of various tissues were observed and thus the anatomical structures were not easily identified. The total blood loss was around 4800 ml, and 12 units red blood cell concentrates and 1600 ml fresh frozen plasma were transfused. Two weeks later, he was re-examined by gastrointestinal radiography to show neither obstruction nor stoma (**Figure 2C**). The patient recovered well and was able to eat on that day. No adverse events such as fever were reported.

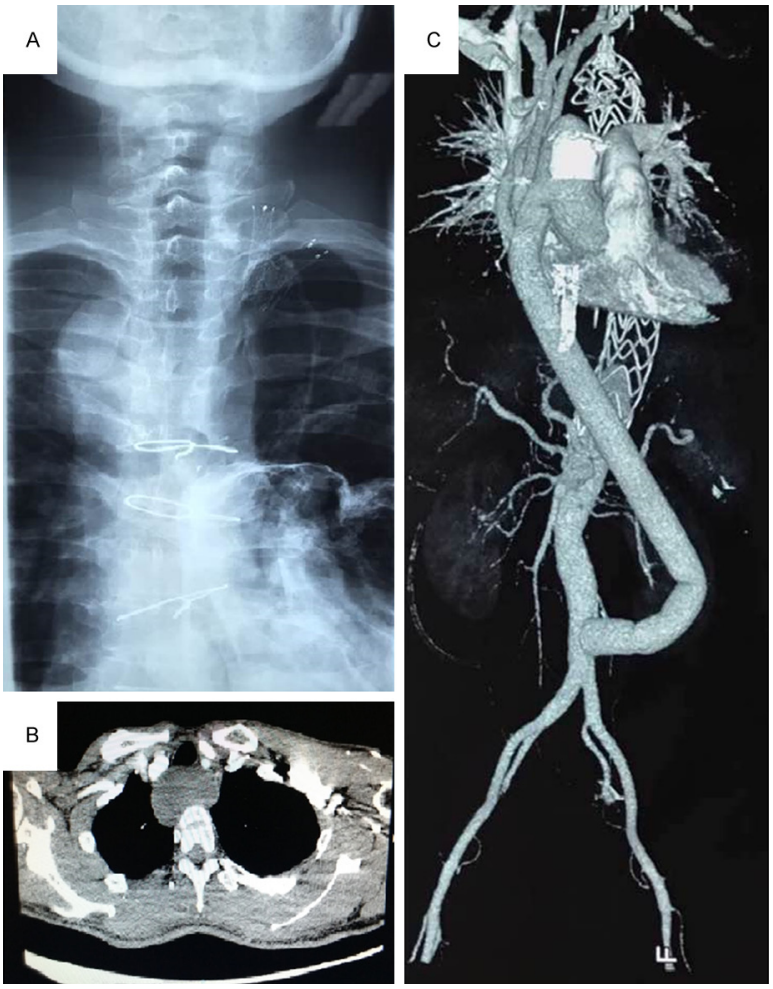

Figure 1. Preoperative images showing the complexities of the anatomical structures. A. Chest radiography showing the thoracic conditions before surgery; B. Preoperative computed tomography image showing a thickened esophageal remnant located behind the cervicothoracic junction; C. Preoperative computed tomography angiogram showing the great vessel prostheses.

Comments

To the best of our knowledge, this is the first successful case of stomach for esophageal replacement in the AEF patient after a relatively long term (32 months) following TEVAR and esophageal stent implantation due to Stanford type B aortic dissection. Engelhardt H et al. reported a 58-year-old man with late-onset AEF 2 years after the initial TEVAR for Stanford type B aortic dissection [4]. The patient underwent open transthoracic esophageal resection and blind closure of the stomach and cervical esophagostomy, three months after which esophageal continuity was restored by retrosternal colon interposition. Miyahara S et al. reported a case with Stanford type B aortic dissection that was successfully treated with extended replacement of total arch and descending aorta and resection of esophagus, but no further surgeries were performed to reconstruct the gastrointestinal tract [5]. Girdauskas E et al. reported a case with rupture of a distal descending aneurysm 3.5 months after stent graft placement [6]. Resection of the perforated esophageal segment with oversewing of the proximal and distal stumps was performed at the first stage. Seven days later, a gastric pull-up procedure was performed to restore esophageal continuity.

Although cervical esophagogastric anastomosis through cervical-thoracic-abdominal incision has been widely used for esophageal carcinoma, our case is much more complicated due to the following reasons: First, although stomach for esophageal replacement is not uncommon, the patient's stomach had markedly shrunk because of the long-term shift of the gastrostomy tube. His small stomach volume was the major barrier for esophageal reconstruction. Therefore, we performed a secondary gastrostomy to allow the patient's nutrition intake through stomach. Subsequently, the stomach was allowed to sufficiently recover before we conducted esophageal reconstruction. We did not use the small intestine or colon for esophageal replacement considering the high complication rate and potential risks. Second, the choice of access for esophageal reconstruction was difficult for this patient. Currently, posterior mediastinum access and anterior mediastinum access have been widely adopted. Coral R et al. observed in autopsy that the posterior mediastinum access was 2.5 cm longer than the anterior mediastinum access and had lower postoperative mortality and complication rates [7]. Posterior mediastinum access has been com-

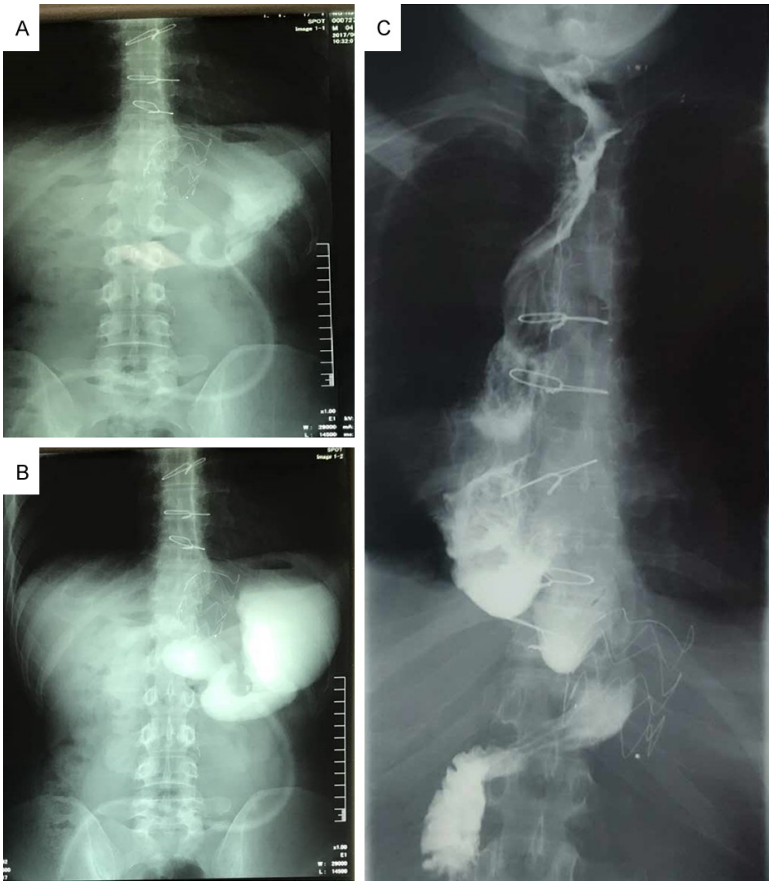

Figure 2. Gastrointestinal radiography showing the processes of gastric recovery. A. Preoperative gastric atrophy with gastric capacity of around 200 ml; B. Gastric capability recovering to 1000 ml 4 months after insertion of a new gastrostomy tube; C. Gastrointestinal imaging showing good continuity of gastrointestinal tract 2 weeks postoperative.

monly used for colon interposition for esophageal replacement. However, in our patient, this access had been blocked by the ascending artery and other abdominal arteries. Furthermore, replacement of the esophagus by intestine requires good blood supplies, but unfortunately, such blood supplies were not identified by us during the surgery. Although the left thoracic access is shorter than the right thoracic access, it's not feasible for our case because two previous surgeries had been performed via this access, causing the esophagus to be extensively adhesive with adjacent tissues. Moreover, a tetrafurcated Dacron graft connecting the ascending aorta to the innominate artery, left common carotid artery, and left subclavian artery blocked the left thoracic access between the stomach and the residual part of esophagus. So the left thoracic access could only be adopted if the patient's stomach was not long enough to reach the esophageal stump [8, 9]. Finally, the right thoracic access was adopted. During surgery, the central parts of the unexpected esophageal remnant were carefully removed and located behind the cervicothoracic junction, while the peripheral parts were retained since it closely adhered to the adjacent tissues. Great attention was paid to avoid any damage to the dorsal tracheal membrane and great blood vessel prosthesis. Additionally attention was paid to dissecting the residual parts of esophagus which relied on (~70%) blood supplies from the inferior thyroid artery and closely adhered to adjacent tissues.

Surgical treatment of AEF has long been a challenging issue. It makes a difference to either repair or replace the ruptured esophagus. Timing is critical for esophageal reconstruction, but no consensus has been reached regarding it. Replacement of the esophagus with the stomach remains the best choice even for those with gastric atrophy. In this case, recovery of gastric function and the choice of surgical access may provide some experience for other thoracic surgeons.

Disclosure of conflict of interest

None.

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