One-stage surgical management of an esophagopericardial fistula presenting with tamponade

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Esophageal fistulas to the airway are rare and frequently fatal complications of chemoradiation therapy in the treatment of squamous cell cancers involving the middle to upper thoracic esophagus. We report a very rare case of a 35-year-old man who presented in cardiogenic shock as a result of tamponade secondary to an esophagopericardial fistula after chemoradiation therapy for a squamous cell carcinoma originating in the distal esophagus. Initial treatment included emergency pericardiocentesis. After clinical improvement, a total esophagectomy with immediate reconstruction was performed, routing a stomach conduit through the anterior mediastinum.

CLINICAL SUMMARY

A 35-year-old man presented with progressive dysphagia and an associated 40-pound weight loss secondary to biopsy-proven, well-differentiated squamous cell carcinoma in the distal esophagus at 35 cm from the incisors. Previous medical history was significant for type 2 diabetes. He reported a 10-pack-year smoking history and denied ethanol abuse. Clinical staging included computed tomography–positron emission tomography fusion imaging and endoscopic ultrasonography, which demonstrated a cT3N0M0 neoplasm. The patient received neoadjuvant chemoradiation therapy with a carboplatin-paclitaxel and 41.4-Gy radiation regimen, with radiation fields set approximately 5 cm beyond the gross tumor volume cranially and caudally and 2 cm in lateral and anteroposterior borders, in accordance with CROSS protocol.¹ The patient had a good clinical response according to repeated computed tomographic imaging. He was scheduled for elective Ivor Lewis esophagectomy 6 weeks after completion of therapy. Three days before scheduled surgery, the patient had rather acute onset of chest pain, dyspnea, and lethargy. He presented to a local emergency department with severe hypotension, tachycardia, and acidosis (base deficit –14 mEq/L). The patient was intubated on an emergency basis, and vasoactive

The anastomosis is performed in the upper anterior mediastinum and covered with a muscle.

Central Message

We report a rare case of successful 1-stage management of a patient who presented in cardiogenic shock as a result of tamponade secondary to esophagopericardial fistula after chemoradiation therapy.

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agents and antibiotics were administered. Chest computed tomography was suggestive of a large pericardial effusion and a distal esophageal perforation (Figure 1). He was rapidly transferred to our institution, where a transthoracic echocardiogram confirmed a hemodynamically significant pericardial effusion and an emergency ultrasound-guided pericardiocentesis, which yielded 650 mL of purulent material, resulted in hemodynamic stability. Subsequent pericardial fluid cytologic examination, however, was negative for malignant cells and showed no bacterial or fungal growth. A contrast esophagogram confirmed a distal esophageal perforation in the location of the treated neoplasm, with a 1-cm wide fistulous tract extending anteriorly into the middle mediastinum. The patient required kidney replacement therapy but was otherwise clinically stabilized 4 days later and was determined to be a candidate for what was thought to be palliative surgical management for a malignant fistula with pericardial sac involvement.

A right thoracotomy through the 6th intercostal space was initially performed for decortication of a basilar empyema, mediastinal débridement, and pericardial irrigation. The gastric cardia was divided just below the gastroesophageal junction with a stapler and the esophagus, fistula tract, and involved pericardium with surrounding lymph nodes were mobilized into the thoracic inlet. The thoracotomy

FIGURE 1. Representative computed tomographic image that shows significant pericardial effusion (red arrow) and distal esophageal wall and mediastinal air (yellow arrow), suggestive of esophageal perforation.

incision was closed after pericardial and mediastinal drains were placed. As the patient remained in stable condition, it was determined that immediate reconstruction, as opposed to excision and cervical esophageal diversion, should be considered for optimal palliation. The patient was placed in supine position, and an upper midline laparotomy performed. A celiac lymph node dissection was accomplished, and a gastric conduit was constructed, including a Heineke-Mikulicz pyloroplasty. The diaphragmatic crus was closed with a bioprosthetic mesh because of a relatively large crural defect in an infected field, and a feeding jejunostomy tube was placed. The leftward sternoclavicular joint was excised. The stomach conduit was advanced through the anterior mediastinum, avoiding the bacterial contamination and possible malignant seeding of the posterior mediastinum. A side-to-side cervical esophagogastric anastomosis was established and covered with an ipsilateral pectoralis major rotational flap (Figure 2).² The patient's postoperative course was uneventful and included resolution of renal failure. Pleural and pericardial drains were removed after negligible drainage, 2 and 3 weeks after surgery, respectively. Antibiotics were discontinued after 10 days. The patient was discharged in good condition tolerating an oral diet on the 32nd postoperative day. Gratifyingly, the final pathologic examination demonstrated a complete pathologic response without evidence of residual neoplasm in the esophagus and 10 lymph nodes sampled. The patient has continued to do well and remains free of disease 3 years after surgery.

DISCUSSION

Esophagopericardial fistulas are very rare and typically fatal complications of benign or malignant esophageal diseases. Although very rare, a fistula to the pericardium

FIGURE 2. Representative image of the esophagogastric anastomosis (EGA) at the thoracic inlet. Under the left sternoclavicular joint, the esophagogastric anastomosis was performed in a side-to-side fashion. The anastomosis was covered with a pectoralis rotational flap (black arrow) to help contain any potential anastomotic leak, as well as to buttress the bony thoracic inlet defect. CC, Clavicular cut; FRC, first rib cut; PM, pectoralis major muscle; MC, manubrial cut.

secondary to an esophageal malignancy is arguably more amenable to either curative or palliative surgery, however, than fistulas to airway or aorta. Similar to pathophysiology of the more common esophageal airway fistulas, neoadjuvant chemoradiation increases the risk of esophagopericardial fistula formation.³

The standard surgical option for a perforated esophageal carcinoma would be esophagectomy with establishment of an end-esophageal fistula and consideration of delayed reconstruction. This approach, although potentially life-saving, obviously leaves patients with poor quality of life for a predictable short life expectancy. The unusual patient who does recover from such an operation then faces a second major reconstructive surgical procedure. Alternatively, endoscopically placed self-expanding stents have been described for management of benign and malignant esophageal perforations, including fistulas into adjacent organs (Table 1). Consideration could have been given to a temporizing stent before surgery; however, complete pericardial drainage and mediastinal débridement was deemed to be needed. There has been some success with use of esophageal stent placement and pericardial drainage in benign esophagopericardial fistula secondary to ablation for atrial

TABLE 1. Reported cases of esophagopericardial fistula secondary to esophageal malignancy

Report	Etiology	Presentation	Management	Outcome
Wang ⁴	Squamous cell carcinoma	Cardiac tamponade	Percutaneous pericardial drainage	Discharge from hospital, unknown follow-up
Takayama ⁵	Squamous cell carcinoma	Purulent pericarditis	Pericardial drainage	Died (6 wk)
Cheng ⁶	Esophageal carcinoma (unknown type)	Pyopneumopericardium	Pericardial drainage	Died (10 d)
Dafnios ⁷	Adenocarcinoma of the esophagogastric junction	Pneumopericardium, pleural effusion	Pericardial drainage, pleurodesis	Died (5 wk)
Włodarczyk ⁸	Esophageal carcinoma (unknown type)	Cardiac tamponade	Pericardial drainage, esophageal stent	Died (7 mo)
Tombazzi ⁹	Squamous cell carcinoma	Cardiac tamponade	Esophageal stent	Died (5 wk)
Peyrin-Biroulet ¹⁰	Squamous cell carcinoma	Purulent pericarditis	Pericardial drainage	Died (<24 h)
Wiedmann ¹¹	Esophageal carcinoma (unknown type)	Purulent pericarditis and bilateral pleural effusion	Esophageal stent	Died (3 mo)
Kaufman ¹²	Esophageal carcinoma (unknown type)	Cardiac tamponade	Pericardial drainage, patient refused esophageal stent	Died (7 d)
Nakshabendi ¹³	Adenocarcinoma	Pyopneumopericardium	Esophageal stent	Died (2 wk)
Kohl ¹⁴	Squamous cell carcinoma	Pericardial effusion	Esophageal stent	Died (6 wk)
Tukkie ¹⁵	Adenocarcinoma	Hydropneumopericardium	Esophageal stent	Discharge from hospital, unknown follow-up
Welch ¹⁶	Squamous cell carcinoma	Purulent pericarditis	Pericardial drainage, cervical esophagostomy	Died (20 d)

fibrillation.¹⁷ Among all patients reported to have undergone stent placement for malignant esophagopericardial fistulas, with or without pericardial drainage to date, however, there have been no long-term survivors, with most dying within a few weeks of intervention.^{7,15} In light of the patient's age, clinical stability, and satisfactory mediastinal débridement, we elected to perform an esophagogastrectomy with immediate reconstruction with a gastric conduit routed through the uncontaminated anterior mediastinum, allowing resumption of an oral diet and sparing a second reconstructive operation. We believe that a similar surgical approach could be used for patients with localized malignant esophageal perforations without fistulization into adjacent organs.

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