Management of esophageal anastomotic leaks, perforations, and fistulae with self-expanding plastic stents

Yiyang Dai, MD,[a] Sascha S. Chopra, MD,[b] Sören Kneif, PhD,[a] and Michael Hünerbein, MD, PhD[a]

Objective: Esophageal anastomotic leaks, perforations, and fistulae are associated with considerable morbidity and mortality. The aim of the present study was to assess the efficacy of self-expanding plastic stents in the treatment of esophageal leaks.

Methods: From 2001 to 2009, 41 patients with postoperative anastomotic leaks (n = 30), esophageal perforations (n = 6), or fistulae (n = 5) were treated by endoscopic insertion of self-expanding plastic stents. The clinical outcome of the patients was analyzed, including leak healing, morbidity, and mortality.

Results: Self-expanding plastic stents were successfully inserted in all 41 patients without procedure-related complications. Non-ventilated patients received oral feeding an average of 3.9 days after stent placement. Complete leak healing was obtained in 27 of 30 patients (90%) with anastomotic leaks and 5 patients (83%) with perforation. Sealing of fistulae by the stents was achieved in all 5 patients, and closure of the fistula was observed in 2 patients (40%). The mean healing time was 30 days for anastomotic leaks, 15 days for esophageal perforations, and 16 days for fistulae. Stent migration occurred in 14 cases, but endoscopic reintervention and new stent placement were successful in all cases. In-hospital mortality after treatment of esophageal leaks with stents was 10%.

Conclusions: In combination with effective interventional or surgical drainage, stenting is a viable option for the treatment of esophageal anastomotic leaks and perforations, but the success in tracheoesophageal fistula is limited. (J Thorac Cardiovasc Surg 2011;141:1213-7)

GTS

Through advances in surgical technique and adjuvant treatment, the prognostic outcome of esophageal cancer has improved, but anastomotic leaks after gastroesophageal resections for cancer are still a therapeutic problem.[1-3] Spontaneous ruptures or esophageal perforations after endoscopic procedures are also potentially life-threatening events. The most effective way to manage these complications remains controversial. In the past, aggressive surgical reexploration and conservative treatment with additional drainage, total parenteral nutrition, nasogastric decompression, and broad-spectrum antibiotics have been associated with considerable mortality rates (20%–40%), extensive intensive care unit (ICU) stay, and lengthy hospitalization of patients.[4-6] Modern surgical management of esophageal leaks with early reoperation and primary anastomotic repair and reinforcement of the anastomosis with muscle flaps results in significantly lower mortality rates.[7,8] Endoscopic placement of self-expanding metal stents (SEMS) has been successfully used for definitive palliative treatment of tracheoesophageal fistulae caused by advanced mediastinal malignancy or radiochemotherapy for esophageal cancer.[9,10] However, there is only limited experience with temporary stenting for the treatment of benign esophageal leaks, such as anastomotic leakage and perforation.

This study evaluated the efficacy of self-expanding plastic stents (SEPS) for the treatment of esophageal anastomotic leaks, esophageal perforations, and fistulae in a group of 41 patients.

MATERIALS AND METHODS

Patients

From 2001 to 2009, SEPS were used in 41 patients for the treatment of postoperative esophageal anastomotic leaks, esophageal perforations, or tracheoesophageal or mediastinal fistulae. This analysis includes 30 patients from our hospital and 11 patients who were transferred from other institutions. All leaks were diagnosed by esophagogastroscopy and a contrast study. Indication for stenting was limited to patients with leaks involving less than 30% of the esophageal circumference and without extensive necrosis of the gastric conduit. Institutional review board approval was not necessary because esophageal stenting was considered as a routine procedure that was added to conservative treatment of esophageal leaks. There were 32 male patients and 9 female patients with a mean age of 63 years (range, 49–90 years). Postoperative anastomotic leaks occurred in 30 patients after abdomino-thoracic esophagectomy with an esophagogastric (n = 18) or esophago-colonic anastomosis (n = 1), transhiatal resection with an esophagogastrostomy (n = 3), gastrectomy with esophagojejunostomy in the lower mediastinum (n = 8), or resection of a diverticulum of the esophagus (n = 1). Three patients had a cervical leak, and 27 patients had a thoracic leak. The interval between surgery and leak detection ranged from 1 to 33 days (mean, 7.6 days). Esophageal perforations were observed

From the Department of Surgery and Surgical Oncology,[a] Helios Hospital, Berlin, Germany; and Department of General, Visceral and Transplantation Surgery,[b] Charite Campus Virchow Hospital, University of Medicine, Berlin, Germany.

Disclosures: Authors have nothing to disclose with regard to commercial support.

Received for publication April 24, 2010; revisions received June 29, 2010; accepted for publication July 11, 2010; available ahead of print Dec 17, 2010.

Address for reprints: Michael Hünerbein, MD, PhD, Department of Surgery and Surgical Oncology, Helios Hospital Berlin, 13122 Berlin, Germany (E-mail: michael.huenerbein@helios-kliniken.de).

0022-5223/$36.00

doi:10.1016/j.jtcvs.2010.07.096

Abbreviations and Acronyms
CT = computed tomography
ICU = intensive care unit
SEMS = self-expanding metal stent
SEPS = self-expanding plastic stent

in 6 patients after dilatation of malignant (n = 3) or benign stenoses (n = 2) and as the result of vomiting (Boerhaave's syndrome) in 1 patient. Tracheoesophageal fistulae occurred in 3 patients after radiochemotherapy of advanced esophageal cancer, but there was also 1 case with postoperative anastomotic leakage. An esophago-pleural fistula after migration of a gastric band and repeated surgery developed in 1 patient. The detailed clinicopathologic data of the patients are shown in Table 1.

Stenting

All patients were treated by insertion of SEPS (Polyflex; Boston Scientific, Natick, Mass). The Polyflex stent consists of an integral polyester braid that is completely covered with a silicone membrane (proximal diameter, 25 mm; body diameter, 21 mm; length, 12/15 cm). Only large stents were used because smaller sizes have a higher tendency to migrate. Usually the stent was placed immediately after the diagnosis of a leak was made by endoscopy, but there was some delay in patients who were transferred from other institutions. The mean interval from diagnosis of the leak to stent placement was 2.7 days for anastomotic leaks, 3.2 days for esophageal perforations, and 2.2 days for esophageal fistulae. The stent was placed immediately during index endoscopy in 25 patients, within 24 hours in 10 patients, and after more than 24 hours in 6 patients. Three patients were initially treated with a covered SEMS before the plastic stent was implanted. Stent placement was performed under combined endoscopic and fluoroscopic control. The details have been described.[11] Briefly, all patients received intravenous conscious sedation with 3 to 5 mg midazolam. By using a Seldinger technique, the stent was inserted into the esophagus with at least a 3- to 4-cm overlap proximal and distal to the leak. Correct placement of the stent and successful leak occlusion were confirmed by endoscopy and contrast-enhanced fluoroscopy with a water-soluble contrast agent (Figure 1). Oral intake was started with clear fluids the day after stent implantation. If that was tolerated well, enteral nutrition was escalated in the following days. Ventilated patients received a transnasal double-lumen catheter for jejunal feeding and gastric drainage. Effectiveness of the treatment was assessed by the quality of drainage fluids and clinical improvement of the patient. Contrast-enhanced fluoroscopy or computed tomography (CT) was performed if there was any doubt about effective leak closure.

If necessary, additional chest tubes were inserted via mini-thoracotomy or interventional drainages were placed under CT guidance. In the initial period, the stent was removed after 1 week to assess healing of the lesion and exclude stent-related complications, but later the time was extended to approximately 14 days. Complete closure of the leak was confirmed endoscopically and by contrast-enhanced fluoroscopy (Figure 1). If there was evidence of a residual leak, another stent was inserted and the procedure was repeated 10 days later. Except in 1 postoperative case, stenting of tracheoesophageal fistula was considered as a definitive palliative treatment.

Data Analysis

Clinical data of patients and treatment were entered prospectively in a database. This analysis includes all patients who were treated by stenting. In this group of patients, the exact number of patients who were treated surgically or by stenting is unknown because some of the patients were transferred from other institutions.

Data for assessment of the efficacy of stent treatment included number of stents required, time to oral intake, ventilatory support, time of ICU stay, and time of hospital stay. Complications of stent implantation, such as migration, obstruction, and bleeding, were also recorded. Complete healing of the leak, perforation, and fistula was assessed by esophagogastroscopy, radiography with water-soluble contrast enhancement, and multislice CT scan. All patients enrolled in the study were followed up in 3-month intervals after SEPS removal.

RESULTS

SEPS were successfully inserted in all 41 patients with esophageal leaks. There was no technical failure in stent placement. Except for stent migration, procedure-related complications were not observed. Usually, it was no problem to reposition the stent endoscopically using a forceps. In case of a leak associated with a stricture, a snare technique was used. The loop of the snare was placed around the proximal end of the stent and tightened. The compressed stent was then gently replaced over the leak.

There was no problem with pain or airway obstruction in patients with proximal or mid-third esophageal stent placement. A single stent was implanted in 27 patients with anastomotic leak (90%), 5 patients with esophageal perforation (83%), and 3 patients with esophageal fistula (60%). Overall repeated stenting was necessary in 38 of 41 patients. In non-ventilated patients, the mean time to oral intake was 3.0 days (range, 0–19 days).

Complete sealing of the leak immediately after stenting was observed in 25 of 30 patients (84%) with anastomotic leakage. In some patients with a gastric conduit (n = 4) or colonic conduit (n = 1), there was backflow of contrast around the stent in the reverse Trendelenburg position. These patients were instructed to maintain an upright position as much as possible. Healing of the anastomotic leak without reoperation was achieved in 27 of 30 patients (90%). Two patients with mediastinal leaks underwent repeat surgery with anastomotic repair because of persistent leakage despite stent treatment. Both patients subsequently died of persistent sepsis and multiorgan failure. Rethoracotomy was performed in 1 patient with a leak of an esophago-colonic anastomosis because of stent dislocation and inability to place new a stent. A new stent was placed intraoperatively, and the leak healed after 19 days. Stent treatment of perforations was successful in 5 of 6 patients (83%). Two patients with esophageal cancer underwent curative esophagectomy after healing of the leak and regeneration. No further treatment was required in 3 patients with benign perforations. One geriatric patient died of severe sepsis resulting from pneumonia and residual mediastinitis.

In the group with fistula, there were 3 patients with advanced esophageal cancer in whom stenting was performed as a definitive palliative treatment. As expected, control bronchoscopy confirmed persistence of the fistula in all 3 patients until they died of progressive disease. However, healing of the fistula was achieved in 2 patients (40%).