

Endoscopic Clip Closure of Benign Esophagopleural Fistulas

by Kimberly Salaycik Kolkhorst, Eric Hill, Patrick Brady

Background: The development of benign esophagopleural fistulas is associated with a poor prognosis and may result in severe respiratory compromise. Esophagopleural fistulas rarely close spontaneously. Surgical management, the standard treatment, is associated with significant morbidity and mortality and significant costs. In this study, we present the result of endoscopic closure of three acute esophagopleural fistulas using metal clips.

Methods: Three patients (2 female and 1 male) with a mean age of 80, who had developed an esophagopleural fistula (mean age 12.7 days) as a result of esophageal surgery, were treated endoscopically by application of metal clips.

Observations: Endoclip treatment resulted in complete fistula closure, as confirmed by Gastrografin esophagography, in all three patients after one session.

Conclusions: The use of endoscopic clips in the closure of benign esophagopleural fistulas is an effective and safe alternative to surgery.

INTRODUCTION

Esophagopleural fistulas (EPF) are anomalous tracts that connect the lumen of the esophagus to the pleural lining of the respiratory tract. They can be of congenital or acquired in origin. Acquired EPF are categorized as malignant or benign. Benign esophagopleural fistulas (BEPF) are most commonly reported after pulmonary resection.¹ Additional etiologies include infection, trauma, radiation, iatrogenic injury, prolonged mechanical ventilation and prior esophageal surgery. The development of BEPF is associated with a poor prognosis and, if untreated, leads to pleural effusion, respiratory compromise, sepsis and death. Patients that survive acute episodes are at additional risk of developing chronic fistulas that become more difficult to manage.

Spontaneous closure of BEPF is rare and conservative management alone is often insufficient. The aims of effective treatment are to treat the infection, support nutrition, eradicate the pleural effusion and close the fistula. Traditionally, BEPF are closed surgically via a transthoracic approach, however, this is a high-risk procedure that is associated with significant morbidity, mortality and hospital costs.²

Advances in endoscopic techniques have increased therapeutic options for patients and minimally invasive procedures often offer a safe alternative to surgery. In this article, we present our experience using endoclips to close benign esophagopleural fistulas that resulted from recent esophageal surgery in three patients. The data on these patients was collected prospectively as part of a study of enteric fistula closure using endoscopic clips. This study has been approved by the University of South Florida IRB.

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CASE REPORTS

Patient 1

An 89 year-old Caucasian female underwent laparoscopic Heller myotomy, esophageal diverticulectomy and anterior fundoplication for a hiatal hernia and esophageal diverticulum. Ten days later, she presented to the emergency room (ER) complaining of worsening fatigue, cough, dyspnea, subjective fevers and anorexia. She was found to have a leukocytosis and computed tomography (CT) scan of the chest revealed a loculated, right-sided pleural effusion. The patient was made NPO, started on antibiotics and received a CT-guided thoracentesis and thoracostomy tube. In order to support nutrition, a nasoenteric feeding tube was placed and jejunal tube feedings were instituted. Gastrografin esophagography revealed a fistulous tract at the right aspect of the distal esophagus with a contained leak tracking laterally to the right (Figure 1A). Esophagogastroduodenoscopy (EGD) identified a fistulous tract opening at 34 cm measuring 3 mm in diameter (Figure 2A). Two Resolution™ clips (Boston Scientific, Natick, MA) were placed, however, only one was successful in approximating the edges over the area of the fistulous tract (Figure 2B). The patient remained NPO and follow-up Gastrografin esophagography two days later revealed a focal outpouching of the esophagus in the area of prior leak but no further evidence of

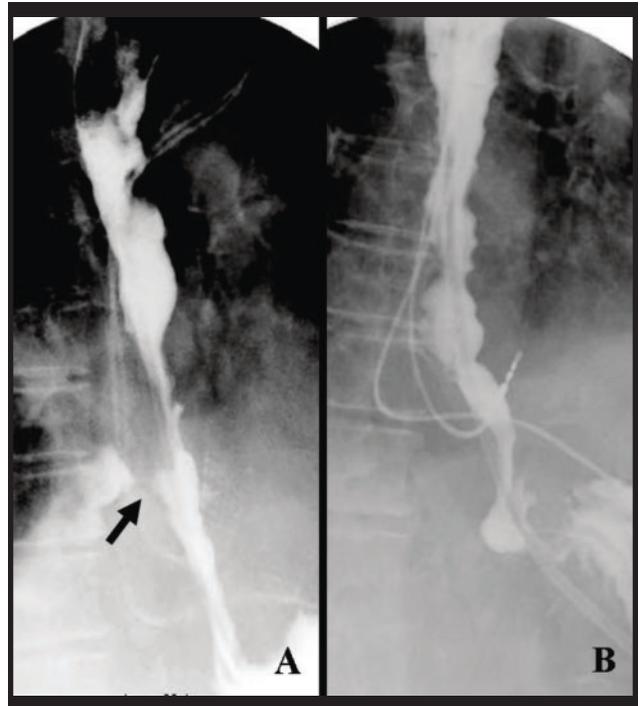


Figure 1. Gastrografin esophagography. **A.** Fistulous tract at the right aspect of the distal esophagus with contained leak tracking to the right (black arrow). **B.** No further evidence of esophageal leak after endoclip placement.

leak (Figure 1B). Her diet was advanced as tolerated and the nasoenteric tube was discontinued. She was discharged to a skilled nursing facility five days after

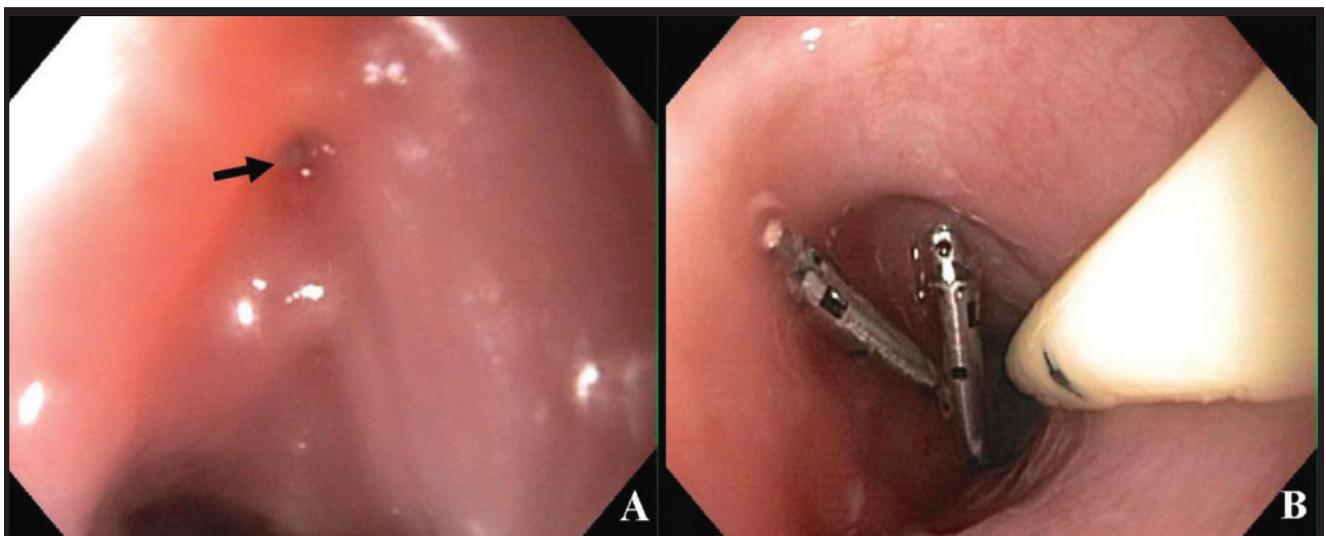


Figure 2. Endoscopic images. **A.** Fistulous tract (black arrow) identified within the esophagus. **B.** Post clip placement. The clip farthest from the Dobhoff tube was successful in approximating the edges of the fistula.

clip placement and did not experience recurrence of the pleural effusion.

Patient 2

A 73 year-old Caucasian male with adenocarcinoma of the distal esophagus underwent 5 weeks of chemotherapy and radiation followed by Ivor Lewis esophagectomy, pyloroplasty and feeding jejunostomy tube placement. Post-operatively, the patient developed an esophageal leak as evidenced by the presence of grape juice in the chest tube after oral consumption. Gastrografin esophagography, however, was without evidence of an esophageal leak. The chest tube drainage eventually slowed and the patient was discharged with the chest tube in place. Three weeks later, he presented for outpatient follow-up and was found to have increased drainage of up to 200 cc/day of thick yellow-brown fluid with a foul odor. He was then admitted to the hospital and made NPO. CT scan of the thorax revealed a leak of enteric contrast at the level of the esophageal anastomosis with extravasation directed posteriorly into the right chest (Figure 3A). EGD performed the subsequent day identified a fistulous tract at 33 cm measuring 6 mm in diameter (Figure 4A). Four Resolution™ endoclips were positioned over the fistulous tract (Figure 4B). A Gastrografin esophagography obtained the following day revealed resolution of the previously identified fistulous tract (Figure 3B). His diet was successfully advanced and the patient was discharged to home.

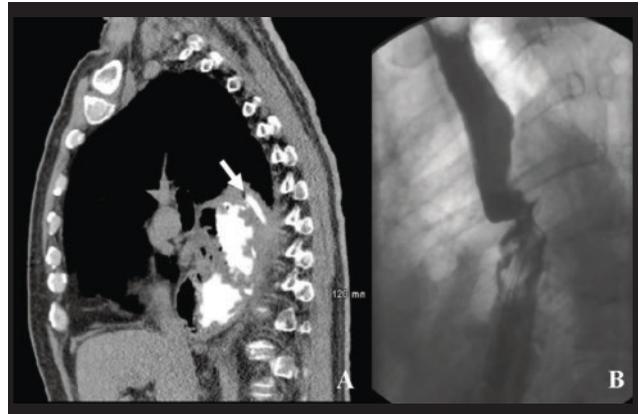


Figure 3. **A.** CT scan of the thorax revealing a leak of enteric contrast at the level of the esophageal anastomosis with extravasation directed posteriorly into the right chest (white arrow). **B.** Gastrografin esophagography without evidence of esophageal leak one day following endoclip placement.

Patient 3

A 78 year-old Caucasian female underwent a Heller myotomy with anterior fundoplication and esophageal diverticulectomy for achalasia with an esophageal diverticulum. She subsequently developed respiratory failure seven days later. A CT of the chest revealed a loculated, right-sided pleural effusion. A bedside chest tube was attempted, but was unsuccessful. She was taken to the operating room (OR) and underwent video-assisted thoracic surgery with drainage of the effusion, take-down of loculations and received two

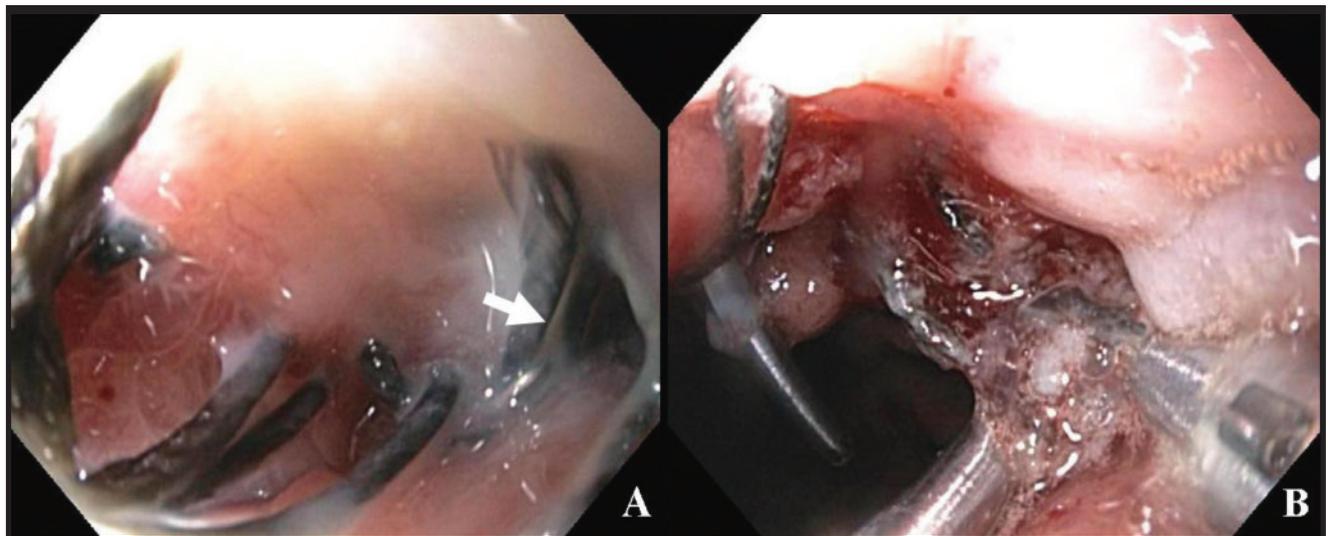


Figure 4. Endoscopic images. **A.** Fistulous tract (white arrow) located at area of previous esophageal anastomosis. **B.** Three endoclips were released, but two clips (located on the right) were successful in approximating the edges of the fistula.

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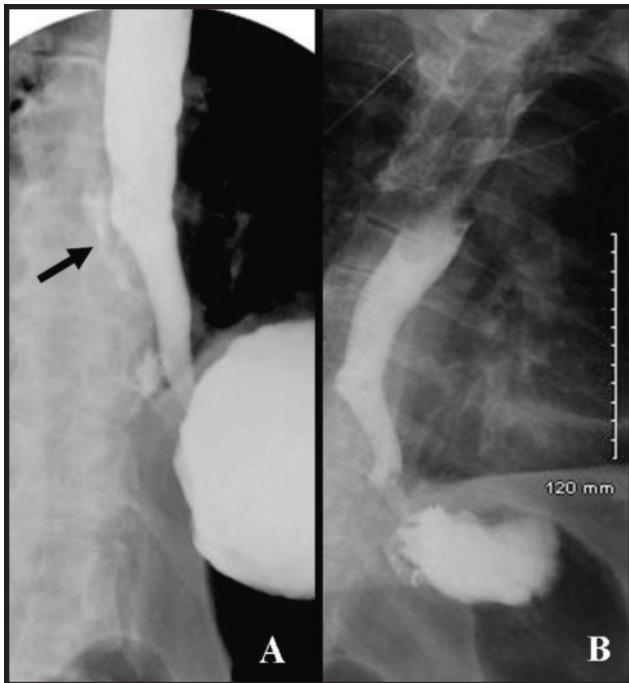


Figure 5. Gastrografin esophagography. **A.** Extravasation of contrast from the distal esophagus prior to clip placement (black arrow). **B.** No further evidence of contrast extravasation after clip placement.

chest tubes; however, the pleural effusion recurred. Gastrografin esophagography revealed extravasation of contrast from the distal esophagus (Figure 5A). EGD identified a fistulous tract at 32 cm measuring 5 mm in diameter (Figure 6A) with occasional air bubbles

emanating from it. One Resolution™ endoclip was placed over the fistulous tract (Figure 6B). Gastrografin esophagography obtained five days later showed a small outpouching in the area of previous leak but no evidence of extravasation of contrast (Figure 5B). Throughout the hospital course, the patient remained NPO and received TPN for nutritional support. After closure of the esophagopleural fistula was confirmed, her diet was advanced as tolerated and she was discharged to a skilled nursing facility without additional recurrence of the pleural effusion.

DISCUSSION

Benign esophagopleural fistulas are commonly associated with respiratory complications and present significant management challenges. The persistent flow of fluid and air through the fistula tract between the esophagus and the pleural space likely hinders wound healing and prevents spontaneous fistula closure. Conservative management that involves draining the pleural effusion, antibiotics and nutritional support takes time and alone may not be sufficient. As a result, the incidence of spontaneous closure of EPF is extremely low. The most favorable outcomes of BEPF are likely to result from increased awareness, early detection and early treatment.

Endoclips were first described as a therapeutic maneuver for GI bleeding hemostasis in 1975.³ Several years later, case series of other indications have accumulated and include closing fistulas and

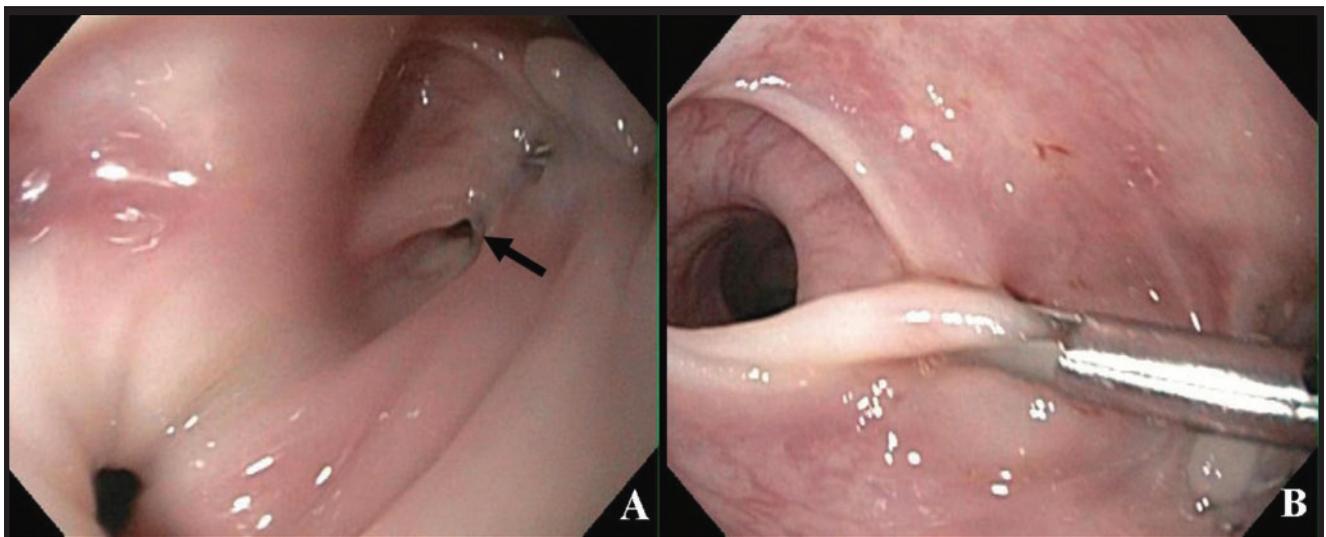


Figure 6. Endoscopic images. **A.** Fistulous tract (black arrow) located in the esophageal wall. **B.** Successful clip placement and closure of the fistula.

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perforations, as radio opaque markers, and for the anchoring of stents, catheters or feeding tubes. The stainless steel Resolution™ endoclips used on our patients have prongs which, when fully opened, measure 11 mm. The clipping technique involves grasping the mucosal and submucosal layers at the orifice edges and approximating the opposite walls, thus leading to macroscopic closure of the fistula opening. This method eliminates injury to surrounding tissues and allows for improved closure of the fistula. Additionally, the use of bowel rest immediately following the procedure helps to further promote mucosal healing. As the wound heals, the endoclips spontaneously fall off and are safely excreted through the GI tract.

Considerable literature exists reporting endoscopic closure of esophageal perforations using various combinations of clips,⁴⁻⁷ stents,^{8, 9} fibrin glue^{10, 11} argon plasma electrocoagulation¹² and percutaneous suturing.¹² However, studies are limited on the application of endoclips to esophagopleural fistulas. To our knowledge, there are only 4 previously reported cases of EPF closure using endoclips.¹³⁻¹⁵ The first reported case¹³ used argon plasma coagulation (APC) in addition to endoclips to close an EPF that was 3 years old and 12mm in size. Successful closure required 4 sessions over 15 weeks. The second and third reported cases¹⁴ used endoclips alone to successfully close 2 EPF with mean age of 45.5 days after 1 session. The fourth case¹⁵ used APC, fibrin glue and endoclips to close an EPF that had been many years old and 8mm in size. Successful closure required 5 sessions over 3 weeks. The endoscopic clipping technique described in our study resulted in complete closure of acute benign esophagopleural fistulas in three patients after one session, as confirmed by Gastrografin esophagography.

The acute nature (mean age 12.7 days) and smaller diameter (mean size 4.7 mm) of our EPF likely contributed to successful closure using endoclips alone after only one session. Our results stress the importance of early detection and early intervention of EPF and introduce implications for deciding which fistulas are more appropriate candidates for endoclip placement alone versus the additional use of other techniques including APC and fibrin glue. Coagulation of the mucosal edges prior to clip placement was considered to be a critical step in the closure of 2 previously reported cases.^{13,15} These fistulas were of long duration and the tracts were likely epithelialized. Thus, direct

relationships may exist between fistula size, fistula age and the need for coagulation to de-epithelialize the fistula prior to clip placement. Additionally, fistulas treated early, before the tract epithelializes, may not require coagulation, which merely serves to de-epithelialize the tract.

In summary, the endoscopic treatment of benign esophagopleural fistulas using clips promotes closure in a safe and effective manner and is a useful and less costly alternative to surgery. Additional studies are warranted to further evaluate the efficacy of using endoclips alone for fistulas of various sizes and ages and the necessity of additional techniques, especially argon plasma coagulation, prior to clip placement in select esophagopleural fistulas. ■

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