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Case report

Endoluminal Vacuum Therapy (EVAC) in Managing Esophagogastric Anastomosis Fistula

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Abstract

Endoluminal vacuum therapy (EVAC) is a promising alternative for the endoscopic management of gastrointestinal fistulas or perforations that do not respond to endoscopic procedures using clips and stents or are even refractory to surgical procedures. In this case report, we describe the successful endoscopic closure of an esophagogastric anastomotic fistula using EVAC, connected to a vacuum system through a probe in the cavity, which did not close with clip management given the friability and edema of the peri-wound tissue. In conclusion, it is a successful alternative to treat these complications, which are sometimes difficult to resolve.

Keywords

Wound closure technique, endoscopy, esophageal fistula, surgical anastomosis.

INTRODUCTION

One of the most important complications after an esophagectomy is the anastomotic fistula, with an incidence between 1% and 30%[1]. Among the alternatives of endoscopic management, we find the endoluminal vacuum therapy (Endo-Vac), a sponge connected to a nasogastric tube located in the defect to be corrected. It is connected to negative pressure[2]. This system decreases bacterial contamination and edema and stimulates tissue granulation through angiogenesis, gradually reducing the cavity size until closure is achieved[3,4]. Esophageal anastomotic fistulas are a life-threatening condition, between 0.8% to 11.6%, due to the development of mediastinitis, pleural empyema, and sepsis[5,6]. Mortality rates of up to 18% have been found in cancer patients[7]. We present a case of esophagogastric anastomotic fistula managed with Endo-Vac.

CLINICAL CASE

A 69-year-old man with a history of gastric adenocarcinoma, extended to the gastroesophageal junction, staged III b (pT4N0M0), who has diabetes *mellitus*. The patient was taken to esophagogastrectomy by laparoscopy and thoracoscopy with negative section edges, in management with adjuvant therapy and Capeox protocol. He presented oro-

pharyngeal dysphagia and odynophagia and a weight loss of 18 kg. On the 11th postoperative day, he showed signs of an inflammatory response with an esophagogram, which evidenced a fistula at the level of anastomosis. The endoscopic study found a 15 mm fistula in the anastomosis at 30 cm of the dental arches. Under the fluoroscopic vision, it presented extraluminization outside the esophageal wall (**Figure 1**). Initial management consisted of placing 5 clips. Due to the mucosa friability, the total closure of the defect was not achieved.

Due to the persistence of a 5 mm fistula on the anastomosis, Endo-Vac therapy is performed with the GranuFoam™ sponge, connected to an intermittent drainage system with a negative pressure of 100 mm Hg (**Figure 2**). A laparoscopic jejunostomy was performed at the same time. Sponge replacement is performed at 7 days, and a reduction in the fistula defect is observed. At 2 weeks of therapy initiation, adequate wound healing is achieved without evidence of fistula. The sponge and nasogastric tube are removed with a 30 mm handle without complications. Endoscopic control one month and 3 months after the end of Endo-Vac therapy. Anastomosis with inflammatory changes and light decrease by 30%, caused by angulation effect and not by stenosis, allowing the equipment's easy passage (**Figure 3**). Management with proton-pump inhibitor was indicated, and dysphagia improved without chest pain.

DISCUSSION

This article describes a closure case of esophagogastric anastomotic fistula in a patient with a history of esophagogastrectomy due to gastric adenocarcinoma, extended to the gastroesophageal junction. The closure was managed by placing endoscopic clips, with a partial closure of the fistula, and the Endo-Vac therapy by means of two replacements. An excellent result is obtained in managing this complex fistula without complications.

Although esophageal perforations are a rare clinical entity, they have a high mortality and morbidity rate. This represents a challenging paradigm in their management[8]. Treatment of anastomotic fistula depends on the cause, size, timing of the continuity solution, and the patient's nutritional status. The therapeutic plan includes support measures, antibiotic therapy, and, in some cases, antifungals, extraluminal collection drainage, and maintenance of enteral nutrition. Endoscopic management is less morbid than surgery[9].

The treatment pillar of upper gastrointestinal fistulas is endoscopic therapy with clips or the OVESCO system for perforations less than 2 cm and endoscopic suture for perforations greater than 2 cm. The placement of self-expanding stents is reserved in cases where primary closure is not achieved[10], with a greater success rate of 68.8%–90% in

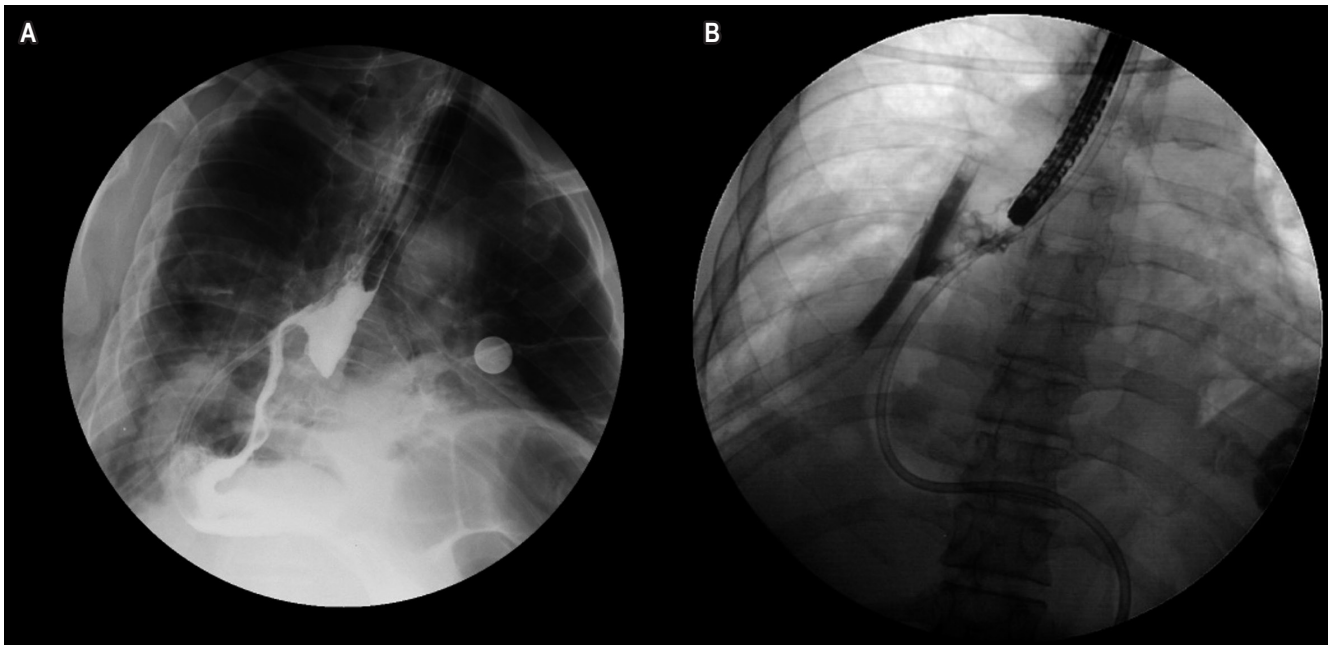

Figure 1. A. Esophagogram: fistula tract in the esophagogastric anastomosis. **B.** Irrigation of the contrast material with extraluminization outside the esophageal wall.

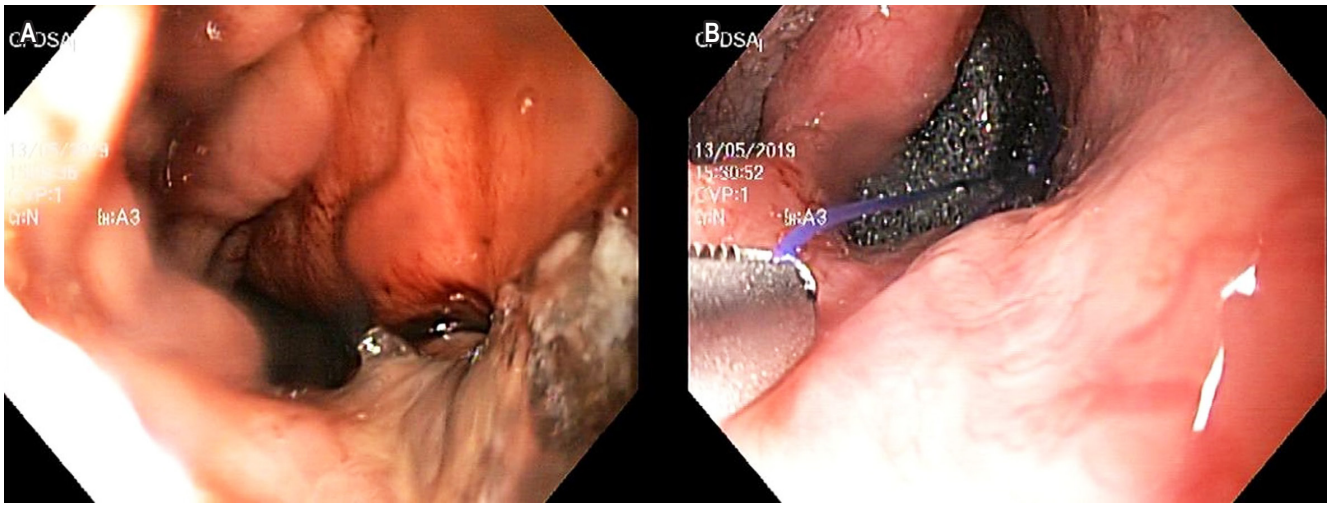

Figure 2. A. Endoscopic visualization of the esophagogastric anastomosis' fistula. **B.** Endo-Vac: Endoscopic insertion of the sponge pulled with suture material using forceps.

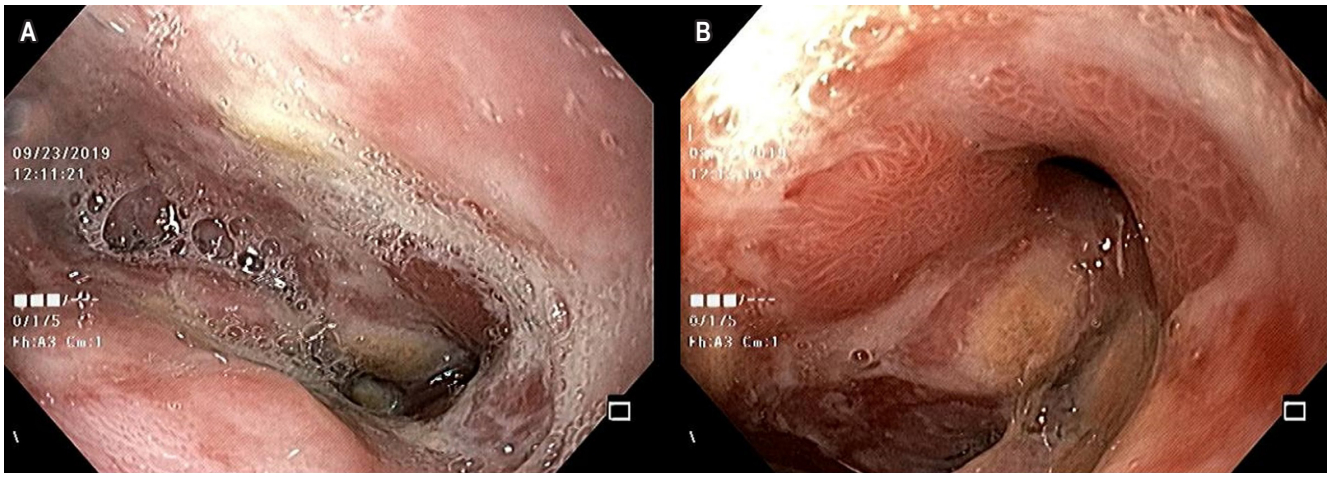

Figure 3. A. Appearance of anastomosis 3 months after completion of treatment with Endo-Vac. **B.** Secondary inflammatory changes.

postoperative anastomotic fistula due to a neoplastic cause. However, failure occurs in 15% of cases and displacement in 40% with complications, such as failed extraction by granulation tissue[11] and stenosis at 28.2%. This is a higher rate compared to Endo-Vac therapy (9.4%) ($p< 0.05$) [12]. Additionally, a greater number of days of intensive care unit stay has been described in the stent group compared to Endo-Vac (median 6 vs. 9 days)[13].

Wedemeyer *et al*[14] reported in 2008 on the endoscopic use of Endo-Vac in the treatment of anastomotic fistula in two patients following an esophagectomy and a gastrectomy. The cavity closure was achieved at 15 days without recurrence. The same results were obtained in the wound healing time in this case. Endo-Vac therapy is an alternative technique that has evolved in managing fistulas for causes such as sleeve-type gastrectomies, esophageal perforation by transesophageal echocardiogram fistulas in the anastomosis, intraoperative perforation, and Boerhaave perforation. Indications depend on the perforation characteristics, such as a size less than 5 cm, the fistula content, and the absence of cavitations[15].

In 2014, Braun's first endoluminal vacuum sponge Eso-SPONGE® was marketed with a 95% success rate. The technique begins by inserting an overtube after glycerol-based hydrogel has been applied. Then, using a pusher, the Eso-SPONGE® is introduced at the end of the overtube. Once the sponge is in the overtube mark, the overtube is extracted until the pusher handle for releasing the sponge. Both the overtube and the pusher are removed. A nasogastric tube No. 16 Fr is introduced through the nasal cavity

and extracted by mouth. The distal end is cut and connected to the Eso-SPONGE®. Endoscopic control is performed, then it is connected to the vacuum system with a pressure between 50–125 mm Hg[16].

The mechanisms to treat fistula by means of negative or subatmospheric pressure therapy are:

- Exudate control by local modifications in blood flow. Elimination of harmful substances.
- The macrodeformation mediated by the suction on the sponge causes deformation. This exerts the defective edges and unites them.
- Microdeformation is the mechanical changes that occur at the microscopic level and cause the cytoskeleton deformation, the release of growth factors, cell proliferation and migration, and the expression of components of the extracellular matrix.
- Changes in perfusion that increase the microvessels density, hypoperfusion of the defect edges, localized hypoxia, expression of vascular endothelial growth factor, increased angiogenesis (these changes occur between 5 and 8 days), and finally bacterial clearance[17].

DESCRIPTION OF THE PROCEDURE

- *Step 1:* Endoscopic evaluation and characterization of the fistula. Contrast material injection may be used to evidence the leakage under fluoroscopic vision.
- *Step 2:* After evaluating the location and size of the defect, irrigation and endoscopic debridement are recommended. Then, the open-pore polyurethane sponge (VAC® GranuFoam™, pore size 400-600 μm) is trimmed and adjusted to the defect size. Next, at the tip of a nasogastric (NG) polyvinyl chloride tube of 12-14 Fr, additional holes are made with scissors (**Figure 4**).
- *Step 3:* The NG tube is inserted through the nasal cavity and then removed through the mouth with forceps or the finger. The sponge is fixed with a 2/0 suture at the proximal and distal end, leaving the tube in the center of the polyurethane sponge (VAC® GranuFoam™). A short handle is made at its distal end (**Figure 4**).
- *Step 4:* The tip of the tube with the sponge is grabbed from the handle with crocodile forceps and carried endoscopically to the defect site. The entire cavity is

Figure 4. A. Construction of the open-pore polyurethane sponge (VAC® GranuFoam™. Sponge attachment to the end of the NG tube and handle distal loop. **B.** Insertion of the NG tube (14 Fr) introduced by the nasal cavity with subsequent removal by mouth with forceps.

covered. The sponge should be smaller than the cavity to promote collapse and further closure.

- *Step 5:* After placing the outside of the NG probe, it is taped to the nose. The outer tip is connected to the vacuum system with a continuous negative pressure between 100 and 125 mm Hg.

The average treatment duration with Endo-Vac is 23 days (range between 9 and 86 days)[12], with a sponge replacement every 3–5 days[18]. However, in this study, it was performed every 7 days with a good result. For the replacement or removal of the sponge, the suction must be suspended. Then, the tube is washed with saline solution to separate the granulation tissue. Later, the sponge is retracted and removed. This procedure can be performed endoscopically or directly with further endoscopic revision[19].

The overall success rate of Endo-Vac therapy is 84% to 100%, with an average of 90%[4]. It has also been described that the insertion techniques of the modified Endo-Vac, with the sponge introduction through an overtube, seem to be easier for the endoscopist: a success rate of 100% and procedure time between 12 and 30 minutes[20].

Pournaras *et al*[9] performed a series with 21 patients taken to Endo-Vac. Indications were post-esophagectomy anastomotic fistula, fistula in gastrogastric anastomosis, and iatrogenic esophageal perforation. The cure rate was 95%, and the number of replacements was 3–12. The diagnosis was made 10 days after the intervention, as in the described case, and a jejunostomy was performed in all patients.

In a prospective study of 8 patients with postoperative esophageal fistulas, Endo-Vac was performed on patients with a follow-up of 193 days. It had a successful closure in 88% of cases, mean treatment of 23 +/- 8 days, with no short- or long-term complications. Replacements were made twice a week[21]. Similar to what is presented, the retrospective study by Bludau *et al*[22] reported a success rate in 86% of the cases. Kuehn *et al*[23] reported a success rate in 9 of 11 patients, corresponding to 82% of patients with fistula in anastomosis. The average distance of the lesions was 32 cm from the dental arches, similar to that described in the present case. If there was evidence of mediastinal or intrapleural lesion or unfavorable evolution within 24 hours after the Endo-Vac procedure, follow-up with tomography was indicated.

Following the failed Endo-Vac therapy, complementary management with self-expandable metallic stents partially coated on the Endo-Vac has been described, with a 71.4% first-line success rate and 80% second-line success rate, without serious adverse events[24]. Brangewitz *et al*[12] compared the Endo-Vac with the metallic or plastic prosthesis in the closure of esophageal fistulas with a success rate of 84.4% compared to 53.8% in the stent group. There were no differences in hospital stay nor in mortality, but a greater presentation of stenosis in the stent group.

Choi *et al*[25] included 39 patients in their study. Eleven cases were treated with Endo-Vac (7 of these cases were switched from stent to Endo-Vac as there was no improvement), and the self-expandable metallic stent was performed in 28 cases, with a median follow-up of 19 months. The Endo-Vac's success rate was 100%, and the self-expandable metal stent's was 74.3% (26/35), with no statistically significant differences. One case presented leak-related death due to infectious complications in the stent group. There were differences in the duration of minor therapy in Endo-Vac compared to the stent (15 vs. 36 days; p <0.001). Complications such as stenosis occurred in 14.3% of the stent group, a higher rate compared to Endo-Vac, 9.1%. No differences were found in the patients' weight, considering that parenteral nutrition is used in Endo-Vac until the sponge removal, and enteral nutrition in the stent is started within 1 to 2 days of insertion.

The disadvantages are periodic endoscopic intervention, permanent connection to the vacuum pump, and oral feeding delaying until the fistula closure[26]. Excessive granulation stenosis in 5% to 9.1%, responding to endoscopic dilation, has been described as a complication[13].

CONCLUSION

Endo-Vac therapy is an easy, safe, and effective technique in treating esophageal and gastric anastomosis fistulas as an alternative to the initial management with stents or clips. This allows the closure of fistulas with an excellent success rate, a low rate of complications, such as stenosis susceptible to endoscopic management and reduced hospital stay.

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