ORIGINAL ARTICLE

Endoscopic vacuum therapy: 2 methods of successful endosponge placement for treatment of anastomotic leak in the upper GI tract

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CASE PRESENTATION

A 74-year-old man presented for evaluation of a gastroesophageal anastomotic leak. The patient's medical history included distal esophageal adenocarcinoma treated with robotic-assisted esophagectomy with gastric conduit. Its postoperative course was complicated by anastomotic leak, confirmed via esophagram, and right-sided pneumothorax requiring right thoracostomy and chest tube placement. EGD revealed a gastroesophageal leak with a 3-cm aperture and development of postsurgical fluid collection. The patient preferred a nonsurgical treatment of the anastomotic leak with the use of endoscopic vacuum therapy (EVT), which was recommended by a multidisciplinary team including an interventional gastroenterologist, thoracic surgeon, and interventional radiologist. A custom-made sponge connected to an external vacuum device was endoscopically delivered at the surgical anastomosis where the leak was present. The sponge was replaced every 3 to 4 days while granulation tissue developed in the surgical cavity. After 10 sessions of sponge replacement, successful closure was achieved without evidence of any remaining leakage. There was no recurrence of the anastomotic leak on 2 subsequent endoscopic evaluations, and the patient did not require any further interventions.

PROCEDURE

Endoscopic vacuum therapy was performed in this patient using 2 different techniques of endoscopic sponge insertion into the anastomotic leak (Video 1, available online at www.videogie.org). The first step for both techniques included creation of a vacuum system. We used a nasogastric (NG) tube: 14F, 16F, or 18F (Salem SumpTubes; Cardinal Health, Dublin, Ohio, USA) and a sponge (V.A.C. Granufoam; 3M, St. Paul, Minn, USA). Using scissors, we created a tunnel in the sponge, and the NG tube was inserted with its tip and side holes covered within the sponge, ensuring adequate vacuum. Next, the NG tube was secured to the sponge using a single suture that was sutured in a continuous fashion, descending from the proximal to the distal end of the NG tube. The sponge was then cut into a smaller and cylindrical shape, fitting into the cavity adequately. This also alleviated endoscopic guidance because it reduced friction.

Once the vacuum system was created, 2 different methods were used to insert the sponge into the anastomotic leak. In the first method, a small loop of suture left at the tip of the sponge acted as an anchor for grasping forceps. The forceps were used to grasp the suture loop. The endoscope was inserted orally and advanced down to the site of the leak, with the sponge pulled behind. A guidewire was also inserted through the NG tube, helping with sponge insertion into the leak cavity. After release of the suture loop from the forceps, the endoscope was brought behind the sponge, and the sponge and NG tube were then grasped with the forceps and pushed forward into the cavity. This process was repeated until the entire sponge was adequately inserted into the cavity. When pulling the endoscope back, the guidewire was used as a visual and fluoroscopic guide to ensure adequate placement.

If the sponge is not easily guided down, a second method can be implemented using an overtube. The overtube was placed on the endoscope and advanced into the cavity. Once the cavity was reached, the endoscope was removed, leaving the overtube in place. The sponge was then lubricated with mineral oil and inserted into the overtube, which directly leads to the cavity. The sponge was guided down by pushing the NG tube. Inserting forceps through the NG tube can increase its rigidity and prevent coiling within the overtube. The endoscope was inserted and followed the sponge through the overtube to visualize adequate placement. The endoscope was also used to push the sponge out of the overtube. Once the sponge was in place, the endoscope and overtube were removed.

Abbreviations: EVT, endoscopic vacuum therapy; NG, nasogastric.

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In both methods, the final step is a nasal exchange of the NG tube. A nasal airway tube, also known as a nasal trumpet (Rusch Nasal Airways; Teleflex Incorporated, Wayne, Pa, USA) was inserted through the nares. The distal end of the trumpet was then grasped in the pharynx using forceps, and the most proximal end of the NG tube was inserted into the distal end of the trumpet. The trumpet with the NG tube attached was pulled out of the nares. The NG tube was then connected to the vacuum device on continuous negative pressure of 125 to 150 mm/Hg (ACTIV.A.C. Therapy System; 3M). The sponge was replaced every 3 to 4 days until complete closure was achieved, in this case after 10 sessions, with granulation tissue forming and closing the cavity.

DISCUSSION

Endoscopic vacuum therapy is an established method of treating anastomotic leaks in the upper and lower GI tract. However, its widespread adoption is hindered by uncertainty about the small details of successfully performing this procedure. We present a step-by-step video of us performing this method using 2 different variations.

The principle of EVT is derived from vacuum-assisted closure treatment used in superficial wounds, which is a well-known and established therapeutic method.[1-3] In EVT, a polyurethane sponge is endoscopically placed inside a defect to apply negative pressure for longer periods.[1-5] Defect healing is achieved through continuous abscess drainage, thus decreasing bacterial colonization and promoting tissue granulation.[1-9] Negative pressure also reduces compression forces that act on the microvasculature, increasing microvessel density, blood flow, and tissue perfusion.[8,10-13]

Several meta-analyses have revealed that EVT is an effective and safe method for treating leaks, fistulae, and perforations. In one meta-analysis, the closure rate of transmural upper GI defects with EVT was 85%. EVT was associated with low mortality (11%), morbidity (10%), and stricture development (14%).[2] Based on location, EVT achieved 80% closure success for esophagectomy patients and 90% closure success for gastrectomy patients.[1] No significant difference was observed in success, mortality, morbidity, or stricture development based on the etiology of the underlying defect (perforations versus leaks and fistulae).[2] Both meta-analyses revealed greater success associated with lower morbidity and lower mortality when compared with self-expandable metal stents.[1-2] EVT is also a feasible treatment option with manageable risk for selected patients with colorectal leaks. The success rate of EVT for treatment of colorectal defects was 81.4% in a recent meta-analysis.[14]

There are a few disadvantages that limit EVT success.[2,9] Long-term NG tube placement causes significant discomfort, pain, and nausea, especially in patients with a concomitant nasoenteric feeding tube.[6] Numerous procedures for sponge exchange may deter some patients from committing to EVT and may cause premature cessation of treatment.[6] Sponge dislocation can also lead to a lack of success. Minor bleeding from granulation tissue may occur after the sponge is removed, but severe bleeding is rarely seen.[2,6,15,16]

CONCLUSION

Endoscopic vacuum therapy is a safe, effective, and minimally invasive procedure for closure of surgical leaks and fistulas in the upper and lower GI tract. It should be considered in all patients with anastomotic leaks, especially if no surgical alternative is available. Lack of standardized tools and physician expertise, longer duration of therapy, and need of multiple endoscopies may deter physicians and patients from EVT. Setting accurate patient expectations and having adequate physician understanding of this method is crucial in achieving success.

DISCLOSURE

Dr Shahid is a consultant for US Endoscopy. Dr Sarkar is a consultant for US Endoscopy and Obalon Therapeutics. Dr Tyberg is a consultant for NinePoint Medical, EndoGastric Solutions, and Obalon Therapeutics. Dr Kahaleh is a consultant for Boston Scientific, Interscope Med, and AbbVie and has received a research grant from Boston Scientific, Emcision, Conmed, Pinnacle, Cook Medical, Merit, and Olympus. All other authors disclosed no financial relationships.

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