A novel technique for the treatment of radiation-induced acquired esophageal atresia in patients with head and neck cancer

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Background and Aims: Dysphagia is a common complaint for patients after radiation therapy for head and neck cancer. Chronic dysphagia ensues when the radiation-induced injury matures into a fibrotic stricture, with the severity of symptoms paralleling the degree of stenosis. Most patients experience progressive dysphagia that prompts medical attention before complete esophageal obliteration. Rarely, patients present late with inability to clear their secretions because of complete obstruction, also termed acquired atresia. These patients represent a challenge and require aggressive and unconventional interventions to reestablish lumenal patency. Using a case series, we hereby describe a novel yet simple technique to treat patients with acquired esophageal atresia.

Methods: Five patients with head and neck cancer in various stages who all underwent nonsurgical treatment with definitive chemotherapy and radiation along with enteral feeding tube placement prior to/during treatment presented with acquired esophageal atresia. All patients underwent an EGD to reestablish lumenal patency. This was accomplished with gentle pressure that was applied in a to-and-fro semi-circular rotational manner as if pushing a corkscrew and twisting it in alternating clockwise and counterclockwise manner.

Results: In all cases we were able to reestablish esophageal luminal patency with a single procedure. There were no adverse events. Four of the 5 patients required additional dilations for symptomatic management. However, all patients’ esophageal lumens remained patent.

Conclusions: We describe a novel yet simple technique to treat acquired esophageal atresia after radiation for head and neck cancer. This technique allows for generous dilation yielding complete resolution of the stenosis in a single session. When our approach is used, the patient can be discharged home the same day and resume immediate oral intake. (VideoGIE 2022;7:462-5.)

BACKGROUND

Dysphagia is the most common late adverse event after radiation therapy for head and neck cancers. Chronic dysphagia ensues as the radiation-induced injury matures into a fibrotic stricture. The severity of symptoms parallels the degree of stenosis, which is proportional to the amount of radiation. Stricture formation occurs in up to 15% of patients who receive radiation dosages exceeding 60 Gy. Locoregional therapy for head and neck cancers require aggressive radiation often exceeding 60 to 70 Gy. Most patients after radiation therapy experience slowly progressive dysphagia that brings them to medical attention before complete obstruction. Rarely, patients present late with inability to clear secretions because of complete obstruction, also termed acquired atresia. These patients represent a challenge to endoscopists and require aggressive interventions to reestablish lumenal patency.

Assessing the degree of stenosis and confirming complete obliteration is accomplished with a barium esophagogram; however, in the case of atresia, the length of the stricture remains unknown. EGD is the modality of choice to reestablish patency and rule out active inflammation or recurrent malignancy. Multiple endoscopic techniques have been described with variable success. In a rendezvous procedure, a transoral endoscope is advanced to the proximal end of the stricture, while at the same time another slim endoscope is inserted through the gastrostomy site and advanced in a retrograde fashion into the esophagus to the distal end of the stricture. If transillumination is elicited, then the stricture is thought to be short. Otherwise, fluoroscopy may be used to assess the extent of the stricture and subsequently the feasibility of any endoscopic intervention. Other techniques include submucosal dissection or EUS-guided needle puncture to create a neoesophagus. The latter 2 techniques tend to create “unnatural” nonepithelialized tracts through altered anatomic planes, which may become a harbinger for serious adverse events such as osteomyelitis or paraspinal abscesses. We hereby describe a case series using a novel straightforward technique in reestablishing patency in patients with acquired...
esophageal atresia. This simple and efficient technique achieves patency of the original esophageal lumen and allows for immediate large-caliber bougie dilation during the same session.

CASE DESCRIPTION

We present 5 patients who were all diagnosed with locally advanced head and neck cancer in various stages and underwent definitive chemotherapy and radiation with a cumulative dose of 65 Gy or greater. All the patients had an enteral feeding tube placed during treatment. Within 1 year of finishing radiation treatment, the patients presented to a GI clinic with inability to clear oral secretions. Barium esophagrams confirmed radiation-induced acquired esophageal atresia (Fig. 1).

Patient 1 was a 52-year-old man with a history of T1aN1M0 squamous cell carcinoma of the hypopharynx who underwent definitive chemotherapy and radiation. During the course of his treatment, he developed dysphagia requiring percutaneous gastrostomy (PEG) tube placement.

Patient 2 was a 72-year-old man with a history of T4aN0M0 squamous cell carcinoma of the hypopharynx who underwent definitive chemotherapy and radiation. He developed poor oral intake during treatment and a PEG tube was placed.

Patient 3 was a 64-year-old woman with a history of T3N2bM0 squamous cell carcinoma of the hypopharynx who underwent treatment with chemotherapy and radiation. She had a PEG tube placed for treatment of dysphagia shortly after therapy.

Patient 4 was a 65-year-old woman with a history of T4aN0M0 squamous cell carcinoma of the hypopharynx treated with chemotherapy and radiation and previous Roux-en-Y gastric bypass. She had a direct jejunal tube placed surgically for enteral feeding during therapy.

Patient 5 was a 78-year-old man with a history of T2N1M0 squamous cell carcinoma of the hypopharynx treated with chemotherapy and radiation. He saw a local gastroenterologist at the beginning of treatment and had a PEG tube placed (Table 1).

PROCEDURE

Shortly after evaluation by the GI team, every patient was scheduled for an EGD with either conscious sedation or monitored anesthesia care based on their underlying co-morbidities. A slim endoscope, preferably a pediatric gastroscope (GIF-XP190N; biopsy channel size of 2.2 mm and insertion tube diameter of 5.8 mm; Olympus America, Minn) was used as it offers the advantage of increased stiffness and the additional right-left maneuverability in a tight fibrotic esophagus as compared to a nasal endoscope. Low-flow carbon dioxide was used for insufflation. On endoscopic examination, all patients had complete obliteration of the esophageal lumen (Fig. 2). Stricture length was not formally measured endoscopically. In some instances, a CT scan was performed and the stricture was able to be visualized (Fig. 3). Estimated stricture length as assessed with the endoscope was approximately 1 to 3 cm. Once the stenosis was reached, gentle pressure was applied with a to-and-fro semi-circular rotational movement as if pushing a corkscrew and twisting it in alternating clockwise and counterclockwise manner. The mucosa began to unfurl as if peeling sticky lamination paper. The process was pursued with increased, yet gentle pressure until the lumen of the esophagus proper was reached. This was performed in either antegrade or retrograde fashion with the gastroscope inserted through the gastrostomy site and advanced into the esophagus. We resorted to the retrograde approach as soon as we met increased and unyielding resistance to the antegrade advancement or when we encountered mucosal bleeding. Following re-establishment of the esophageal lumen, the gastroscope was advanced into the gastric antrum in an antegrade approach and a guidewire was threaded into the biopsy channel. The gastroscope was withdrawn in an exchange process. Single bougie dilation was performed (dilation size ranging from 14-19 mm) in all cases except for one where serial dilations were performed from 11 to 15 mm to further open the esophageal lumen (Video 1, available online at www.giejournal.org). After recovery, the

Figure 1. Barium esophagram showing complete obliteration of the esophageal lumen.
Patients were discharged home with recommendations to start with a liquid diet and advance as tolerated. All patients were continued on proton pump inhibitors. Oral viscous lidocaine was prescribed as needed for throat pain.

Outcomes

In all cases, we were able to reestablish esophageal luminal patency with a single procedure. There were no adverse events. Recurrent strictures occurred in 4 of the 5 patients: Patient 1 required no additional therapy following treatment; Patient 2 required 7 dilations over 5 years following the index procedure; Patient 3 required 1 dilation since the procedure 1 year ago; Patient 4 required 9 dilations over 2 years; Patient 5 required 12 dilations over the past year until 20 mm was reached and then no additional dilations since.

We hypothesize that with radiation-induced mucositis, the esophageal mucosa becomes denuded, exposing the submucosa on the opposing walls rendering them sticky. This causes tissue adherence and eventual luminal fusing leading to atresia. The ability of the blunt tip of the endoscope to “dissect” its way through the atresia without causing any mucosal or deep tears and without inducing any bleeding, and the ability to safely perform large-caliber dilation during the same session, argue for this hypothesis.

Although our cases were successful, the presence of irregular borders or nodular strictures or failure to achieve luminal patency despite attempts from both approaches, raises suspicion for underlying malignancy and adequate biopsies to be obtained from the site of the stricture.

In addition, our case series was limited to patients who have not undergone laryngectomy. In such patients, the scarring and adhesions cannot be distinguished from radiation related injury and the mechanism of the atresia is believed to be different. These cases carry a higher degree of complexity and serious adverse events and should be...
managed in a multidisciplinary approach, which is beyond the scope of this article.

**CONCLUSION**

We describe a novel yet simple technique to treat patients with acquired esophageal atresia after radiation for head and neck cancer. This technique allows for generous bougie dilation yielding complete resolution of the stenosis in a single session with no complications. When our approach is used, the patient can be discharged home the same day and can resume immediate oral intake.

**DISCLOSURE**

All authors disclosed no financial relationships.

*Abbreviation: PEG, percutaneous gastrostomy tube.*

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