Esophageal Anastomotic Strictures: Outcomes of Endoscopic Dilation, Risk of Recurrence and Refractory Stenosis, and Effect of Foreign Body Removal

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BACKGROUND & AIMS: **Esophageal anastomotic strictures often require repeat dilation to relieve dysphagia. Little is known about factors that affect their remediation. We investigated long-term success and rates of recurrence or refractoriness after dilation and factors associated with refractory stenosis.**

METHODS: **We performed a retrospective study of 74 patients with an anastomotic stricture that had been dilated during a 5-year period (564 dilations; median follow-up period, 8 months). A stricture was refractory if luminal patency could not be maintained after ≥5 dilation sessions during 10 weeks.**

RESULTS: **Of the 74 patients, 93% had initial relief of dysphagia. The stricture recurred in 43% of patients, and 69% were considered refractory. Removal of sutures/staples protruding into the lumen did not accelerate time to initial patency (median, 37 days; interquartile range [IQR], 20–82 days) or lengthen the dysphagia-free interval (37.4 days; IQR, 8–41 weeks), compared with patients who did not undergo removal (initial patency, median 55 days; IQR, 14–109 days; $P = .66$ and median dysphagia-free interval, 21.7 days; IQR, 9–64 weeks; $P = .8$). Use of fluoroscopy during dilation (odds ratio, 8.92; 95% confidence interval, 1.98–40.14) was positively associated with development of refractory strictures, whereas neoadjuvant chemotherapy (odds ratio, 0.28; 95% confidence interval, 0.07–0.97) was inversely associated. Female sex and distal location of strictures increased risk of refractoriness as effect modifiers in multivariate analysis.**

CONCLUSIONS: **Endoscopic dilation is highly successful in achieving luminal remediation, yet anastomotic strictures are often refractory and frequently recur. Removal of sutures/staples within the lumen does not help achieve patency. Need for fluoroscopic guidance indicates a high likelihood of refractoriness to dilation, whereas prior neoadjuvant chemotherapy indicates a lower risk.**

Keywords: Esophageal Anastomotic Strictures; Recurrence; Refractory; Foreign Body Removal.

Proton pump inhibitor therapy has effectively eliminated easy-to-treat peptic-related esophageal strictures, and currently the remaining esophageal strictures by definition tend to include more complex strictures.[1] Benign esophageal strictures that develop after surgery for primary esophageal or head and neck malignancies can be particularly difficult to manage by nonsurgical measures. These anastomotic strictures are often refractory to endoscopic dilation and require multiple dilation sessions to remediate.[2–15] Strictures are typically amenable to anterograde endoscopic dilation by using a variety of endoscopic tools (Savary–Gilliard dilators or through-the-scope [TTS] balloon dilators) and carry a low complication rate.[13] However, the risk of recurrence after dilation is considerable for these complex, non-peptic strictures.[1,16,17]

Cardiovascular risk factors, such as diabetes and obesity, and prior chemoradiation are associated with anastomotic stricture development after esophagectomy.[3] Shorter time of dysphagia onset after surgery,

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Abbreviations used in this paper: aOR, adjusted odds ratio; CI, confidence interval; IQR, interquartile range; TTS, through-the-scope.

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smaller luminal diameter at index dilation, presence of anastomotic leak, type of transthoracic approach, intraoperative hemorrhage, poor vascularization of the gastric tube, and type of anastomosis (staples worse than hand-sewn) are factors associated with stricture recurrence.[1,2,7,8] Although these few reports describe factors affecting stricture formation and recurrence that are based on surgical factors, studies on the clinical and endoscopic factors associated with refractory strictures are lacking. Risk-stratifying patients prone to have strictures refractory to traditional endoscopic therapies may help determine the appropriate timing and relative benefit of endoprosthetics or surgical revision. Furthermore, the prevalence of recurrent and refractory strictures by using standardized criteria is not well-characterized.

Lastly, endoscopic findings that influence remediation (reestablishing of patency of a luminal stenosis) and duration of relief of dysphagia in these patients are not well-delineated. A common endoscopic finding in patients with anastomotic strictures is the presence of suture material or staples from the surgical field protruding into the esophageal lumen. Presence of a foreign body may contribute to inflammation and scarring, thereby impairing stricture remediation.[1]

This study was designed to determine the long-term clinical success of endoscopic dilation and the rates of recurrent and refractory esophageal anastomotic strictures. A secondary aim was to identify clinical and endoscopic factors associated with refractory strictures.

Methods

A retrospective analysis was performed on patients who underwent endoscopic dilation for esophageal stenosis by a single provider (M.L.K.) from October 2007 through October 2012. The study population included patients who developed dysphagia after formation of an esophageal anastomosis. Some patients had prior chemoradiation. Only patients who had an anastomotic esophageal stricture, clinical dysphagia, and at least 1 month of follow-up after dilation were included. Patients who died before achieving luminal remediation were excluded. Only patients in whom initial remediation was achieved were included in the a priori analysis of the staples/suture removal and retention groups. The institutional review board approved this protocol.

Dilation Procedures

All patients with a stenosis underwent anterograde dilation (Figure 1). Patients who had a complete stenosis requiring retrograde dilation (ie, a guidewire was unable to be passed through the residual lumen or a residual lumen was not visualizable via endoscope or fluoroscopy) were excluded from the study (4 patients during the study period).[1] Dilation technique was at the discretion of the operator. Patients underwent serial dilation until successful stricture remediation was achieved. Reintervention was performed if they developed recurrent dysphagia.

Stricture Characteristics

Size of stenosis was estimated on the basis of diameters of the endoscope and dilators used (TTS or Savary). Inability to traverse the stricture by using an adult upper endoscope (Olympus GIF-H180 in the majority or GIF-160 in the remainder; Olympus Corporation, Center Valley, PA) implied stricture diameter <9 mm. Endoscopic injection of Kenalog into the stricture (four 1-mL aliquots of 10 mg/mL triamcinolone acetonide in a 4-quadrant pattern for a total of 40 mg) by using a standard sclerotherapy needle was used in selected patients. Endoscopic steroid injection was used in patients who had early significant stricture recurrence in the absence of inflammation. The degree of stenosis recurrence and lack of response to dilation (eg, stricture dilated up to 15 mm and promptly returned with dysphagia and a luminal diameter of 8 mm) guided the determination to use Kenalog as adjunctive therapy. Suture/staples removal was performed after endoscopic visualization of the protruding foreign body in the lumen after technical success of dilation was achieved. Synthetic nylon suture material or staples that were visible within the lumen and located within the proximal end of the stricture were cut and removed in entirety. Forceps (FG-47L-1; Olympus) or endoscopic scissors (straight FB3L-1 or sickle-shape scissors 38B-130; Olympus) were used for retrieval.

Definitions of Variables

Technical success was defined as the ability to traverse the stricture with the chosen dilator and subsequent completion of dilation (increasing luminal diameter by at least 3 mm). Clinical success was defined as resolution of dysphagia and achieving luminal patency for $\geq$1 month. Luminal patency was defined as $\geq$14-mm diameter and inferred if the patient remained dysphagia-free after the patient had undergone dilation with a CRE balloon dilator or Savary dilation preceding relief of dysphagia. The length of time required to achieve clinical success (or reestablish patency after recurrence) was determined and referred to as a dilation cycle. The number of dilation sessions needed to achieve luminal patency $\geq$14 mm was determined for each dilation cycle. The days between dilation cycles were calculated to identify treatment time intervals.

A stricture was considered refractory if luminal patency $\geq$14 mm could not be achieved after $\geq$5 dilation sessions within 10 weeks.[18] Dysphagia-free intervals and number of dilation sessions within each dilation cycle were used to determine whether a stricture was