Management of Esophageal Strictures

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KEYWORDS

• Esophageal stricture • Balloon dilation • Bougie dilation
• Benign esophageal stricture • Malignant esophageal stricture

KEY POINTS

- Esophageal strictures can be classified as simple or complex based on their length, diameter, and focality.
- There are various options for endoscopic treatment of strictures including through-the-scope balloon dilation and bougie dilation.
- Endoscopic dilations are most effective when the underlying cause of the stricture is addressed, particularly in the setting of inflammatory etiologies.

INTRODUCTION

Esophageal strictures are narrowings of the esophageal lumen caused by inflammatory, fibrotic, or neoplastic processes.[1] They affect between 1/100 and 1/1000 patients in the United States, with a financial burden of greater than $1 billion annually on the health care system.[2] These luminal constrictions often lead to life-altering dysphagia symptoms. Interference with swallowing can create numerous serious sequelae including malnutrition, aspiration, and an overall decreased quality of life. Strictures are heterogeneous entities caused by both benign and malignant causes, and characterized as simple, complex, refractory, or recurrent (**Table 1**).[3] Accordingly, a variety of management options exist for esophageal strictures and generally involve addressing the underlying cause of the stricture in conjunction with endoscopic management. In this review, we begin by discussing state-of-the-art endoscopic management techniques for esophageal strictures, then focus on the management of strictures in specific disease states.

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Abbreviations	
AEs	adverse events
BDS	biodegradable stent
CI	confidence interval
ELP	esophageal lichen planus
EoE	eosinophilic esophagitis
FLIP	functional lumen imaging probe
GERD	gastroesophageal reflux disease
LAMS	lumen opposing metal stents
MMC	Mitomycin C
RBES	refractory benign esophageal stricture
SEMS	self-expanding metal stent
SEPS	self-expanding plastic stent
TTS	through the scope

STATE-OF-THE-ART TECHNIQUES

Dilation

Endoscopic dilation in often the initial approach in the endoscopic management of strictures.

The most commonly used forms of dilation are bougie dilation and through-the-scope (TTS) balloon dilation (Fig. 1).

Bougie dilation

Classic bougie dilations involve passing long, flexible, tapered rigid instruments with gradually increasing diameters over a guidewire. This technique allows bougie dilators to provide both radial and longitudinal force across a stricture. Additionally, this tool can allow for dilation of the entire esophagus (as opposed to a focal area) to a chosen diameter. The classic teaching for blind bougie dilation is the "rule of 3," where sequential dilation should be a maximum of 3 increments of 1 mm from the diameter where resistance is initially felt.[4] However, this is not an evidence-based recommendation, and nonadherence with this rule has not been shown to directly increase the risk of adverse events (AEs) such as perforation.[5] Many experts instead recommend dilating based on the level of resistance felt. A more conservative approach is to perform an immediate relook endoscopy after resistance is felt to assess the degree

Table 1
Types of strictures

Classification	Features
Simple stricture	• <2 cm length • Straight • Focal • Allows passage of standard endoscope with 9.5 mm diameter
Complex stricture	• ≥2 cm length • Tortuous • Multifocal • May not allow passage of standard endoscope
Refractory stricture	• Inability to maintain esophageal diameter ≥14 mm over 5 dilation sessions at 2-wk intervals
Recurrent stricture	• Inability to maintain esophageal diameter at 14 mm for 4 wk after a diameter of 14 mm has been achieved

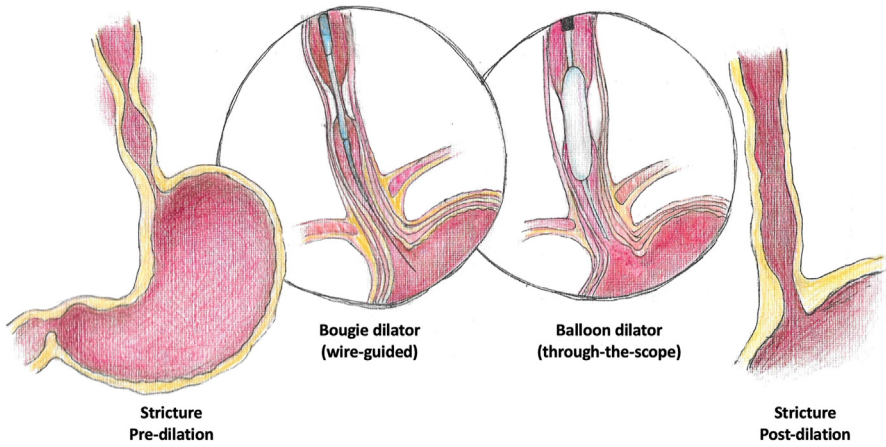

Fig. 1. Types of dilators.

of mucosal disruption and determine if further upsizing is indicated. Bougie dilations are available in both single-use and multiuse form.

Recently a single-use, dome-shaped, transparent hard plastic cap has been developed for esophageal stricture dilation. When attached to the tip of the endoscope, this dilating device allows for bougie dilation under direct endoscopic observation.[6]

Through-the-scope balloon dilation

Balloon dilators are single-use instruments that can be passed through-the-scope with or without a guidewire. After passing across a narrowed segment, the balloon is inflated with fluid (water or radio-opaque contrast) to a desired pressure that corresponds with a specific diameter. Balloon dilation allows for direct endoscopic visualization while dilating with radial forces. Following balloon deflation, the mucosa is assessed to evaluate for evidence of mucosal trauma. If no mucosal change is noted, dilation to a higher pressure and diameter is performed using these multistage dilators. However, when significant mucosal disruption is noted, further dilation is generally not pursued in the same session.

Static balloon dilation limits radial dilation effect to the area where the balloon is inflated. However, a pull-though technique can be used to allow for pan-esophageal dilation with longitudinal forces as well, whereby the inflated balloon is positioned at the gastroesophageal junction and withdrawn proximally through the entire esophagus. Subtle strictures can be appreciated by identifying areas of resistance. If no resistance is felt, the process is serially repeated after inflating the balloon to the next size. The process is terminated when adequate mucosal disruption is noted on endoscopic visualization. If no resistance is encountered, the balloon is pulled to the level of the cricopharyngeus, deflated, and withdrawn into the endoscope and the esophagus is evaluated for mucosal disruption. If resistance is encountered in the proximal esophagus or in the area of the upper esophageal sphincter, the balloon is pulled back completely across the cricopharyngeus, and the esophagus is reintubated to examine for mucosal disruption.[7]

Which to use: balloon or bougie?

There is no difference between these 2 dilation techniques with regards to efficacy, safety, or stricture recurrence rates of simple strictures.[8,9] If multifocal strictures are

present, a bougie may be preferable for pan-esophageal dilation, though pull-through technique with a TTS balloon dilator is also an option.

For severe strictures that do not allow passage of the standard upper endoscope, small caliber (≤6 mm) endoscopes can be used to traverse the stricture. However, their small working channels do not allow passage of TTS balloon dilators. Therefore, endoscopic placement of a guidewire for bougie dilation is necessary. There is also the option of placing the guidewire through the endoscope, introducing a dilating balloon over the wire (across the stricture) and simultaneously reintroducing the small-caliber endoscope alongside the balloon to allow direct visualization. Alternatively, fluoroscopy can be used to pass a guidewire for a bougie dilator or wire-guided dilating balloon (with radio-opaque contrast) across the stricture, allowing for fluoroscopically guided dilation. Prior endoscopy reports or barium swallow studies can help predict the need for small-caliber endoscopes or fluoroscopy preprocedurally.[10]

Dilation target

The ultimate target diameter for a stricture varies, as the main goal is symptomatic improvement. The ideal diameter is variable based on patient size, etiology of stricture, and stricture location.[11] A study of benign esophageal strictures of various etiologies showed that dilation up to 13 to 15 mm was associated with a greater number of subsequent endoscopies compared to dilation up to 16 to 18 mm (5.0 vs 4.1, hazard ratio 1.4, P=.001).[12] The authors suggested that clinicians should consider a dilation target up to at least 16 mm, if possible, to reduce the number of subsequent dilation sessions for benign esophageal strictures.

Dilation frequency

Simple strictures as defined in **Table 1** usually respond to 1 to 3 sequential dilations, while complex strictures are more likely to be refractory to dilation. The success rate of endoscopic dilation in achieving the target diameter of complex benign esophageal strictures can be as low as 65% when dilation is pursued every 2 weeks. When dilation every 2 weeks is not successful and the stricture diameter appears to have regressed by 50% or more compared to the prior dilation, weekly dilations should be considered.[13] Weekly dilations should be continued until the target diameter is achieved and maintained. Success rates using weekly dilation for complex strictures has been reported to be over 80%. For refractory strictures, there may also be benefit in using adjunctive therapies, such as steroid injections or even stent placement.[14]

INJECTION THERAPY

Endoscopic intralesional injection therapy with corticosteroids can be done at the time of dilation for complex strictures. Injection steroids (such as triamcinolone) have the ability to inhibit local inflammatory pathways and decrease collagen deposition and fibrosis, thereby reducing stricture recurrence. Triamcinalone can be injected in a 4-quadrant fashion into a stricture prior to dilation or into a mucosal rent after dilation. In a controlled trial of 30 patients with a recurrent peptic esophageal stricture, patients were randomized to receive either steroid injection (40 mg triamcinalone injected in four 1 mL aliquots of saline solution) or sham injection into the stricture followed by balloon dilation of the stricture. Both groups were maintained on proton pump inhibitor therapy after the intervention. In the 1-year follow-up period, 2 patients in the steroid group (13%) and 9 in the sham group (60%) required repeat dilation (P=.011).[11]

Injection or topical application of mitomycin-C (MMC) has also been used for stricture therapy. This chemotherapeutic agent inhibits DNA synthesis, leading to a

decrease in production of fibroblasts. In a randomized controlled trial of 40 pediatric patients with caustic strictures, topical application of MMC before dilation led to a decrease in the number of dilation sessions needed for resolution of dysphagia compared to those who underwent dilation with application of placebo.[15] While 80% of strictures in the MMC group completely resolved, only 35% resolved in the placebo group. The mean number of dilation sessions was significantly different between the 2 groups with 3.85 $\pm$ 2.09 sessions needed in the MMC group to achieve dysphagia resolution compared to 6.9 $\pm$ 2.12 in the placebo group (P<.001). Though these results are encouraging, there are no large-scale studies on the use of MMC to warrant its routine use.

STENTING

Esophageal stent placement can be considered for refractory esophageal strictures, particularly when other measures including repeated weekly dilations have failed. Stent placement at the site of a benign refractory stricture allows for remodeling of the stricture around the stent. After stent removal, recurrence rates are high; thus, weekly dilations should be restarted shortly after stent removal to minimize the risk of regression.[14]

The types of available stents for strictures include self-expanding plastic stents (SEPS), self-expanding metal stents (SEMS), biodegradable stents (BDS), and lumen opposing metal stents (LAMS). SEPS are the only stents that have been approved by the US Food and Drug Administration for refractory benign esophageal strictures (RBES). SEMS and SEPS should stay in place for 6 to 8 weeks to maximize success, but no more than 12 weeks, given the risk of hyperplastic tissue overgrowth. BDS apply constant radial force on the strictures mucosa, and degrade by hydrolysis over 8 to 12 weeks, avoiding both tissue overgrowth and a second procedure for removal.[16] A meta-analysis of RBES showed that overall pooled success rate of stenting was 40.5% (95% confidence interval [CI] 31.5%–49.5%). There was no significant difference between success rates in patients treated with SEPS, SEMS, and BDS (SEPS 46.2% [95% CI 27%–66.3%]; SEMS 40.1% [95% CI 28.1%–54.1%]; BDS 32.9% [95% CI 23.1–44.1]).[17] There are no prospective head-to-head trials comparing these stents, and additional evidence is needed to elucidate their role in the management of benign esophageal strictures. LAMS are short biflanged fully covered SEMS, which can be used in the management of short gastrointestinal stricture, with potentially reduced migration rates. However, more studies are needed to better understand their role specifically in the management of RBES.[18] Esophageal stent placement is also a palliative treatment of dysphagia caused by stenosis in advanced esophageal cancer. Further discussion on this can be found in the malignant strictures section later.

OTHER TECHNIQUES: STRICTUROTOMY, ABLATION, SELF-DILATION

Other modalities that are less frequently used for stricture dilation include stricturotomy, ablation, and self-dilation. During a stricturotomy, an endoscopic knife is used to cut the stricture in a circumferential or radial fashion using electrocautery.[19]

Ablation techniques, such as argon photocoagulation, radiofrequency ablation, and cryoablation, have been used for palliating malignant tumors, but have largely been replaced by stents as the primary intervention for management of dysphagia from malignant strictures. Ablation can, however, also be used for prevention or management of stent complications such as stent ingrowth or migration.[20]

Despite all of the tools available for managing refractory strictures, there may be patients who will need frequent repeated dilations long term. For such patients with benign strictures, self-dilation with a bougie at home can be considered, which eliminates the need for sedation and numerous endoscopies. The self-dilation technique allows patients to glide the dilator over the tongue and to the desired distance to traverse the stricture.[14] These patients are typically initially taught with fluoroscopic biofeedback (to help identify the sensation that occurs if the dilator tip curls) and subsequently without fluoroscopy. Self-dilation is safe and effective, with an approximate 94% success rate in relieving dysphagia symptoms. However, given the complexities in learning the technique paired with limitations related to anxiety and motivation, self-dilation is only a practical option in a highly selective group of patients.[21]

ESOPHAGEAL STRICTURES IN VARIOUS DISEASE STATES

Peptic Strictures

Gastroesophageal reflux disease (GERD) can cause inflammation, ulceration, and fibrosis of the distal esophagus, leading to the development of peptic strictures (**Fig. 2**A–I). These are generally short (<2 cm), focal, nonangulated strictures located in the distal third of the esophagus. They can be treated effectively with either balloon or bougie dilation, and usually resolve after less than 5 dilations. There are no

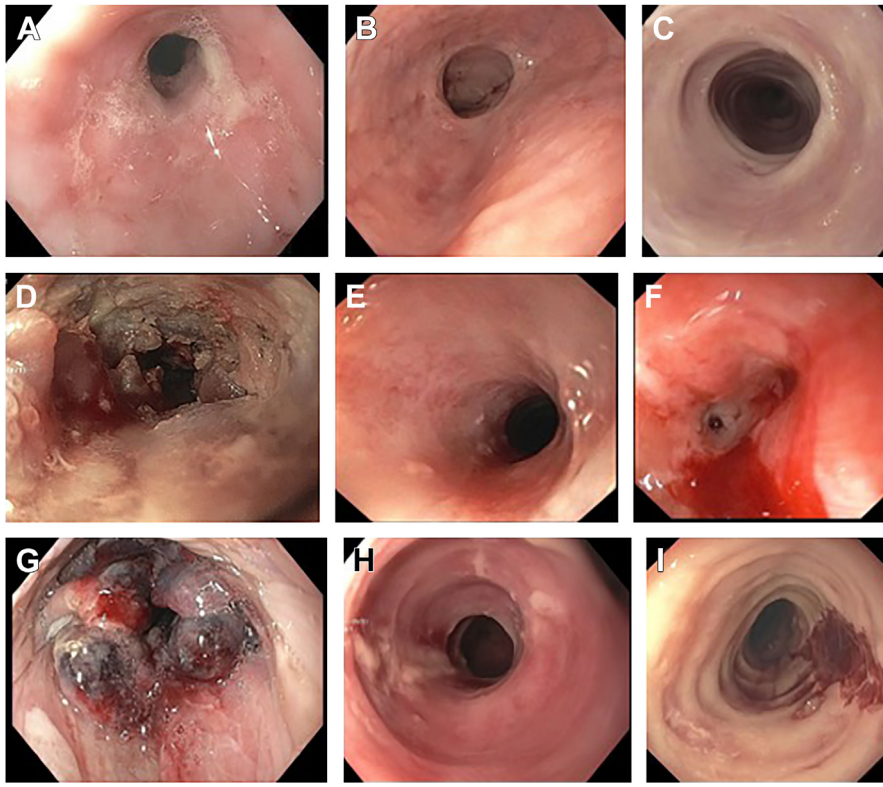

Fig. 2. Strictures in various disease states. (*A*) Peptic stricture, (*B*) eosinophilic esophagitis, (*C*) lichen planus, (*D*) malignant, (*E*) radiation, (*F*) caustic, (*G*) bullous pemphigoid, (*H*) mucous membrane pemphigoid, (*I*) postdilation mucosal rent.

high-quality studies to favor one technique over the other, as a meta-analysis has shown that both have similar resultant symptomatic relief, recurrence at 12 months, and complications.[9]

Peptic strictures are conclusive evidence for a diagnosis of GERD. Hence, patients with this endoscopic finding should be kept on acid suppressive therapy indefinitely to help heal esophagitis and prevent stricture recurrence.[11,22] Acid suppression with proton pump inhibitors reduces the need for repeat dilation and prolongs the interval between dilations. A randomized double-blind trial of 366 patients with peptic stricture randomized to either omeprazole 20 mg daily or ranitidine 150 mg twice daily showed that 46% of patients in the ranitidine group versus 30% in the omeprazole group required repeat dilation for symptom management in the year after initiation of medical therapy ($P<.01$).[23] For refractory peptic strictures, triamcinolone injection into the stricture prior to dilation or stent placement can reduce the risk of stricture recurrence.[24]

Eosinophilic Esophagitis Strictures

Eosinophilic esophagitis (EoE) is a chronic immune-mediated inflammatory disease that can lead to fibrosis and stricturing of the esophagus. While the cornerstone of therapy is treating the underlying inflammation with medication or dietary management, endoscopic dilation is frequently utilized as an adjunct to manage symptomatic patients with remodeling features such as rings, strictures, or narrow-caliber esophagus (characterized by inability to pass an adult endoscope with 9 mm diameter).[25]

While esophageal strictures have been reported in up to 38% of adults with EoE, they are often overlooked on endoscopy and radiography.[26] In fact, an EoE subgroup with a "slender esophagus" has been reported via distensibility measurements using the endoluminal functional lumen imaging probe (FLIP); this group of patients lacks obvious dysphagia, narrowing, or inflammation while maintaining significant esophageal narrowing.[27] FLIP can aid in the identification of strictures using impedance planimetry to obtain distensibility measurements, providing a complementary novel tool in the investigation of dysphagia.[28]

Both bougies and TTS (with consideration of pull-through technique of the entire esophagus) are effective for EoE stricture management.[29] Choice of technique should be based on stricture characteristics and endoscopist preference. Empiric dilation can also be considered in patients who have achieved histologic and endoscopic remission (with a normal appearing diameter of the esophagus) if they have persistent dysphagia, given the poor sensitivity of endoscopy for detection of strictures in EoE. The immediate endpoint of endoscopic dilation is the appearance of a mucosal disruption or achieving the target luminal diameter. The goal diameter that generally relieves dysphagia and prevents food impactions is $\geq$16 mm.[30] It may take 1 or more sessions to reach the target and patients should be forewarned of the risk of chest pain post dilation.

Early reports of dilation in EoE raised concerns that the inflamed tissue had increased susceptibility to AEs, including bleeding and perforation. However, a recent meta-analysis of 37 studies involving 2034 dilations in 977 patients, showed that clinically significant AEs were rare including gastrointestinal bleeding in 0.028% (95% CI, 00%–0.217%), chest pain in 3.64% (95% CI 1.73%–5.55%), and perforation in 0.033% (n = 9) (95% CI 0%–0.226%) of the patients. Thirty studies, representing 1957 dilations, described the dilation technique that was utilized and revealed a perforation rate of 0.022% (95% CI, 0%–9.347%) with bougie dilation and a similar perforation rate of 0.059% (95% CI, 0%–0.374%) with balloon dilation. These rates of perforation are comparable to esophageal dilation for other benign indications. Thus, many experts feel that dilation can be done safely in EoE patients with active

inflammation. Additionally, the rare cases of EoE patients who do have radiographic or endoscopic evidence of a perforation generally respond to conservative therapy and rarely require endoscopic or surgical interventions.[29]

Control of esophageal inflammation in patients with EoE decreases the need for future endoscopic dilation. In a study of patients with EoE managed with swallowed topical steroids, patients with histologic response to therapy required half as many dilations to achieve a similar increase in esophageal diameter compared to those who did not achieve histologic remission.[31]

It is important to note that patients with eosinophilic esophagitis who present with a prolonged food bolus impaction are likely at a higher risk of spontaneous and iatrogenic perforation due to underlying mucosal injury from the food bolus. Thus, it is recommended that dilation not be pursued at the time of an acute food bolus impaction, though esophageal biopsies should always be taken in patients without a formal diagnosis at the time of food impaction.[32]

Caustic Strictures

Corrosive agents, most commonly strong bases, can cause significant tissue damage within seconds of ingestion. While hemorrhage, thrombosis, and inflammation are most common during the first 24 hours after ingestion, fibroblast formation occurs about 1 week after ingestion, and repair with mucosal reepithelialization occurs approximately 2 to 6 weeks following ingestion. Scar retraction, also known as contracture, begins at 3 weeks and continues for months, leading to stricture formation. An early endoscopy (3–48 h) post ingestion can assess the extent and severity of injury, with higher grade injury increasing future risk of stricture formation. Caustic strictures can involve all esophageal segments and vary in length.[33]

The goal of caustic stricture management is to improve symptoms and nutritional status rather than achieve wide luminal patency. Dilation is the first-line treatment and can be started safely after the acute injuries have healed, generally between 3 and 6 weeks following ingestion. Waiting until after 6 weeks can decrease the efficacy of dilation, given increased fibrosis by that point.[33]

Dilation of corrosive strictures is associated with higher perforation risk (4%–17%) compared to other benign strictures (0.1%–0.4%). It is not clear whether perforation should preclude future attempts at dilation. Repeat dilations should be pursued 1 to 3 weeks after initial dilation. Approximately half of dilations for caustic strictures are successful, which is lower than for other benign strictures (75%–80%).[34] Attempts at intraluminal stenting for preventing stricture recurrence has been considered. However, the routine use of stents is limited by various factors including hyperplastic tissue growth, challenges with removal, and high migration rate (approximately 25%). Intralesional steroid injection can augment the effect of dilation and can be considered for management of complex strictures.

If a patient has no improvement despite 5 to 7 dilations, it is advised to stop dilations and consider reconstructive surgery. Reconstructive surgery, such as colonic interposition, should be delayed at least 6 months to allow injuries to stabilize, thereby decreasing rates of cervical anastomotic strictures.[34]

Malignant Strictures

Esophageal adenocarcinoma and squamous cell carcinoma are the most common causes of malignant strictures in the esophagus. The management of a malignant stricture is guided by tumor staging, patient symptoms, and the anticipated oncological therapy.[20]

Palliative dilations provide minimal long-term symptomatic relief, given progressive tumor growth. Stepwise dilation to 14 mm is considered safe and effective in permitting echoendoscope passage beyond the stricture for staging purposes.[35]

Management options beyond dilation include SEMS, brachytherapy, external beam radiotherapy, chemotherapy, esophageal bypass surgery, and ablation. SEMS insertion alone is the preferred palliative management for dysphagia. Fully or partially covered stents are preferred over uncovered stents to prevent tumor ingrowth.[36] Stenting can be combined with brachytherapy, particularly in those with a longer life expectancy, though this combination therapy is associated with more AEs, including fistula formation. Chest pain, bleeding, and reflux are common early AEs after stent placement, while fistula formation is a known delayed complication. Stenting should be avoided as a bridge to surgery, as it is associated with poor oncologic outcomes.[37] Photodynamic therapy as well as cryoablation have been suggested as palliative measures in areas that are difficult to treat with stents, such as the proximal esophagus.[20]

Radiation Strictures

External beam radiation can be used as adjuvant therapy for esophageal, head and neck, and thoracic malignancies. The esophagus is at risk of injury from radiation, which can lead to postradiation strictures for which endoscopic dilation is usually the first-line treatment. In one retrospective study of 63 patients with radiation-induced strictures who underwent dilation (with TTS balloon, bougie, or both), clinical success, defined as endoscopic dilation up to 14 mm and subsequent relief of dysphagia, was achieved in 83% of patients. However, given the fibrotic response to radiation, there was a high risk of stricture recurrence. Factors that predicted stricture recurrence included delay in stricture formation, cervical location of the stricture, and length $\geq$2 cm.[38]

DERMATOLOGIC CONDITIONS

The skin and esophagus are both lined with stratified squamous epithelium, so despite having distinct embryologic origins, there are diseases that affect both of these organs. These conditions include autoimmune, inflammatory, and genetic disorders.

Pemphigus and Pemphigoid Disease

Pemphigus is an autoimmune disorder caused by autoantibodies that target desmosomes, thereby compromising cell-to-cell adhesion, causing blistering of the skin and mucous membranes. Pemphigus vulgaris is the most common form of pemphigus, with involvement of the esophagus in 47% to 68% of cases, where it can lead to stricturing.[39]

Pemphigoid disorders are similar but are caused by autoantibodies that target the basement membrane, leading to sub-epidermal bullae. Pemphigoid disorders, such as bullous pemphigoid rarely affect the esophagus.

The treatment of pemphigus and pemphigoid disease affecting the esophagus involves treating the underlying disease, often with systemic steroids and immunotherapy. For esophageal strictures that do not resolve with systemic therapy, dilation with balloons or bougies, intralesional steroid injection, stricturoplasty, or stenting can be considered (Usman).[40] Endoscopy should be performed with great caution as the esophageal mucosa is fragile, and the endoscope may cause erosions, subepithelial hemorrhages, and/or bullae formation. Given this increased fragility, there is thought to be a higher risk of perforation with dilation in these patients.[41]

Epidermolysis Bullosa

Epidermolysis bullosa is a rare, inherited syndrome leading to mucocutaneous fragility and blister formation due to defects in proteins involved in cellular integrity and adhesion.

Blistering and scarring occur in response to even minor trauma, thereby leading to strictures, most commonly in the proximal esophagus. Nutritional support is the mainstay of management in patient with this condition. While endoscopic dilation techniques can usually be used for stricture management, this can potentially lead to iatrogenic sheer stress esophageal injuries, resulting in additional blistering and progression of strictures over time. Thus, in some cases, use of nonendoscopic fluoroscopically guided hydrostatic balloon has been utilized, allowing for better assessment of size and severity of the stricture prior to dilation.[42]

Esophageal Lichen Planus

Esophageal lichen planus (ELP) is a mucocutaneous chronic inflammatory disorder that often presents endoscopically with mucosal denudation and friability. Stricturing is most commonly seen in the proximal and mid-esophagus, with frequent sparing of the gastroesophageal junction (GEJ), given transition to columnar mucosa. A combination of serial esophageal dilations and medical therapy is the typical approach to treat patients with ELP. Bougie dilation is often preferred, given that the strictures are most commonly proximal. Medical therapy options for ELP include systemic therapy, such as oral tacrolimus at a dose of 1 to 2 mg twice daily, systemic corticosteroids, or cyclosporine. Patients have also been treated with swallowed topical steroids such as fluticasone 880 μg twice daily or budesonide 3 mg twice daily, with reduction in dysphagia symptoms and endoscopic improvement of the esophageal mucosa.[43]

Tylosis

Tylosis is a rare genetic disorder characterized by hyperkeratosis of the palms and soles and thickening and fissuring of the skin. The disease is categorized into early onset (before age 1 year) and late onset (age 5–15 years), with the late-onset subtype having a high risk (40%–92%) of developing esophageal squamous cell cancer. Endoscopically, patients can have white polypoid lesions, diffuse hyperkeratosis with nodularity, and friability that can cause strictures. Given the rarity of tylosis, there are no studies to date on the optimal management of esophageal strictures related to this condition. However, it is important to perform surveillance endoscopies on these patients with 4 quadrant biopsies in the upper, middle, and lower esophagus every 1 to 3 years beginning at age 30, given the high risk of esophageal cancer in these patients.[44]

SUMMARY

Esophageal strictures are caused by a variety of disease states, both benign and malignant. Management of strictures is aimed at treatment of the underlying condition in combination with endoscopic therapy. The mainstay of endoscopic management is dilation with either TTS dilators or bougie dilators. Other options for management include intralesional steroid injection, stent placement, incisional therapy, ablation, and self-dilation. To determine the best management technique, one must consider stricture size and length, response to prior therapy, underlying cause, and endoscopic strategies.

CLINICS CARE POINTS

- Strictures can be classified as simple or complex based on their length, diameter, degree of tortuosity, and focality.
- Options for endoscopic treatment of strictures include dilation (through-the-scope or bougie), intralesional steroid injection, stent placement, and stricturotomy.
- For benign refractory strictures that do not improve with dilation every 2 weeks, weekly endoscopic dilation or self-dilation should be considered.
- Endoscopic dilations will be more effective if the underlying inflammatory cause of the stricture (such as eosinophilic esophagitis or GERD) is medically treated.
- Dilation is the first-line therapy for management of strictures from caustic ingestion, but it is associated with higher perforation risk compared to other benign strictures. Dilation should begin after the acute injuries have healed.
- For advanced esophageal malignancies, palliative dilations provide minimal long-term symptomatic relief, given progressive tumor growth; thus, SEMS placement is often the preferred palliative management for dysphagia.
- There are autoimmune, inflammatory, genetic disorders, and dermatologic conditions that are also associated with esophageal stricture formation. Dilation should be pursued with caution in many of these conditions, as trauma from dilation can lead to progression of strictures.

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