Endoscopic Management of Refractory Benign Esophageal Strictures: What's New?

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INTRODUCTION

Dysphagia is the most common symptom of esophageal strictures that can range from difficulty in swallowing some solids to inability to swallow anything including saliva. Besides poor quality of life, dysphagia can cause malnutrition and risk aspiration episodes. Unlike palliation of malignant dysphagia, patients with benign esophageal strictures require long-term relief with minimal reinterventions. Benign esophageal strictures can be simple (<2 cm length, single, straight, and allow a standard 9.5 mm diameter endoscope to pass, e.g., webs, rings, gastroesophageal reflux disease [GERD]-related). They usually respond to 1–3 sequential dilations (1). Complex strictures (corrosive, radiation, postablation/mucosal resection, postsurgery, pill-injuries) on the other hand are long (≥2 cm long), tortuous, multifocal, and usually do not allow a standard endoscope to pass. These strictures tend to be refractory benign esophageal strictures (RBES) defined as inability to achieve a luminal diameter of ≥14 mm despite 5 dilations done at 2-week intervals or requiring ≥1 dilation every month to maintain a diameter of 14 mm (2). Simple strictures can become complex with superimposed injuries such as other pills the patient may be taking getting held up at the stricture site causing pill injury. Moreover, response to proton pump inhibitors given empty stomach may not be fully effective if pills get held up at the stricture site. Hence, liquid formulation should be considered initially.

ENDOSCOPIC MANAGEMENT

Besides addressing the primary cause (e.g., GERD, pill injuries, and eosinophilic esophagitis), endoscopic dilation is the initial approach in managing these patients. However, success rates of endoscopic dilations in RBES can be as low as 60% (3). Still, the *first approach* in managing RBES that have "failed" endoscopic dilation as defined above is endoscopic dilation. If dilation once every 2 weeks is failing (one-step forward and one-step back), then *consider dilating every week*. At repeat endoscopy, before dilation, assess luminal regression. If the luminal diameter appears to have regressed by 50% or more compared with the size it was dilated to a week earlier, continue weekly dilations and progressively use larger diameter dilators every week (increase by 1–3 mm each time) until a target diameter is achieved and maintained. If luminal regression is minimal or shearing effect is minimal on relook (as seen with peptic strictures), larger diameter dilators can be used (increase by 2–3 mm) and intervals between dilations spaced out. Recent studies have shown some beneficial effect with local steroid injections during dilation (4). Using this approach, Palam et al (5) showed that almost 60% of patients with RBES who had failed prior dilations done at ≥2 weekly intervals started responding. Others have also reported similar benefits of starting with weekly dilations instead of once every 2 weeks (6). Moreover, if this approach is used upfront for all complex strictures, the response rates were even higher (>80%) (5). Both bougie and balloon dilators are equally effective with similar safety profiles (7). However, if *multifocal strictures* are suspected (e.g., eosinophilic esophagitis, corrosives, and radiation), it is advisable to *use a bougie* for pan-esophageal dilation as against using a balloon where one tends to focus on the tight region and may miss additional strictures that are ≥10 mm in diameter allowing the standard endoscope to pass (Figure 1). Bougies also gives an opportunity to "palpate" the stiffness of the stricture and decide on the next dilator size. After dilation, we recommend an immediate relook endoscopy to evaluate the shearing effect based on which one can consider going higher or stop. Relook endoscopy will also check if there are any adverse events such as bleeding, perforation, or guidewire injury. Relook may also be needed if there is concern of guidewire displacement if no fluoroscopy is being used.

Other endoscopic interventions

A subset of patients will still not respond to weekly dilation (± steroid injections) where other interventions may be required (1). These include temporarily placing fully covered, self-expanding esophageal stents (SEMS)/biodegradable stents, and electrocautery incision (1), or combination of these techniques (8). The only US Food and Drug Administration cleared stent in the United States for RBES is the expandable plastic stent (9). Owing to significant adverse events (chest pain and migration) (9), excessive foreshortening on deployment, and not preloaded on the delivery system, many are using fully covered metal SEMS instead (off label) (1). Even SEMS can be associated with significant adverse events (10), and after removal, the stricture recurrence rates are high (11). Hence, these patients should soon *restart weekly dilations* so as to not lose

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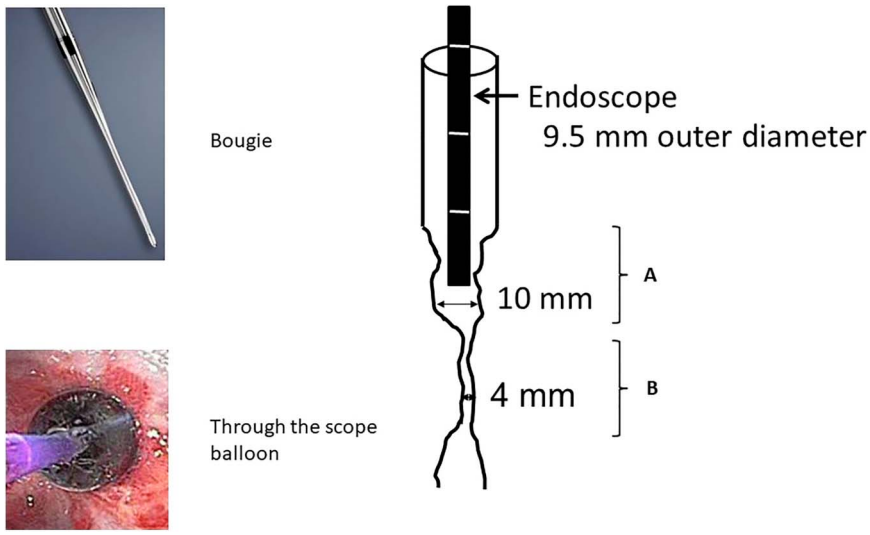

Figure 1. Bougie or balloon to dilate multifocal esophageal stricture. Patients with esophageal injuries such as from radiation or corrosives can have multifocal strictures. Strictures that are >10 mm in diameter (**a**) may allow a standard 9.5 mm diameter endoscope to pass and hence can be missed if attention is focused primarily on dilating a visible tight region (**b**) using a through-the-scope balloon. Hence, in those where multifocal strictures are suspected, consider using a bougie dilator for pan-esophageal dilation.

out on the immediate gains made with SEMS/electrocautery (5). The intervals between dilations can then be stretched till durable response is achieved. A fair proportion of patients who were initially did not respond to weekly dilations started responding after additional interventions were applied and weekly dilations restarted (5).

Will subjecting the patients to frequent dilations increase adverse events did not bear out in a study where 488 dilations

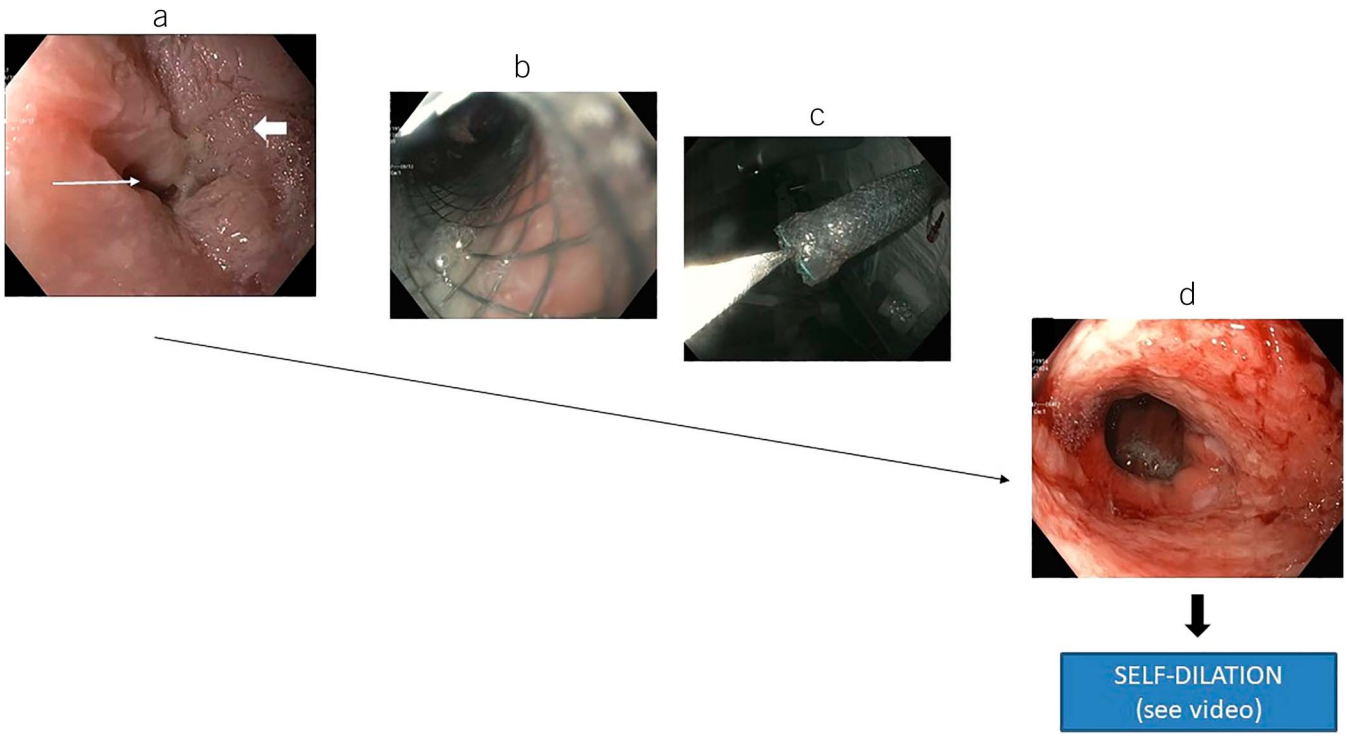

Figure 2. Refractory benign esophageal stricture managed with an expandable metal stent and then self-dilation. A 67-year-old patient developed a refractory benign esophageal stricture following a perforation during anti-reflux surgery. Despite several sessions of dilations every 2 weeks and trial with a fully covered SEMS, she required dilations every 1–2 weeks at which point the patient was keen on trying self-dilation instead of surgery. As her stricture was >2 cm in length, tortuous (**a**, arrow), and had a shelf (**a**, arrowhead), she was not ideal candidate for self-dilation. It was then elected to straighten the stricture and eliminate the shelf with a 23 mm diameter SEMS that was placed across the stricture (**b**) and removed after 1 week (**c**). The stricture/web region became straight and opened up wide enough to allow for self-dilation using a 58 French dilator (see Supplementary Video 1). SEMS, self-expandable esophageal stent.

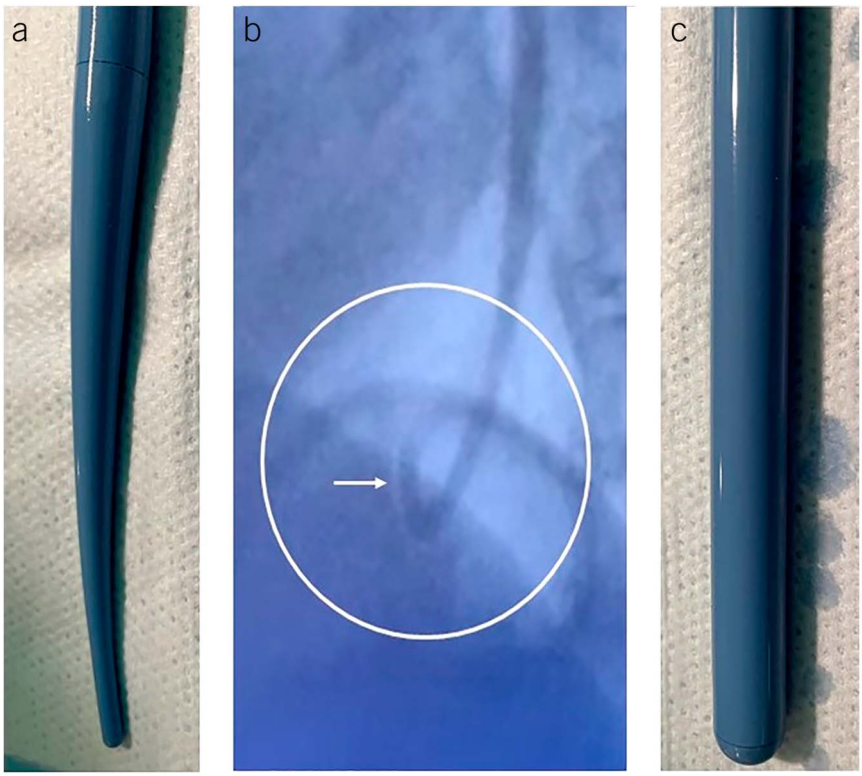

Figure 3. Types of self-dilators. (**a**) is a tapper-tip self-dilator that can at times curl at the level of the stricture as shown in the fluoroscopy image (**b**). During training with fluoroscopic biofeedback, the patient learns what to expect as a feeling when this happens and to slightly withdraw the dilator and reinsert. Otherwise, patients can be provided with a short rounded-tip dilator (**c**).

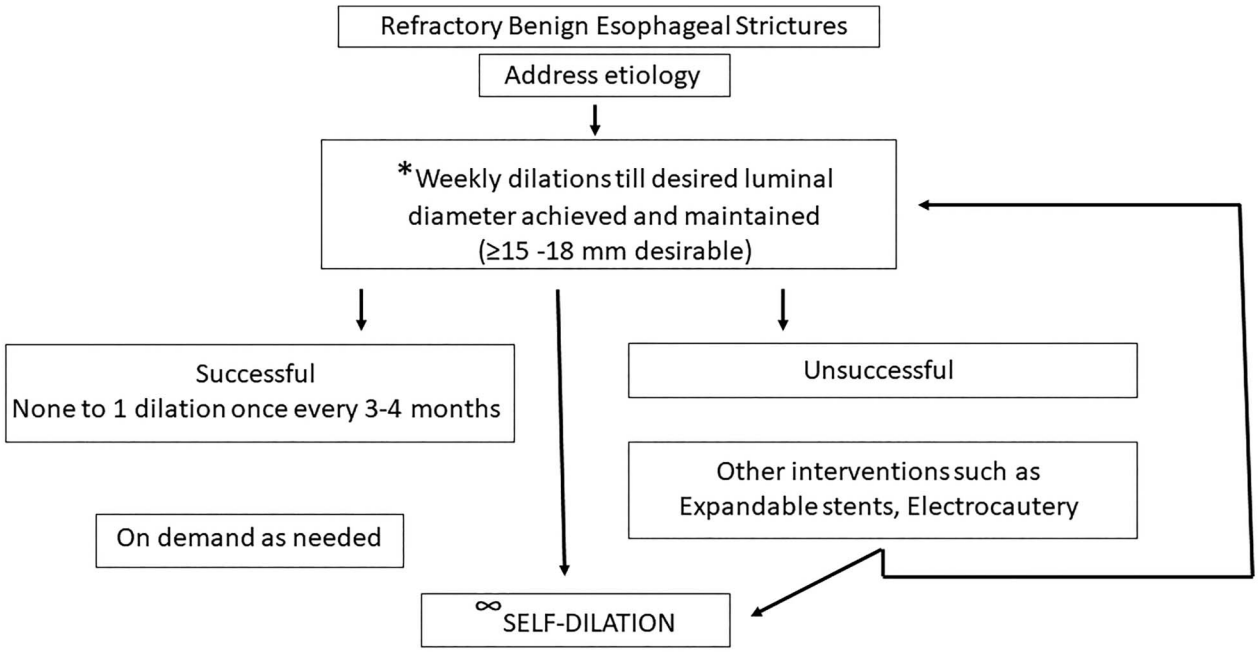

Figure 4. Endoscopic management of refractory benign esophageal strictures. Algorithm used for the weekly dilation protocol (5).

were performed using the above approach. Only 1 perforation and 1 bleeding episode were reported (5). Similar safety profile was also reported in an earlier study (6). Despite the high initial cost with weekly dilations, the good response rates lead to long-term cost savings. Moreover, this approach can be used at any community hospital and does not need referring the patient to a tertiary-care center especially since 60% of these "failed" patients start responding with without additional interventions that would have required a tertiary-care center (5).

The rationale behind the effectiveness of starting with weekly dilations can be explained on the principles of wound healing. After mucosal injury, fibrosis generally sets in by 2 weeks and re-epithelization can take up to 5 weeks (12,13). Hence, dilating every week to avoid luminal distortion from fibrosis could be one option. Using steroids to delay fibrosis is another alternative (4), and a combination of the 2 approaches could be considered. Hastening re-epithelization by cell-sheet technology or injecting autologous pluripotent cells has also been tried with promising results (14).

Self-dilation

Despite the above approach, around 25% of patients will still require frequent dilations (5). Instead of organ-losing surgery, these patients can be trained in the organ-preserving option of self-dilation. Although self-dilation was described in the 1960s, it is still an underutilized modality. Benefits include the patient being in control and no sedation/endoscopy (cost savings). Showing videos of other patients performing self-dilation can be encouraging. We prefer initially to endoscopically dilate the patient with a bougie (as they will be using a bougie at home) and then give them a bougie that is 3 French smaller than the size achieved at endoscopy. The extent to which the patient should insert the dilator (based on the location of the stricture) is marked on the dilator (Video 1). At our self-dilation clinic, patients are trained in one setting initially with fluoroscopy biofeedback and then immediately without fluoroscopy (Video 1). During training, patients are asked to slowly glide the dilator over the tongue and advance to the desired level at their own pace and get a feel of what to expect while fluoroscopically watching the dilator go down. The dilator is then withdrawn slowly and reinserted without the patient this time watching the fluoroscopy monitor. Throughout the process, patients are told to continue breathing, swallow saliva, and provided encouragement. Straight/short strictures are ideal for self-dilation, but these strictures also respond well to endotherapy. Hence in some of our patients with tortuous strictures/shelf, we use SEMS ± electrocautery incision and start self-dilation after the SEMS is removed when the stricture straightens and the shelf eliminated (Figure 2, Video 1). The patient then performs the first self-dilation under supervision with fluoroscopy. They perform self-dilation 2–3 times a day and as per response, reduce to once a day. In those instances where the tapper-tip of the dilator curls and patients' experiences how that feel while watching fluoroscopy (Figure 3a,b), or the tip impacts against the gastric wall, they are instructed to slightly withdraw the dilator and then reinsert. Alternatively, dilators with a short rounded tip (Figure 3c) can be provided. As patients cannot buy self-dilators on-line, our hospital loan them to the patient with the understanding that they will be returned when not needed (in one instance, the patient's spouse returned it when the patient died with recurrence of metastatic cancer, and in another case, the patient achieved durable response). Self-dilation is safe and effective (15) with success rates of around 94% (1,15). There was no perforation reported in the 4,600 home dilations performed in one study (16). One can consider the self-dilation option even earlier in the algorithm (Figure 4) as is being tried at our center.

GOALS

Finally, the goal of achieving ≥14 mm luminal diameter to facilitate normal swallowing as per the definition of RBES (2) may not be applicable to all. Goals need to be set on a case-by-case basis based on the patient's needs and quality of life. Although achieving a luminal diameter of ≥14 mm is desirable, risk of an unforgiving perforation will be high if one strives to reach this size in a patient on G-tube feeding with a tight hypopharyngeal stricture from an irradiated neck who desires just to take some liquids by mouth for quality of life. Similarly, managing a soft-liquid by mouth diet may be all what a 96-year-old frail patient may want for quality of life.

SUMMARY

In summary, besides addressing the primary etiology, endoscopic dilation is still the first line of approach in the management of RBES who are listed as "failed" to dilation. Instead of dilating once every 2 weeks, consider dilating once every week (± local steroid injections). Based on the response, intervals between dilations can be stretched. A significant proportion of patients will respond especially when this approach is used upfront. In others, additional interventions such as SEMS, electrocautery, or both may be needed. Since recurrence rates are still high after these interventions, consider restarting the weekly dilation protocol soon after these interventions and many will start responding when initially they did not. In the few who still do not respond, consider self-dilation training over surgery. One can consider self-dilation options even earlier in the algorithm. Finally, striving to achieve a ≥14 mm diameter for normal swallowing, although desirable, may not be applicable to all. Patients with complex, tight, post-radiation hypopharyngeal strictures or an elderly frail patient with comorbidities may be satisfied with a liquid-soft diet for quality of life and risking a perforation to achieve 14 mm is not advisable.

CONFLICTS OF INTEREST

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