Balloon dilatation for symptomatic gastric sleeve stricture

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During recent years, laparoscopic sleeve gastrectomy (LSG) for morbidly obese patients has been gaining popularity.[1] Several studies have reported that it yields a percentage of weight loss similar to that of Roux-en-Y gastric bypass (RYGB).[2] Moreover, LSG has demonstrated a good safety profile and is not as technically demanding as RYGB.[3] In addition, LSG has fewer late adverse events, such as nutrient and vitamin deficiencies, marginal ulceration, and internal hernia. Last, it leaves the gut in continuity and allows future ERCP without difficulty.

Nevertheless, because of a long staple line and altered intragastric pressures, sleeve gastrectomy is prone to some serious adverse events, such as staple line leakage in 1% to 20% of patients,[4] bleeding, and sleeve stricture.[5] The reported prevalence of sleeve stricture is between 0.7% and 4% in different studies.[5-7] Early strictures are symptomatic in the first 6 weeks after surgery.[8]

Strictures may be caused by imbrications of the staple line, overretraction of the greater curvature during stapling, progressive rotation of the staple line, and scarring of the sleeve in a kinked rotation. Whether the size of the bougie is related to the incidence of strictures remains controversial.[9] The incisura angularis is the site most prone to stricture development.

Typical symptoms of sleeve stenosis include dysphagia, vomiting, and rapid weight loss. Different therapeutic approaches have been suggested including conservative management with parenteral nutrition, endoscopic dilatations, and surgical treatment.[8,10] However, only scant descriptions of balloon dilation have been reported, most of them demonstrating limited success.[10] Herein, we describe a relatively large series of endoscopic treatment for sleeve stricture.

AIM

Our aim was to evaluate the efficacy and safety of balloon dilation in patients with symptomatic sleeve stenosis. In addition, we have looked at the number of procedures needed to relieve symptoms.

METHODS

We reviewed the medical records and imaging studies of consecutive patients diagnosed with sleeve stricture who were referred to our clinic between January 2012 and April 2013. According to our institution protocol, they were initially referred for balloon dilatations. Dilatation procedures were performed by 2 methods: (1) pneumatic balloon dilatation (Rigiflex esophageal balloon; Boston Scientific, Natick, MA, USA). The procedure was performed under direct vision and fluoroscopy with continuous inflation up to a maximal diameter of 30 mm in each session. The balloon was held maximally inflated in the stricture for 1 minute (2). Through-the-scope (TTS) balloon dilatation (esophageal wire-guided balloon dilatation catheter; Boston Scientific, Natick, MA, USA). The balloon was gradually inflated, first to 18 mm and after a few seconds to a maximal diameter of 20 mm in each session. As in the pneumatic technique, the balloon was held maximally inflated in the stricture for 1 minute. The pneumatic balloon was preferred over the TTS balloon because of its higher rigidity. Therefore, in cases where the strictures seemed to be reachable by the pneumatic device's guide, this technique was applied first. However, use of the pneumatic device is limited by the length of its introducer, especially in a rotated sleeve.

All patients were interviewed in a clinic visit 2 weeks after each dilatation procedure to monitor their response to the treatment. The procedure was repeated in symptomatic patients.

Abbreviations: LSG, laparoscopic sleeve gastrectomy; RYGB, Roux-en-Y gastric bypass; TTS, through-the-scope.

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TABLE 1. Patient demographics and surgical details

	Age, y	Sex	BMI	Symptom	Imaging
1	35	F	36	Dysphagia	NA
2	44	F	37	Vomiting	NA
3	50	F	47	Vomiting	Normal CT scan
4	25	F	38	Dysphagia	NA
5	54	M	42	Dysphagia	NA
6	24	F	40	Dysphagia	NA
7	44	F	39	Dysphagia	NA
8	56	F	50	Dysphagia	Normal CT scan
9	36	F	43	Dysphagia	NA
10*	27	F	65	Dysphagia	Sleeve stenosis on CT scan
11	67	F	40	Dysphagia	Stenosis on barium swallow
12	48	F	48	Dysphagia	Sleeve stenosis on CT scan
13*	48	M	35	Dysphagia	Normal CT scan
14	43	F	36	Dysphagia	NA
15	68	M		Dysphagia Recurrent aspiration	NA
16	36	F	40.7	Dysphagia	NA

BMI, Body mass index; *F,* female; *NA,* information not available; *M,* male.
*These patients had previous laparoscopic adjustable gastric banding.

RESULTS

Sixteen patients after LSG were referred to our clinic between January 2012 and April 2013 with a diagnosis of sleeve stricture according to symptoms and imaging studies. In 12 patients, surgical reports were available and elicited that a 32 bougie was used with no imbrication. Other etiologies for the symptoms, such as gastroesophageal reflux disease, were excluded. Demographics and patient data are depicted in Table 1. All patients presented with mid-sleeve stricture, located near the incisura and traversable by an endoscope (Fig. 1A and B). Three patients were treated with the pneumatic approach, and 14 patients were treated with TTS (Fig. 2).

The average time between the surgery and the first endoscopy was 183 ± 279 days, with a median of 91 days, and the number of dilation attempts ranged from 1 to 3 (Table 2). Seven patients (44%) reported significant symptomatic improvement, with no need for surgical interventions. All of the successful cases reported at least partial improvement of symptoms immediately after the first attempt. However, 3 of them needed 3 procedures to achieve sustained maximal improvement. Of note, all 3 patients who were treated with the pneumatic approach reported alleviation of their symptoms.

Nine patients eventually were defined as treatment failures, including 3 patients who were lost to follow-up. None of them experienced any relief after the first attempt. In 5 patients of this group, up to 3 dilatation attempts were used. Six patients eventually had second operations. In one failed case, a large remnant of fundus was demonstrated during endoscopy. During surgery, the remnant fundus was discovered inside a diaphragmatic hernia and subsequently was mobilized and resected to achieve a "formal" sleeve. After this procedure, the patient's symptoms resolved. The other 5 patients underwent conversion to RYGB.

In our series, at least 3 patients had normal imaging results. However, 1 of them responded to endoscopic dilatations, indicating the limitation of imaging studies in demonstrating functional stenosis.

Five patients reported mild epigastric pain after the procedures, which was resolved with analgesics alone without the need for further evaluation or intervention. Importantly, no serious adverse events occurred during or after endoscopic dilatation.

Interestingly, in 1 patient, the etiology of the stricture was not surgical narrowing but external compression by a hematoma. An early TTS dilatation was used (after 23 days), with immediate symptomatic resolution. This case was not included in the series and overall analysis.

DISCUSSION

LSG recently has been accepted as an effective surgical approach for long-term weight loss with regression of major associated comorbidities. A serious adverse event of this procedure is sleeve stenosis, resulting from an anatomical stricture of the gastric tube or gastric tube twisting.[11] The International Sleeve Gastrectomy Expert Panel has recommended in its consensus paper the following approach to sleeve stenosis: observation, followed by endoscopic dilatation attempts and reoperation in patients who failed endoscopic treatment for 6 weeks. In cases that seromyotomy is not feasible, conversion to RYGB is indicated.[8] Interestingly, no consistent method to dilate LSG strictures has been described in the literature. The scant reports include use of a Savary bougie,[11] TTS,[7] and even esophageal stents.[8] In our patients, we used either TTS or pneumatic balloon dilatations.

We report a success rate of 44%. Importantly, it seems that even long-standing strictures may be amenable to dilatation, as 1 of our patients responded to the treatment 3 years after surgery. Of note, most of our patients (5/7) required more than 1 dilatation to reach consistent