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Endoscopic Balloon Dilatation of Gastroenteric Anastomotic Stricture After Laparoscopic Gastric Bypass

Background and Study Aims: Laparoscopic gastric bypass is a recently introduced treatment option for morbid obesity, with promising initial results. Stenosis of the gastroenterostomy is a recognized complication. The efficacy and safety of endoscopic balloon dilatation for the management of this type of anastomotic stenosis has not been studied.

Patients and Methods: 450 patients who underwent laparoscopic gastric bypass at our institution were followed prospectively. All patients had a 15 ml gastric pouch and either a 75 cm or 150 cm jejunal Roux limb depending on whether obesity was morbid (body mass index (BMI) < 50 kg/m²) or super-morbid (BMI > 50 kg/m²). Patients who developed symptoms compatible with stenosis of the gastrojejunostomy were referred for upper gastrointestinal endoscopy.

Results: 14 patients, 11 women and three men, underwent a total of 27 endoscopies, with 23 balloon dilations. Their average age was 46 years (range 33–59 years), average preoperative BMI was 47 kg/m², and they presented an average of 2.7 months

after surgery (range 0.3–15.7 months). Of the 14 patients, 13 had a stricture of the gastrojejunostomy and one patient had edema. For initial dilatation, a 15 mm hydrostatic balloon was used in 12 patients and an 18 mm balloon in two patients. There was response to treatment with the 15 mm balloon in seven of the 12 patients (58%), and they required no further dilatation; in one there was a response to a further 15 mm balloon dilatation; in three patients a response to subsequent 18 mm balloon dilatation; and one patient required 18 mm and 25 mm balloon dilations. The two patients treated with an initial 18 mm balloon dilatation required no further dilations. The average length of follow-up after successful dilatation was 18 months (range 7–30 months). There were no complications with any of the 23 dilations performed.

Conclusion: Stenosis of the gastroenterostomy after laparoscopic gastric bypass occurred in 3.1% of the patients in this series. It can be successfully and safely treated with endoscopic balloon dilatation with good long-term follow-up.

Introduction

Recent reports have demonstrated the dramatically increasing prevalence of obesity in the United States. The National Longitudinal Study of Adolescent Health and the National Health and Nutrition Examination Survey (NHANES) studies have shown that over 40% of the population is overweight [1], with the prevalence in 18–29 year olds having almost doubled to 19% between 1991 and 1999 [2]. Morbid obesity can be defined by several criteria, but is generally associated with a body mass index

(BMI) of 40 kg/m² or more [3]. It can lead to a number of co-morbid conditions, including hypertension, diabetes mellitus, hyperlipidemia, osteoarthritis and sleep apnea.

Dietary and pharmacological therapy for obesity is often unsuccessful, particularly in morbidly obese individuals, and can be associated with potentially life-threatening complications such as cardiac valvular defects [4]. Various surgical techniques for treating morbid obesity have been advocated for several decades, but currently the consensus of opinion favors either gastro-

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plasty (vertical or horizontal banding) or a gastric bypass procedure, with the latter, in the form of a Roux-en-Y gastric bypass, considered the gold standard for bariatric surgery [5]. Multiple variations exist for both procedures. The purpose of gastroplasty is to reduce caloric intake by limiting the intake of solids, while gastric bypass also restricts intake by forming a small gastric pouch, and additionally induces some degree of malabsorption, depending on the length of the Roux limb.

Laparoscopic gastric bypass has a much shorter recovery time than the conventional open approach, yet is thought to have the same long-term results [6, 7].

Stenosis of the gastrojejunal anastomosis is a recognized complication of open gastric bypass procedures [8] and can lead to prolonged vomiting and nutritional deficiencies [9]. Upper endoscopy and balloon dilation have been advocated as effective therapy for this complication but the data are scarce and relate only to the open gastric bypass procedure [8].

The aim of this study was to determine the incidence of stomal stenosis in a prospective cohort of patients undergoing laparoscopic gastric bypass and to evaluate the safety and efficacy of endoscopic balloon dilation in these patients.

Patients and Methods

A total of 450 patients who underwent laparoscopic gastric bypass at our institution between 1998 and 2000 were followed prospectively. All the patients had a 15 ml gastric pouch and either a 75 cm or 150 cm jejunal Roux limb depending on whether obesity was morbid (body mass index (BMI) < 50 kg/m²) or super-morbid (BMI > 50 kg/m²). The gastroenteric anastomosis was fashioned by running a posterior suture to approximate the Roux limb to the gastric pouch. A stapling device was used to create the anastomosis, which was strengthened with a second suture layer. A 9 mm diagnostic endoscope was used as a bougie to ensure the gastroenterostomy had an appropriate diameter.

Patients monitored their dietary intake and were followed as outpatients and by regular telephone calls, by a multidisciplinary team of nurses, physicians and nutritionists. Patients who developed postprandial vomiting consistent with stenosis of the gastrojejunostomy were referred for upper gastrointestinal endoscopy. Patients with narrowing of the gastrojejunal anastomosis, as evidenced by inability to pass the 9 mm Pentax diagnostic gastroscope through the stoma, underwent hydrostatic balloon dilation using 10, 12, 15, 18, or 25 mm diameter through-the-scope (TTS) balloons (Bard Endoscopic Technologies, Billerica, Massachusetts, USA). Stricture was distinguished from edema according to the degree of surrounding inflammation. Dilation was not performed if there was evidence of obvious ulceration around the anastomosis. All procedures were performed by a therapeutic endoscopist or senior trainee.

The decision as to which diameter of balloon to use was taken by the endoscopist at the time of the procedure and depended on the degree of narrowing. Additional dilations with a larger balloon could be performed if judged to be necessary and safe by

the endoscopist, according to the initial postdilation appearance. The balloon was passed through the scope, positioned across the stoma, inflated to a pressure of 15 atmospheres, and held for 60 seconds (as seen in Figure 1–4). After dilation, the gastroscope was passed through the stoma to ensure there was no ulceration distal to the anastomosis. Patients were not routinely treated with acid-suppressive therapy. Patients were followed for clinical response and underwent repeat endoscopy if symptoms did not improve.

Results

Of the 450 patients, 14 (3.1%) were referred for endoscopy and found to have significant narrowing of the gastrojejunostomy. Their clinical characteristics are presented in Table 1. There were 11 women and three men, with an average age of 46 years (range 33–59 years), and average preoperative BMI of 47 kg/m². They presented at an average of 2.7 months after surgery (range 0.3–15.7 months), although this was skewed by one patient who presented over a year after gastric bypass. The other 13 patients all presented within a range of 0.3–3.3 months. All patients had experienced dramatic weight loss, and presented with postprandial vomiting as the predominant symptom of gastric outlet obstruction.

At endoscopy, 13 of 14 patients had a stricture of the gastrojejunostomy and one patient had marked edema. There was no apparent cause for stomal stenosis, with no evidence of anastomotic breakdown or major adjacent inflammatory process.



Figure 1 Endoscopic appearance of a strictured gastroenteric anastomosis in a 46-year-old woman who presented with vomiting 16 months after laparoscopic gastric bypass.



Figure 2 A deflated 18-mm balloon is passed down the scope and through the stricture.

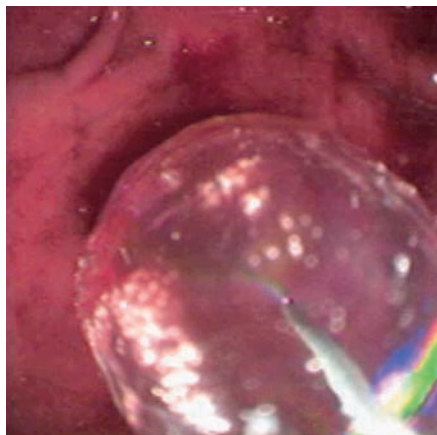


Figure 3 The balloon is inflated and left in place for 60 seconds.

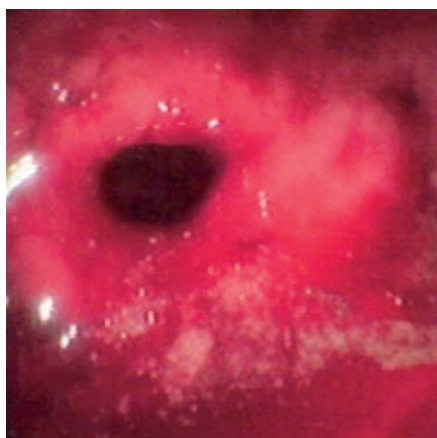


Figure 4 The post-dilation appearance.

A total of 12 patients underwent dilation with a 15 mm hydrostatic balloon, having presented an average of 1.8 months (range 0.3–3.3 months) after surgery. At the first endoscopy, two of these patients were initially treated with 10 mm and 12 mm balloons and then with the 15 mm balloon. Of the 12 patients, seven (58%) responded with good long-term symptomatic relief and required no further dilation; one (8%) responded to a further dilation with a 15 mm balloon, three patients (25%) responded to subsequent dilation with an 18 mm balloon, and one patient (8%) required dilation with a 25 mm balloon after an unsuccessful attempt with an 18 mm balloon.

Two patients underwent initial dilation with an 18 mm balloon and required no further dilations. They had presented 8.5 months after surgery (range 1.2–15.7 months). No patients were treated with the 25 mm balloon at the first endoscopy.

The average length of follow-up after successful dilation was 18 months (range 7–30 months). The 14 patients underwent a total of 27 endoscopies, with 23 balloon dilations. There were no perforations or other complications with any of the 23 dilations performed.

Discussion

The obesity epidemic in the developed world has meant that surgery has become an accepted therapeutic modality for patients with morbid obesity. The laparoscopic approach results in a

much shorter recovery time and there are few major complications in experienced hands [5]. With open gastric bypass and other gastric restriction procedures, stenosis of the gastrojejunostomy has been reported to have an incidence of between 5 and 19% [10–12]. The incidence is similar with the laparoscopic approach, a recent series of laparoscopic gastric bypass procedures in 281 patients having a stomal stenosis rate of 6.6% [13]. Several techniques have been used to treat stomal stenosis, ranging from surgical revision to use of a variety of endoscopic dilators. The endoscopic approach initially involved the use of pneumatic balloon catheters which were placed through the endoscope using a guide wire and inflated under fluoroscopic guidance [10]. Sequential dilation with this technique, using 4 mm to 15 mm (12-Fr to 45-Fr) diameter balloons, was successful with no complications in a Canadian series of 13 patients with stomal stenosis after gastroplasty [10]. In contrast, Kretzschmar et al. found a total lack of response after balloon dilation using Fogarty and Gruntzig balloons, in a cohort of eight patients with stenosis following gastroplasty, but the same method was successful in 10 of 14 patients with stomal stenosis complicating gastric bypass, with up to 5 years of follow-up [14]. Pneumatic balloon dilation under direct visualization can also be used to dilate stenoses. Wolper et al. demonstrated its long-term efficacy in 10 of 15 patients, and noted that it was tolerated better than their previous attempts using fluoroscopic guidance [12]. In the present series TTS balloons were utilized that do not require fluoroscopy and necessitate only one intubation with the endoscope as opposed to the multiple intubations needed with older balloons. This is inherently more comfortable for the patient and appears to be as efficacious [8]. Kozarek demonstrated that endoscopic balloon dilation is a procedure commonly undertaken by gastroenterologists in the United States, with good outcomes in a variety of situations, and a perforation rate of 2% [15].

The present series illustrates that good long-term results are possible with treatment using TTS balloons for stomal stenosis following laparoscopic gastric bypass. Use of the 15 mm balloon gave a success rate of 58%, suggesting that this size should be used initially. No perforations were noted even with the 18 mm diameter balloon, although the number of patients involved was small. Similarly, only one episode of dilation was required in nine patients with a durable response, showing that repeated dilations with balloons of increasingly larger diameter are often not required.

The re-stenosis rate of 3.1% may have been a slight underestimate as some patients may have been seen at other institutions for follow-up after gastric bypass surgery, and may have undergone endoscopy and dilation. However, in our experience, it was very unusual for patients with significant symptoms after surgery to be investigated without referral back to our institution.

Conclusion

In this cohort of 450 patients, stenosis of the gastrojejunostomy occurred with an incidence of 3.1%. Initial endoscopic therapy using the 15 mm hydrostatic balloon was associated with long-term resolution of symptoms in 58% of patients, with the remainder responding to repeat dilations with either 15 mm or

Table 1 Characteristics of 14 patients and endoscopic findings after laparoscopic gastric bypass for morbid obesity

Age	Sex	BMI,kg/m ²	Interval since surgery, months	Symptoms	EGD findings	Endoscopic therapy
36	F	53	1.2	Vomiting	Stricture	15 mm balloon dilation
			1.9	Vomiting	Stricture	18 mm balloon dilation
56	F	53	3.1	Vomiting	Stricture	15 mm balloon dilation
46	F	57	15.7	Vomiting	Stricture	18 mm balloon dilation
39	F	55	0.3	Vomiting	Edema	15 mm balloon dilation
			1.4	Vomiting	Stricture	15 mm balloon dilation
			2.0	Vomiting	Stricture	15 mm balloon dilation
40	F	43	0.9	Vomiting	Stricture	15 mm balloon dilation
49	F	41	3.3	Vomiting	Stricture	15 mm balloon dilation
			4.1	Vomiting	Stricture	18 mm balloon dilation
59	M	42	2.6	Vomiting	Stricture	12, 15 mm balloon dilation
			2.8	Vomiting	Patent	18 mm balloon dilation
			3.2	Vomiting	Patent	18 mm balloon dilation
			3.3	Vomiting	Patent	25 mm balloon dilation
51	F	47	1.2	Vomiting	Stricture	18 mm balloon dilation
47	F	47	1.5	Vomiting	Stricture	15 mm balloon dilation
41	M	45	3.1	Vomiting	Stricture	15 mm balloon dilation
33	F	44	0.9	Vomiting	Stricture	15 mm balloon dilation
48	M	44	1.2	Vomiting	Stricture	10, 12, 15 mm balloon dilation
			1.5	Vomiting	Stricture	15 mm balloon dilation
			1.7	Vomiting	Stricture	18 mm balloon dilation
			2.2	Vomiting	Patent	None
			4.6	Vomiting	Patent, jejunal ulceration	None
			6.4	Vomiting	Patent	None
			8.0	Hematemesis	Tear in gastric pouch	None
49	F	42	1.7	Vomiting	Stricture	15 mm balloon dilation
52	F	44	1.4	Vomiting	Stricture	15 mm balloon dilation

EGD, esophagogastroduodenoscopy.

18 mm balloons. Initial dilation with an 18 mm balloon was effective in both patients in whom it was used. We conclude that endoscopic balloon dilation is an effective, safe, and durable method for managing stenosis of the gastrojejunostomy subsequent to laparoscopic gastric bypass.

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