

Surgical Management of Gastroesophageal Reflux Disease in Obese Patients

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Obesity or morbid obesity is common among patients who are seeking surgery for refractory gastroesophageal reflux disease (GERD). Several surgical options for treating GERD in obese patients are available. Fundoplications may be effective, at least in the short-term, but have no effect on weight loss and comorbidity reduction. Silicone-adjustable gastric banding and Roux-en-Y gastric bypass have different antireflux mechanisms, but also have proven efficacy against GERD and result in significant weight loss and comorbidity reduction. Vertical banded gastroplasty is not an effective antireflux procedure, and it may induce GERD in some patients. The malabsorption operations have no proven efficacy against GERD. Patients with severe obesity who are seeking surgical treatment for GERD should be considered for silicone adjustable gastric banding or Roux-en-Y gastric bypass because of the added benefit of weight loss and consequent comorbidity reduction. Copyright © 2001 by W.B. Saunders Company.

Key Words: Gastroesophageal reflux disease, obesity, morbid obesity, bariatric surgery, Roux-en-Y gastric bypass, vertical banded gastroplasty, gastric banding, biliopancreatic diversion.

Gastroesophageal reflux disease (GERD) and obesity are currently two of the most common ailments of Western civilization. Both diseases are treated according to severity. Mild disease is treated primarily with lifestyle changes, followed by medical management and then surgery for severe or refractory disease. The goal of surgery for GERD is to prevent pathologic gastroesophageal reflux, whereas the primary goal of surgery for obesity is to induce and maintain weight loss. Operations for obesity have been suggested as having either a positive or negative impact on GERD. In some cases, bariatric surgery may actually induce GERD. GERD and morbid obesity often coexist not only because they

are both very common, but also because obesity is a major risk factor for GERD. Thus, many of the lifestyle changes aimed at treating GERD are intended to encourage weight loss. Patients with both severe obesity and severe GERD refractory to medical treatment present a challenging problem. At the present time, there is controversy as to which operations are most appropriate for treating GERD in the morbidly obese. Surgeons who treat GERD will most likely treat obese patients at one time or another; therefore, they should be aware of the special challenges that these patients bring and develop appropriate treatment strategies.

Incidence and Comorbidities of Obesity

In Western society, morbid obesity has become a major concern for medical professionals. The incidence of obesity has increased dramatically; an estimated 50% of the United States population is overweight or obese, and 5% is morbidly obese.¹ The overweight patient is known to have a high general-risk profile for serious medical problems and a decreased life expectancy.^{2,3} A number of obesity-related problems may not be associated with death but can lead to significant physical or psychological disability. These include degenerative osteoarthritis, pseudotumor cerebri, cholecystitis, skin infections, chronic venous stasis ulcers, stress overflow urinary incontinence, gastroesophageal reflux, sex hormone imbalance with dysmenorrhea, hirsutism, infertility, and an increased risk of uterine and breast cancer.⁴

GERD and Obesity: Incidence and Mechanisms

GERD is one of the more common comorbidities of morbid obesity, with an incidence as high as 50% to 70% of patients seeking gastric bypass surgery for severe obesity.⁵⁻⁷ This high incidence

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1071-5517/01/0804-0005\$35.00/0

doi:10.1053/slas.2001.30464

appears to be expected, because there is evidence that obesity itself is an independent risk factor for GERD,⁸⁻¹⁰ although there are some studies that show no relationship between GERD and obesity.¹¹ The accepted pathophysiologic mechanisms of GERD, including impaired esophageal acid clearance, reduced lower esophageal sphincter function, and poor gastric emptying, may all play a role in inducing GERD in obese and non-obese patients (Fig 1). Obesity, however, may independently induce GERD through mechanisms that are not clearly understood. One probable hypothesis is that severe obesity causes chronically increased intra-abdominal pressure, which promotes reflux of gastric contents through an ineffective lower esophageal sphincter.^{12,13} The relative pressure gradient from abdomen to chest is therefore exaggerated, promoting gastroesophageal reflux. Associations between obesity, hiatal hernia, and impaired lower esophageal function independent of elevated intra-abdominal pressure have also been entertained as possible etiologic factors of obesity-induced GERD.¹⁴

Treatment Strategies for GERD in Obese Patients

In general, treatment strategies for GERD in morbidly obese patients have been no different than those for nonobese patients. Lifestyle changes, including weight loss followed by pharmacologic treatment with H₂ blockers and proton pump inhibitors, have been the mainstay of medical treatment. Weight loss programs in the severely obese to improve GERD and other comorbidities that use diet, exercise, behavioral changes, or pharmacologic means have been generally unsuccessful. When medical treatment fails to control GERD, surgical treatment may be entertained.

A variety of operations with specific surgical strategies to treat GERD have been devised (Table 1). The most commonly used surgical strategies for GERD in both nonobese and obese populations work by restoring cardioesophageal competence. Examples of such operations are the funduplications, including the Nissen, Toupet, Dor, and Belsey procedures, as well as the Hill

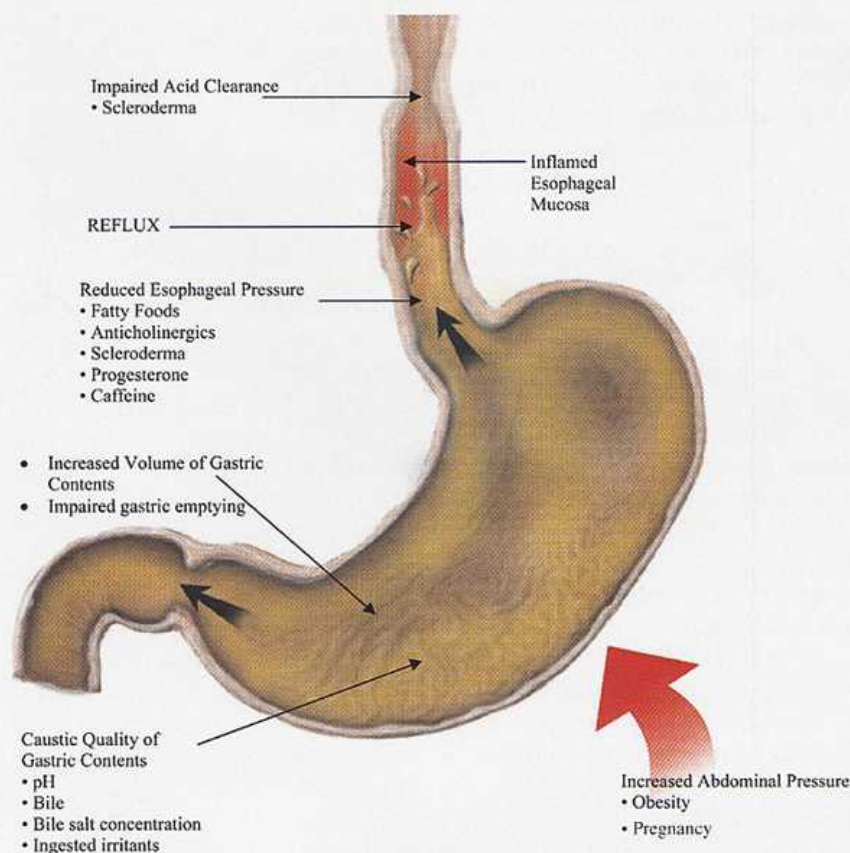


Figure 1. Mechanisms of GERD in obese and non-obese patients.

Table 1. Antireflux Operations and Their Mechanisms to Prevent GERD

Operation	Mechanical barrier to reflux	Decrease gastric acid secretion	Improve gastric emptying	Divert bile from stomach	Induce weight loss
Antireflux operations					
Funduplications	+	—	—	—	—
Hill repair	+	—	—	—	—
Pyloroplasty	—	—	+	—	—
Vagotomy	—	+	—	—	—
Vagotomy/Antrectomy	—	+	+	—	—
Vagotomy/Antrectomy RY gastrojejunostomy	—	+	+	+	—
Duodenal Switch	—	—	—	+	—
Morbid obesity operations					
Vertical banded gastroplasty	—	—	—	—	+
Gastric banding	+	—	—	—	+
Roux-en-Y gastric bypass	—	+	+	+	+
Bilopancreatic diversion +/- duodenal switch	—	—	+	+	+

NOTE: + = present, — = absent.

posterior gastropexy. These operations are the gold standard for GERD surgery because they have proven efficacy and have very low short-term and long-term risk profiles.^{15,16} However, procedures that do not affect cardioesophageal competence have also been proven to be effective treatments for GERD. Pyloroplasty is generally considered an adjunctive procedure, along with a fundoplication in patients with severely delayed gastric emptying.^{17,18} By improving gastric emptying, it may reduce gastroesophageal reflux. Vagotomy, vagotomy plus antrectomy, and vagotomy plus antrectomy with Roux-en-y gastrojejunostomy are operations that were initially intended for treating peptic ulcer disease but may also be considered antireflux operations.^{19,20} As opposed to strictly creating an antireflux barrier, they reduce gastric acid secretion, which is a strategy similar to medical treatment with proton pump inhibitors. The Roux-en-Y connection also effectively diverts bile from the stomach and esophagus, thus eliminating any effect of bile reflux on GERD. Csendes et al have advocated similar strategies for control of severe reflux in patients with Barrett's esophagus, and they add a fundoplication to vagotomy, antrectomy and Roux-en-Y gastrojejunostomy (Fig 2).²¹ The duodenal switch, as described by DeMeester et al,²² is intended to eliminate pathologic duodenogastric reflux only without vagotomy or gastric resection.

Bariatric operations are primarily intended to achieve weight loss and reduce comorbidities, but may also evoke some of the antireflux strategies described earlier for the pure antireflux operations.^{5,7,23-25} The 4 most commonly per-

formed procedures include vertical banded gastroplasty (VBG), silicone adjustable gastric banding (SAGB), Roux-en-Y gastric bypass (RYGBP), and the malabsorption procedures, including

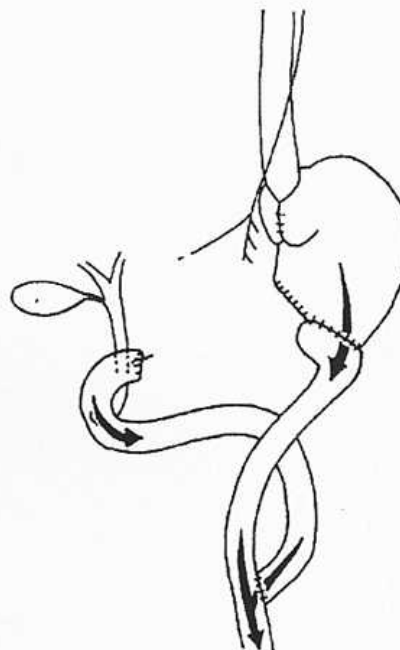


Figure 2. Vagotomy, antrectomy and Roux-en-Y gastrojejunostomy with esophagocardioplasty. From Antrectomy and Roux-en-Y Gastrojejunostomy with Esophagocardioplasty Braghetto I, Korn O, Csendes A, Frias JC. "Esophagocardioplasty, vagotomy-antrectomy and Roux-en-Y gastrojejunostomy: Indication in cases with severe esophageal motor dysfunction." *Diseases of the Esophagus* (1998) Vol 11(1):58-61, Fig. 2, reproduced with permission.⁴⁴ www.blackwell-science.com

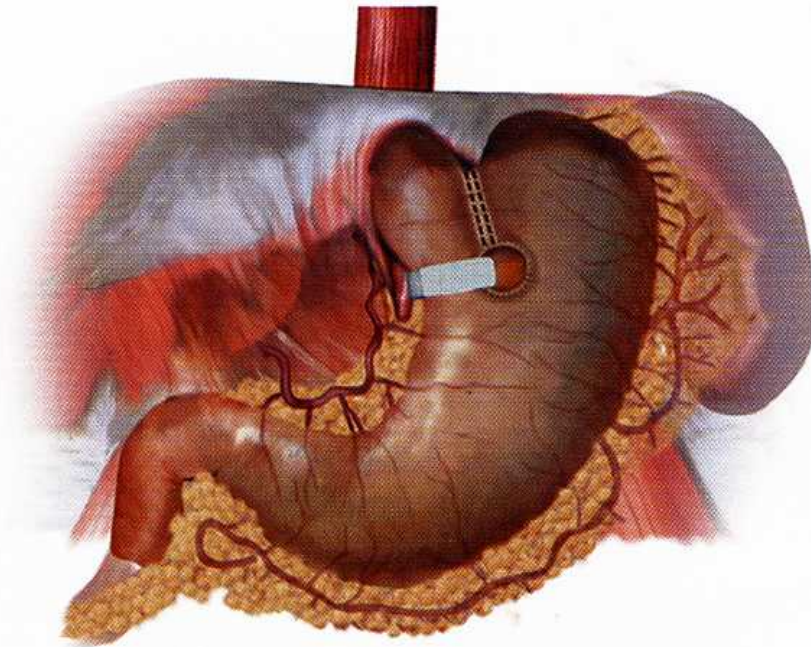


Figure 3. Vertical banded gastroplasty.

bilopancreatic diversion (BPD) and BPD with duodenal switch (BPD-DS) (Figs 3-6). Each of these operations can be performed laparoscopically, and specific outcomes have recently been reviewed.²⁵ Patients are candidates for bariatric surgery if they have failed to lose weight by non-surgical means and have a body mass index (BMI) equal to or greater than 35 Kg/m² with

significant comorbidity or have a BMI equal to or greater than 40 Kg/m² with or without comorbidity.²⁶ SAGB may potentially reduce GERD by creating a mechanical barrier to GERD and by inducing weight loss. The banded outlet for the VBG, however, is placed lower on the stomach than the adjustable gastric band, allowing acid production above the outlet. The adjustable gas-

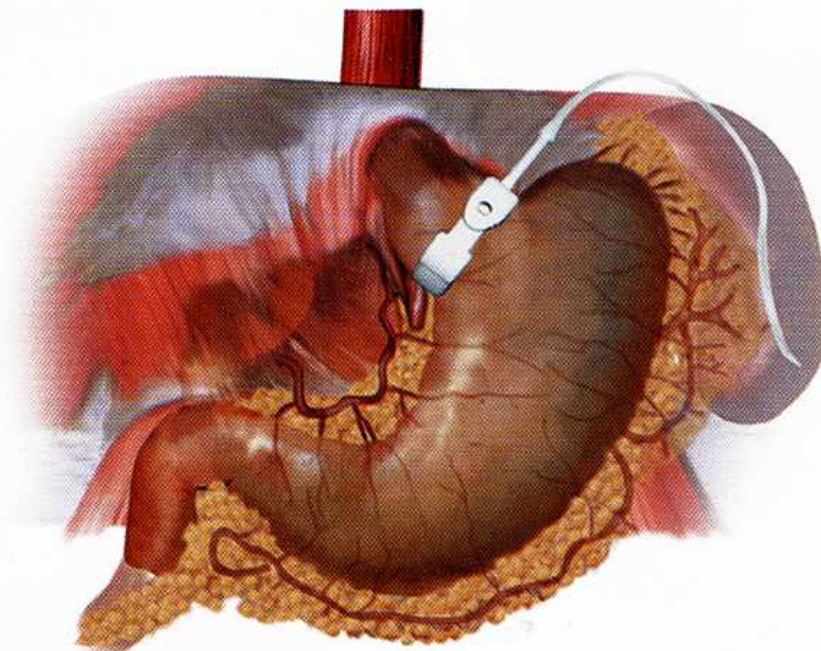


Figure 4. Silicone-adjustable gastric banding.

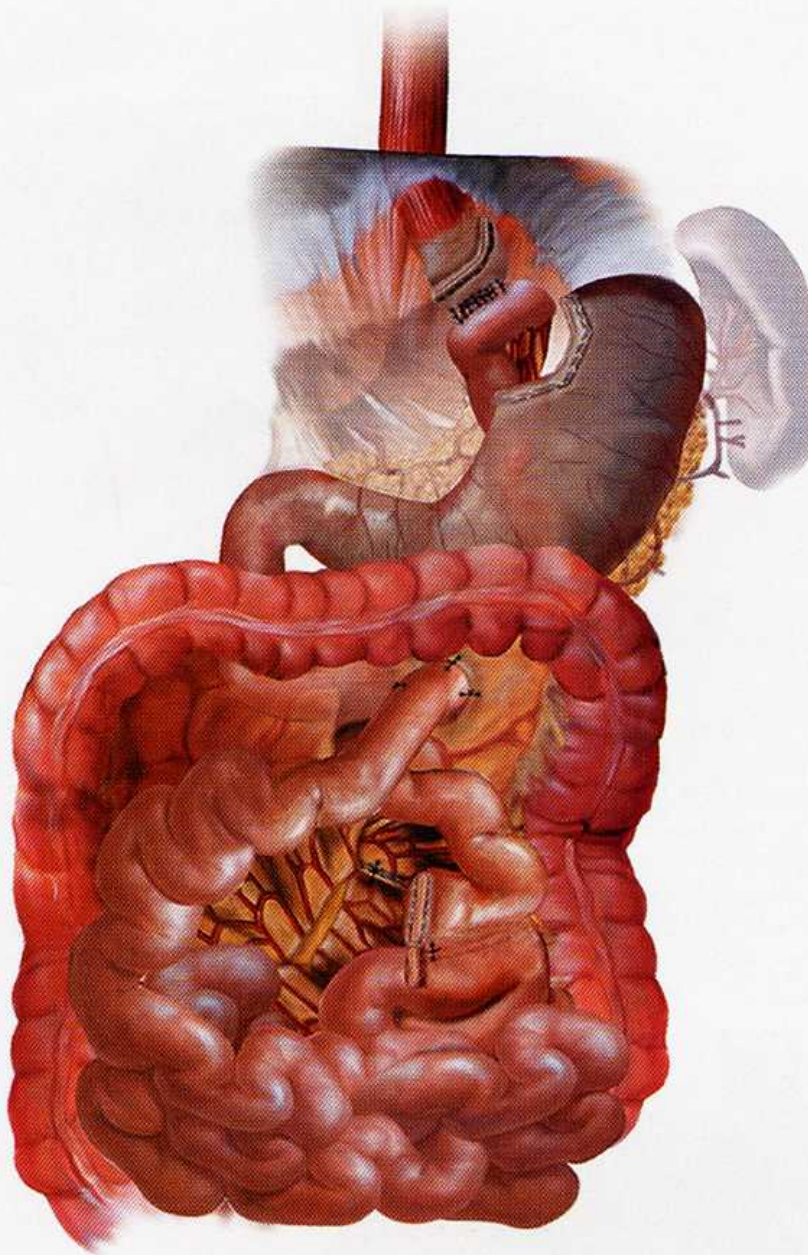


Figure 5. Gastric bypass.

tric band is placed immediately below the gastroesophageal junction and is thought to create a barrier to reflux. It is similar in concept to the Anglelick antireflux prosthesis, which is placed around the distal esophagus.²⁷ RYGBP similarly decreases gastric acid secretion (in the pouch) and diverts bile as do the vagotomy, antrectomy, and RY gastrojejunostomy procedures, except that the gastric pouch reservoir is much smaller (15 mL) and should yield significantly less acid production. The malabsorption procedures divert

bile and potentially reduce gastric acid secretion, but generally involve a much larger gastric reservoir (200 to 500 mL) compared with the gastric bypass.

Results of Surgical Management of GERD in Obese Patients

The fundoplication procedures, to varying degrees, have been proven to achieve effective long-term control of GERD, at least in normal weight

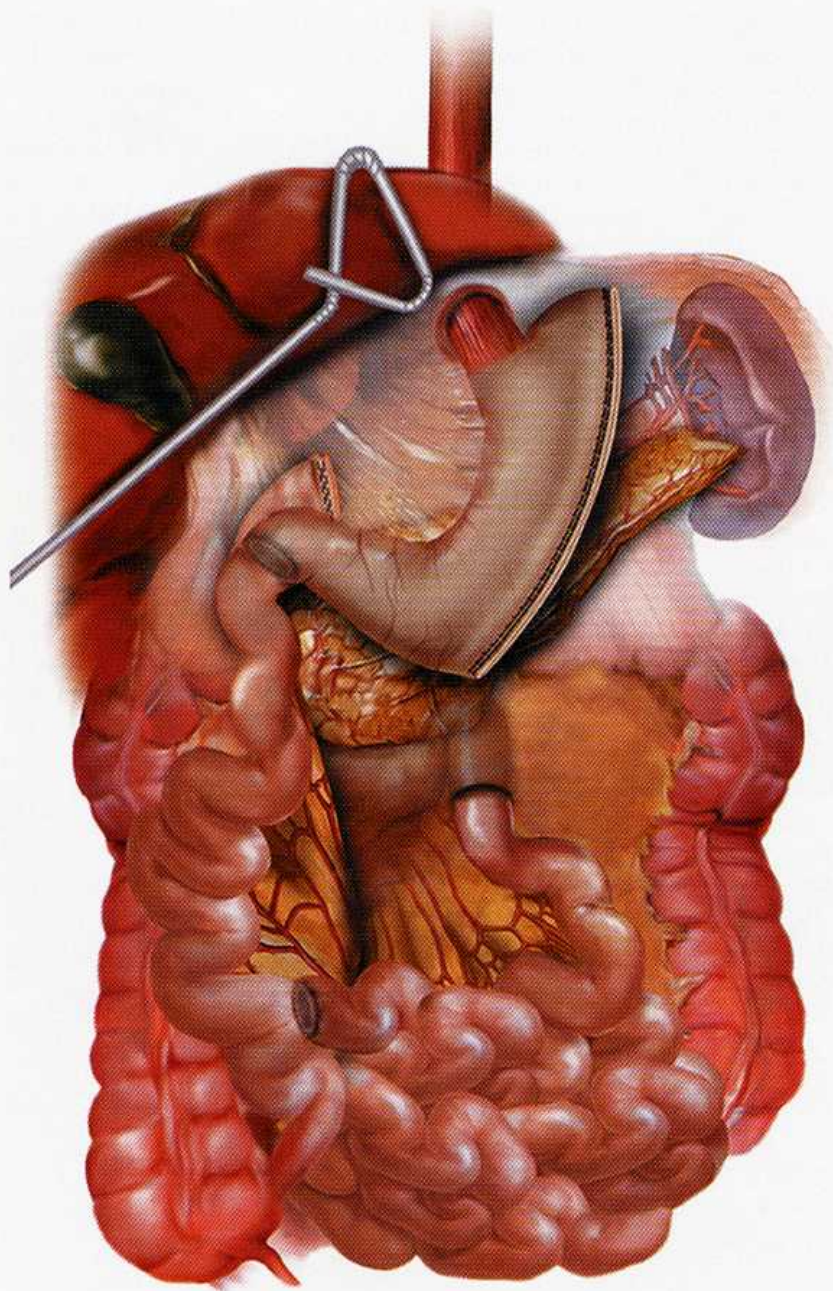


Figure 6. Biliopancreatic diversion with duodenal switch.

populations.^{15,16} Their effectiveness in obese or morbidly obese patients is not as well documented. One study by Perez et al²⁸ involving 224 patients who underwent either a lap Nissen (187) or Belsey Mark IV (37) procedure suggested a high recurrence rate (mean follow-up 37 months) in obese patients. Recurrence rates according to BMI were 4.5 % for BMI less than 25, 8% for BMI 25 to 30, and 27% for BMI greater than 30 ($P < .05$).²⁸ In a similar study, however, Fraser et al

found that there was no correlation between increasing BMI and a poorer overall outcome after laparoscopic fundoplication with a mean follow-up of 3.2 years.²⁹ McNatt et al similarly found no difference in symptom scores when they compared results at 6 weeks and 1 year after laparoscopic antireflux surgery in 37 morbidly obese patients (BMI greater than 35) with a matched cohort of nonobese patients (BMI 17 to 27).³⁰ These studies collectively suggest that fundoplica-

tions in obese patients may be effective in the short-term but long-term durability remains unknown until studies with longer follow-up are reported.

Bariatric operations have been shown to induce or prevent GERD by the various mechanisms described previously. VBG appears to be ineffective in controlling GERD and may actually promote GERD.^{31,32} One recent study by Balsiger et al showed a high rate of GERD after VBG, requiring conversion to RYGBP.³³ Studies of the laparoscopic adjustable gastric banding operations seem to have conflicting reports. The SAGB, like the Angelchick prosthesis, should eliminate GERD but may actually cause GERD in some cases. Dixon et al reported 90% resolution or improvement in GERD in 48 patients who underwent laparoscopic gastric banding with a preoperative diagnosis of GERD.³⁴ However, Forsell et al reported GERD to be one of the most common complications (4.7%) after laparoscopic banding.³⁵ Slippage of the band down the stomach may be an important etiologic factor.

RYGBP does not directly affect cardioesophageal competence, but it may prevent GERD through weight loss and elimination or reduction of acid production in the gastric pouch. The cardiac region of stomach, where the pouch is created, has been shown to be absent of parietal cells.³⁶ Because a small gastric pouch, composed of only gastric cardia, is absent of any parietal cells, it should produce no or minimal acid. Smith et al have shown basal and stimulated gastric acid secretion to be virtually absent from the gastric pouch after RYGBP.³⁷ Bile reflux is also eliminated because of bile diversion into the Roux-limb distal to the gastrojejunal anastomosis. Furthermore, the small pouch minimizes any reservoir capacity to promote regurgitation.

In a series involving morbidly obese patients with GERD, Smith et al showed a significant reduction in GERD symptoms according to modified Visick classification after RYGBP with or without distal gastrectomy and gastropepy (188 patients), with a follow-up of 4 to 48 months.³⁸ They also showed a significant reduction in GERD medication requirement, from 100% to 7%. Jones et al showed RYGBP to be an effective antireflux procedure when compared with Nissen fundoplication.³⁹ The same group evaluated the efficacy of RYGBP in 44 patients with endoscopically proven GERD and only modest obesity (mean BMI of 33 kg/m²).⁴⁰ With a mean follow-up of 56 months (range 1 to 9 years), only 2% were

symptomatic for GERD postoperatively. Balsiger et al showed that conversion of VBG to RYGBP for treatment of GERD resulted in significant improvement or resolution of GERD symptoms in 96% of patients.³³

We recently evaluated the effect of laparoscopic RYGBP on GERD symptoms, quality of life, and patient satisfaction in 152 morbidly obese patients with chronic GERD.⁴¹ We found a significant reduction in GERD symptomatology involving both typical GERD symptoms, heartburn and water brash, and atypical (pulmonary) symptoms (Table 2). In general, the improvement in symptoms was noted immediately postoperatively, suggesting that GERD improvement resulting from weight loss may be of secondary benefit. The GERD-Health Related Quality of Life Score (HRQL) analysis showed very effective reflux control in all parameters studied (Table 3). Furthermore, chronic medication use for GERD decreased from 100% to 3% after LRYGBP. These results appear to be comparable to Nissen fundoplication. Patient satisfaction, both in terms of overall satisfaction with the results of the operation (including weight loss and improvement in comorbidities) and satisfaction with improvement in GERD-related symptoms, was very favorable. Quality of life changes were also favor-

Table 2. Changes in GERD and Gastrointestinal Symptoms After Laparoscopic Roux-Y Gastric Bypass (LRYGBP)

	PRE	POST
Typical GERD Symptoms		
Heartburn	132(87%)	34(22%)*
Regurgitation	69(45%)	33(22%)
Water brash	27(18%)	11(7%)*
Dysphagia	15(10%)	7(6%)
Odinophagia	12(8%)	5(3%)
Atypical GERD Symptoms		
Laryngitis	26(17%)	11(7%)*
Wheezing	61(40%)	8(5%)*
Chest Pain	43(28%)	19(12%)
Hoarseness	23(15%)	14(9%)
Aspiration	29(19%)	4(2%)*
Gastrointestinal Symptoms		
Early satiety	10(6%)	142(94%)*
Flatulence	43(28%)	94(62%)*
Diarrhea	55(36%)	66(43%)
Inability to belch	10(6%)	22(14%)

****P* < .01, ***P* < .001, **P* < .0001. Reprinted with permission.⁴¹

Table 3. GERD-HRQL Score (%) n=152

	0	1	2	3	4	5
Heartburn, general	74	14	7	3	0.5	0.5
Heartburn, supine	83	8	5	3	0.5	1
Heartburn, erect	80	12	3	4	0.5	0.5
Heartburn, after meals	78	14	5	2	0	0.5
Heartburn, diet-related	87	7	1	3	0.5	1
Nocturnal heartburn	94	1	3	1	0	1
Dysphagia	96	1	3	0.5	0	1
Odynophagia	98	6	0.5	0.5	0	0
Medication use	97	1	0.5	0	0	1

0= No symptoms; 1= Symptoms noticeable; 2= Symptoms noticeable and bothersome but not every day; 3= 2, except everyday; 4= Symptoms after daily activity; 5= Symptoms are incapacitating; unable to do daily activities.
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able, suggesting benefit from weight loss and improvement in GERD.

Although the obesity malabsorption procedures have been in existence for more than 2 decades, there are little data regarding their effect on GERD.⁴² Although these procedures achieve complete bile diversion, both the BPD and BPD-DS leave a significant parietal cell rich gastric reservoir that has significant acid producing potential. The occurrence of a fairly high stomal ulcer rate (8.3% to 12.5%) after BPD is indirect evidence that it is not effective in acid reduction and thus is not likely to be effective in preventing GERD.⁴² In fact, Scopinaro recommends routine H₂ blocker prophylaxis after BPD to reduce stomal ulcer incidence.⁴³

Summary

Several surgical options for treating GERD in obese patients are available. Funduplications may be effective in the short-term, but insufficient data exist to support lasting durability in obese patients. Funduplications certainly have no effect on weight loss and comorbidity reduction. Among the bariatric procedures, the current evidence suggests that SAGB and RYGBP have proven efficacy against GERD. SAGB works by creating a barrier mechanism, whereas RYGBP diverts bile and reduces acid production. SAGB, however, may promote GERD in some patients. The malabsorption procedures have no proven efficacy against GERD.

Conclusion

Obesity or morbid obesity is common among patients who seek surgery for refractory GERD.

For obese patients, GERD is often one of many comorbidities. Morbidly obese patients who require surgery for GERD may be better served by LRYGBP or SAGB as opposed to fundoplication, because of the additional benefit of significant weight loss and comorbidity reduction. To address only GERD with one operation and ignore the other, often more serious comorbidities, such as hypertension, diabetes, and sleep apnea appears shortsighted. A bariatric procedure, which also may effectively prevent GERD, should be considered. We recommend that patients with refractory GERD and a BMI of 35 or greater should undergo RYGBP or SAGB as opposed to a fundoplication. Surgeons who are unfamiliar with the discipline of bariatric surgery should either obtain advanced training in bariatric surgery or refer those patients to a qualified bariatric surgeon.

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