

Combined Treatment of Symptomatic Massive Paraesophageal Hernia in the Morbidly Obese

George Kasotakis, MD, Sumeet K. Mittal, MD, Ranjan Sudan, MD

ABSTRACT

Introduction: Repair of large paraesophageal hernias by itself is associated with high failure rates in the morbidly obese. A surgical approach addressing both giant paraesophageal hernia and morbid obesity has, to our knowledge, not been explored in the surgical literature.

Methods: A retrospective review of a bariatric surgery database identified patients who underwent simultaneous repair of large type 3 paraesophageal hernias with primary crus closure and Roux-en-Y gastric bypass (RYGB). Operative time, intraoperative and 30-day morbidity, weight loss, resolution of comorbid conditions and use of anti-reflux medication were outcome measures. Integrity of crural closure was studied with a barium swallow.

Results: Three patients with a mean body mass index of 46kg/m² and mean age of 46 years underwent repair of a large paraesophageal hernia, primary crus closure, and RYGB. Mean operative time was 241 minutes and length of stay was 4 days. There was no intraoperative or 30-day morbidity. One patient required endoscopic balloon dilatation of the gastrojejunostomy. At 12 months, all patients were asymptomatic with excellent weight loss and resolution of comorbidities. Contrast studies showed no recurrence of the hiatal hernia.

Conclusion: Simultaneous laparoscopic repair of large paraesophageal hernias in the morbidly obese is safe and effective.

Key Words: Hiatal hernia, Morbid obesity, Paraesophageal hernia, Roux-en-Y gastric bypass.

INTRODUCTION

Approximately 5% of the United States adult population, or more than 15 million Americans, are morbidly obese—the highest prevalence of obesity worldwide—and the problem appears to be accelerating rapidly according to the Centers for Disease Control and Prevention,¹ with more than 120,000 bariatric procedures performed annually in the United States.² At the same time, gastroesophageal reflux disease (GERD), as defined by heartburn or regurgitation symptoms at least 2 times to 3 times per week, is one of the most commonly encountered gastrointestinal disorders, currently affecting >75 million Americans.³

Epidemiologic data suggest that obesity is a significant independent risk factor for GERD,⁴ and the prevalence of both has increased in Western populations over the last 40 years, further corroborating this association.⁵ Not surprisingly, the prevalence of GERD is considerably higher in obese individuals compared to their nonobese counterparts,^{3,5} with 39% to 61% of morbidly obese patients undergoing evaluation for bariatric surgery reporting chronic reflux symptoms.^{3,6–8} Heartburn worsens linearly with BMI,⁵ and obesity appears to not only predispose one to reflux, but also is a significant independent risk factor for development of hiatal hernia in itself,⁹ with hiatal herniation present in up to half of all morbidly obese individuals.^{10–12} Hiatal hernia repair with fundoplication is the standard surgical treatment for paraesophageal hernias (PEH). Higher recurrence rates have been reported in obese patients, and it would be desirable to address obesity in the same setting.

In this case series, we report the results of 3 morbidly obese females with giant PEH who underwent successful primary repair of their hernias combined with a laparoscopic RYGB. The safety and feasibility of this combined procedure is explored.

MATERIALS AND METHODS

After obtaining institutional review board approval, we conducted a retrospective review of all patients who underwent bariatric surgery from August 2002 to August 2008. Patients who underwent simultaneous laparoscopic

Creighton University Medical Center, Omaha, Nebraska, USA (Drs. Kasotakis, Mittal).

Duke University Medical Center, Durham, North Carolina, USA (Dr. Sudan).

Address correspondence to: Ranjan Sudan, MD, Duke University Medical Center, Box 2834, Durham, North Carolina 27710, USA. Telephone: (919) 613-5069, Fax: (919) 613-5902, E-mail: Ranjan.Sudan@duke.edu

DOI: 10.4293/108680811X13022985132164

© 2011 by JSLS, *Journal of the Society of Laparoendoscopic Surgeons*. Published by the Society of Laparoendoscopic Surgeons, Inc.

Roux-en-Y gastric bypass with repair of large type 3 paraesophageal hernias, in which the majority of the stomach was intrathoracic, were identified (**Figures 1 and 2**). Demographics of these patients are described in **Table 1**. In all 3 patients, the diagnosis of PEH was established by endoscopy and barium swallow studies for evaluation of dysphagia and heartburn. Two patients were referred to the esophageal service for repair of the PEH. However, given their obesity and medical problems, a decision was made to proceed with evaluation for bariatric surgery and offer a combined repair of the large PEH and laparoscopic gastric bypass. The third patient was referred to the bariatric service for consideration of weight loss surgery. There was no evidence of impaired gastric motility on the barium swallows of any of our patients, and the possibility of formal gastric emptying studies and gastrostomy tube placement in the gastric remnant was not considered. We also expected that formation of the gastrojejunostomy would keep the pouch reduced in the abdominal cavity. All patients were evaluated and followed in the esophageal surgery program for symptom recurrence using a standardized questionnaire. A barium swallow was obtained after the first postoperative year to document the integrity of the hiatal repair (**Figure 3**). This is part of the esophageal program's routine annual follow-up for all patients who have undergone hiatal hernia repair.

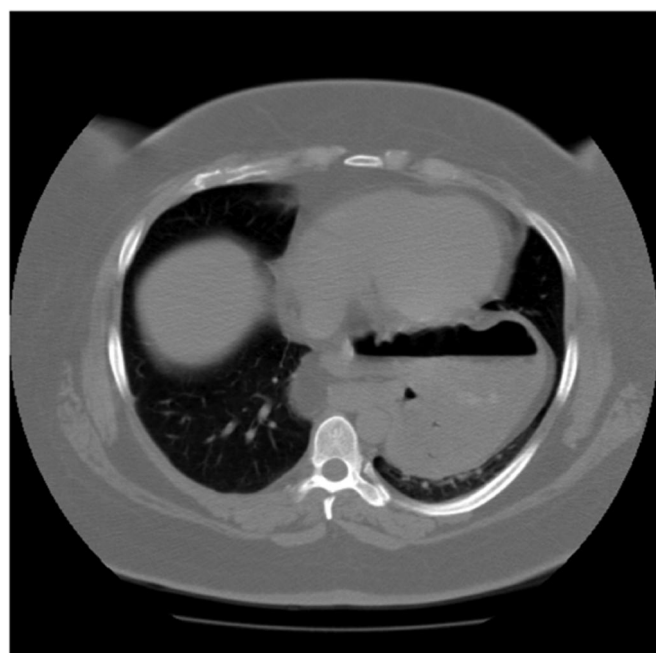


Figure 1. CT scan demonstrating large intrathoracic stomach due to paraesophageal hernia type III.



Figure 2. Chest x-ray demonstrating intrathoracic stomach.

Table 1.
Patient Characteristics

	Case #1	Case #2	Case #3
Age (years)	39	58	52
Sex	F	F	F
Height (m)	1.66	1.57	1.6
Weight (kg)	129.1	128.8	130
IBW	57.8	49.7	52.4
Excess Body Weight (kg)	71.3	79.1	77.6
BMI	46.8	52.3	50
OR time (min)	295	237	192
ASA	III	III	III
Estimated Blood Loss (mL)	50	50	100
Roux Limb Length (cm)	150	75	150
Hospital Length of Stay	5	5	2
Most Recent Follow-up	1 year	1.5 years	1.5 years
Weight Loss at 1 yr (kg)	38.7	28.5	37.2
Weight loss as Excess Body Weight (%)	54.3	36	47.9
BMI at 1 yr	32.8	40.7	36.2
Weight Loss at Most Recent Followup (kg)	38.7	31.7	33.2
Reflux Free	Yes	Yes	Yes
Off Antireflux Medications	Yes	Yes	Yes

The operative steps for a successful intrathoracic stomach reduction and hiatal hernia repair, followed by a laparoscopic RYGB, are as follows: pneumoperitoneum is ob-

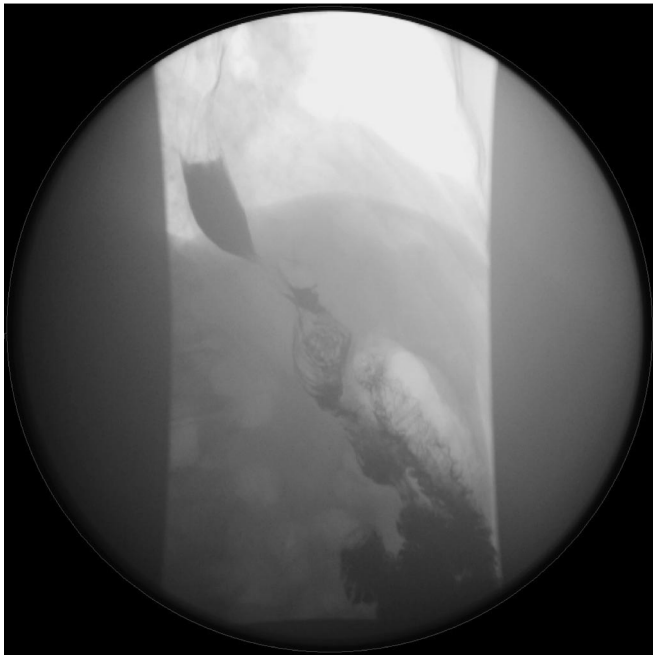


Figure 3. Postoperative barium swallow at one-year following hiatal hernia repair and Roux-en-Y gastric bypass.

tained with a Veress needle inserted in the left upper quadrant. A 5-mm camera port is then inserted by using an optical trocar in a supraumbilical position, slightly to the left of midline. Additional 5-mm and 12-mm ports are inserted in each subcostal area. A Nathanson liver retractor is used for retracting the left lobe of the liver laterally to allow adequate access to the diaphragmatic crura. A complete dissection of the hernia sac allows reduction of the intrathoracic stomach back into the peritoneal cavity. The diaphragmatic crura are next reapproximated primarily with braided 1-0 suture in a figure-of-8 configuration. The omentum is subsequently divided lengthwise, and a biliary limb is created by dividing the proximal small bowel approximately 50cm distal to the ligament of Treitz. An end-to-side anastomosis is created 150cm distal to the first bowel division to create the Roux limb. A gastrotomy is then made, and the gastric anvil is introduced. The gastric pouch is sized to approximately 30mL, and the stomach is divided. An ante-colic ante-gastric end-to-side gastrojejunostomy is made between the gastric pouch and the proximal Roux limb by using a size 21 EEA. Intraoperative endoscopy is then used to confirm a satisfactory airtight gastrojejunostomy. A Penrose drain is left adjacent to the divided stomach, and the mesenteric defect is closed with a running nonabsorbable suture. Hemostasis is ensured in the entire operative field, the abdomen is irrigated, and the ports are finally removed.

RESULTS

All 3 patients had uneventful procedures with a total operating time ranging between 192 minutes to 295 minutes (**Table 1**), and estimated blood loss of <100mL. All patients had unremarkable postoperative recoveries and were discharged home 2 days to 5 days after surgery. At the most recent follow-up (12 to 18 months), our subjects had lost from 36kg to 47.9kg, which represented 36% to 54.3% of their excess body weight, and all were reflux symptom-free and off antireflux medications (**Table 1**). These findings support our belief that a combination of a laparoscopic bariatric with an antireflux procedure can be safely performed in experienced hands with carefully selected patients.

DISCUSSION

Morbid obesity is an independent risk factor for GERD,⁴ and the prevalence of both has been rising in the United States over the past few decades.⁵ Even though a direct pathophysiologic link between obesity and GERD has not been clearly demonstrated, multiple obesity-related physiologic derangements appear to promote reflux: central obesity leads to increased intragastric pressure, thus predisposing to reflux¹³; obese individuals are also found to have a decreased lower esophageal sphincter (LES),¹² more frequent LES relaxation intervals,^{14,15} and esophageal motility disorders.¹⁶ In addition, visceral fat is metabolically active and produces a variety of cytokines, including IL-6 and TNF, which might affect esophagogastric motor activity¹⁷ and worsen reflux symptomatology.

Hiatal herniation has also been demonstrated to be extremely common in this population,⁹ with a prevalence of 20% to 52.6%.^{10,12} The mechanisms that predispose obese individuals to reflux may also make them susceptible to hiatal herniation.¹⁸ Further corroboration of these findings were provided by Pandolfino et al,¹⁸ who demonstrated that the morphology of the pressure tracings along the gastroesophageal junction (GEJ) were altered in a manner supporting the formation of a hiatal hernia. They also reported that the intragastric pressure and the GEJ pressure gradient, both risk factors for hiatal herniation, correlated strongly with increasing BMI.^{3,9}

Higher BMIs are not only associated with a greater incidence of hiatal hernia, but also adversely affect the outcomes of surgical repair.¹⁹ Repair has traditionally included hernia reduction, primary crural reapproximation, and gastric fundoplication, but is associated with a high rate of breakdown in the obese. Evidence is mounting that

the RYGB is a successful operation for gastroesophageal reflux and sliding hiatal hernias.^{20,21} The gastric bypass offers a combined restrictive and malabsorptive approach to weight loss, while a long Roux limb offers the added benefit of preventing acid and bile reflux to the gastric pouch.²² At the same time, weight loss in itself helps reduce intraabdominal pressures typically associated with excess body weight, hence ameliorating a significant risk factor for development, or in this case recurrence, of hiatal herniation. The smaller gastric pouch creates a much smaller “storage area,” leading to much less gastric content being able to regurgitate into the esophagus, and the stapling to a jejunal loop, in combination with the crural reapproximation, offers an anchoring mechanism for preventing new or recurring transhiatal herniation.^{8,23}

Several recent reports of gastric banding concurrent with hiatal hernia repair are encouraging,^{24,25} even in patients with paraesophageal hernias.²⁵ Hiatal defect repairs in band patients are often performed preferably by anterior crural closure to avoid posterior dissection. Extensive posterior dissection is thought to be responsible for a higher rate of band slippage. However in the instance of giant paraesophageal hernias, reduction of the stomach is not possible until the sac has been completely dissected, often requiring extensive posterior dissection. Though gastric banding surgery is technically simpler than RYGB, the concern of band slippage remains a possibility. In addition, the higher weight loss afforded with the laparoscopic RYGB may lower the abdominal pressure more than the band and decrease chances of the breakdown of the hiatal hernia repair. Prevention of acid and bile reflux due to the bypass offers additional advantages over the laparoscopic band. For these reasons, we recommend selecting the gastric bypass in the context of a giant paraesophageal hernia.

Similar to sliding hiatal hernias in the obese, paraesophageal hernias recur quite frequently (12% to 42%), when repaired by crural closure alone.^{26,27} The cause of this high failure rate is multifactorial, including large hernia defects, closure under tension, constant movement of the repair with respiration, or coughing, or both together, and morbid obesity. Therefore, extrapolating from the inguinal and ventral hernia literature, many authors have advocated the use of mesh in hiatal hernia repairs. Synthetic materials have been tested extensively with promising results.^{28,29} However, mesh erosion into the esophagus or stomach, ulceration, stricture, and dysphagia have all been described,²⁹ and recurrence of paraesophageal hernias is not eliminated. In our case series, we avoided the use of a permanent prosthetic mesh in a field potentially

contaminated from performing bowel anastomoses, as this may have increased the risk of mesh infection. The use of biologic meshes for crural reinforcement has shown good initial results in preliminary studies,³⁰ and we would consider using them if the diaphragmatic crural fascia is severely attenuated or torn intraoperatively.

CONCLUSION

A combined approach of treating morbid obesity and giant paraesophageal hernia repair is feasible and safe. We advocate RYGB as the optimal bariatric procedure and primary suture closure of crura.

References:

1. Ogden CL, Carroll MD, Curtin LR, McDowell MA, Tabak CJ, Flegal KM. Prevalence of overweight and obesity in the United States, 1999-2004. *JAMA*. 2006;295:1549–1555.
2. Buchwald H, Cowan GSM, Pories WJ, eds. *Surgical Management of Obesity*. Saunders Elsevier; 2006.
3. El-Serag HB, Graham DY, Satia JA, Rabeneck L. Obesity is an independent risk factor for GERD symptoms and erosive esophagitis. *Am J Gastroenterol*. 2005;100:1243–1250.
4. Nocon M, Labenz J, Willich SN. Lifestyle factors and symptoms of gastro-oesophageal reflux – a population-based study. *Aliment Pharmacol Ther*. 2006;23:169–174.
5. El-Serag HB. Time trends of gastroesophageal reflux disease: a systematic review. *Clin Gastroenterol Hepatol*. 2007;5:17–26.
6. Buchwald H, Avidor Y, Braunwald E, et al. Bariatric surgery: a systematic review and meta-analysis. *JAMA*. 2004;292:1724–1737.
7. Fisher BL, Pennathur A, Mutnick JL, Little AG. Obesity correlates with gastroesophageal reflux. *Dig Dis Sci*. 1999;44:2290–2294.
8. Frezza EE, Ikramuddin S, Gourash W, et al. Symptomatic improvement in gastroesophageal reflux disease (GERD) following laparoscopic Roux-en-Y gastric bypass. *Surg Endosc*. 2002;16:1027–1031.
9. Wilson LJ, Ma W, Hirschowitz BI. Association of obesity with hiatal hernia and esophagitis. *Am J Gastroenterol*. 1999;94:2840–2844.
10. Dutta SK, Arora M, Kireet A, Bashandy H, Gandsas A. Upper gastrointestinal symptoms and associated disorders in morbidly obese patients: a prospective study. *Dig Dis Sci*. 2009;54:1243–1246. Epub 2008 Oct 31.
11. Iovino P, Angrisani L, Galloro G, et al. Proximal stomach function in obesity with normal or abnormal oesophageal acid exposure. *Neurogastroenterol Motil*. 2006;18:425–432.

12. Suter M, Dorta G, Giusti V, Calmes JM. Gastro-esophageal reflux and esophageal motility disorders in morbidly obese patients. *Obes Surg.* 2004;14:959–966.
13. Frezza EE, Shebani KO, Robertson J, Wachtel MS. Morbid obesity causes chronic increase of intraabdominal pressure. *Dig Dis Sci.* 2007;52:1038–1041.
14. Schneider JH, Kuper M, Konigsrainer A, Brucher B. Transient lower esophageal sphincter relaxation in morbid obesity. *Obes Surg.* 2009;19:595–600.
15. Wu JC, Mui LM, Cheung CM, Chan Y, Sung JJ. Obesity is associated with increased transient lower esophageal sphincter relaxation. *Gastroenterology.* 2007;132:883–889.
16. Koppman JS, Poggi L, Szomstein S, Ukleja A, Botoman A, Rosenthal R. Esophageal motility disorders in the morbidly obese population. *Surg Endosc.* 2007;21:761–764.
17. Corley DA, Kubo A, Zhao W. Abdominal obesity, ethnicity and gastro-oesophageal reflux symptoms. *Gut.* 2007;56:756–762.
18. Pandolfino JE, El-Serag HB, Zhang Q, Shah N, Ghosh SK, Kahrilas PJ. Obesity: a challenge to esophagogastric junction integrity. *Gastroenterology.* 2006;130:639–649.
19. Hinder RA, Raiser F, Katada N, McBride PJ, Perdakis G, Lund RJ. Results of Nissen fundoplication. A cost analysis. *Surg Endosc.* 1995;9:1328–1332.
20. Jones KB, Jr. Roux-en-Y gastric bypass: an effective antireflux procedure in the less than morbidly obese. *Obes Surg.* 1998;8:35–38.
21. Raftopoulos I, Awais O, Courcoulas AP, Luketich JD. Laparoscopic gastric bypass after antireflux surgery for the treatment of gastroesophageal reflux in morbidly obese patients: initial experience. *Obes Surg.* 2004;14:1373–1380.
22. Patterson EJ, Davis DG, Khajanchee Y, Swanstrom LL. Comparison of objective outcomes following laparoscopic Nissen fundoplication versus laparoscopic gastric bypass in the morbidly obese with heartburn. *Surg Endosc.* 2003;17:1561–1565.
23. Salvador-Sanchis JL, Martinez-Ramos D, Herfarth A, Rivadulla-Serrano I, Ibanez-Belenguer M, Hoashi JS. Treatment of morbid obesity and hiatal paraesophageal hernia by laparoscopic Roux-en-Y gastric bypass. *Obes Surg.* 2010;20:801–803. Epub 2008 Sep 5.
24. Gulkarov I, Wetterau M, Ren CJ, Fielding GA. Hiatal hernia repair at the initial laparoscopic adjustable gastric band operation reduces the need for reoperation. *Surg Endosc.* 2008;22:1035–1041.
25. Landen S. Simultaneous paraesophageal hernia repair and gastric banding. *Obes Surg.* 2005;15:435–438.
26. Hashemi M, Peters JH, DeMeester TR, et al. Laparoscopic repair of large type III hiatal hernia: objective followup reveals high recurrence rate. *J Am Coll Surg.* 2000;190:553–560, discussion 60–61.
27. Mattar SG, Bowers SP, Galloway KD, Hunter JG, Smith CD. Long-term outcome of laparoscopic repair of paraesophageal hernia. *Surg Endosc.* 2002;16:745–749.
28. Frantzides CT, Madan AK, Carlson MA, Stavropoulos GP. A prospective, randomized trial of laparoscopic polytetrafluoroethylene (PTFE) patch repair vs simple cruroplasty for large hiatal hernia. *Arch Surg.* 2002;137:649–652.
29. Granderath FA, Schweiger UM, Kamolz T, Asche KU, Pointner R. Laparoscopic Nissen fundoplication with prosthetic hiatal closure reduces postoperative intrathoracic wrap herniation: preliminary results of a prospective randomized functional and clinical study. *Arch Surg.* 2005;140:40–48.
30. Franklin ME, Jr., Gonzalez JJ, Jr., Glass JL. Use of porcine small intestinal submucosa as a prosthetic device for laparoscopic repair of hernias in contaminated fields: 2-year follow-up. *Hernia.* 2004;8:186–189.