HHS Public Access

Author manuscript

Surg Endosc. Author manuscript; available in PMC 2016 March 24.

Published in final edited form as:

Surg Endosc. 2011 July ; 25(7): 2164–2167. doi:10.1007/s00464-010-1516-x.

Impact of gastrojejunostomy diameter on long-term weight loss following laparoscopic gastric bypass: a follow-up study

Carter Smith,

Department of Surgery, University of Wisconsin School of Medicine and Public Health, Madison, WI 53792, USA

Michael Garren, and

Department of Surgery, University of Wisconsin School of Medicine and Public Health, Madison, WI 53792, USA

Jon Gould

Department of Surgery, University of Wisconsin School of Medicine and Public Health, Madison, WI 53792, USA

H4/726 Clinical Science Center, 600 Highland Avenue, Madison, WI 53792, USA

Jon Gould: gould@surgery.wisc.edu

Abstract

Background—Stenosis of the gastrojejunostomy after laparoscopic Roux-en-Y gastric bypass is a common occurrence. We have previously presented data demonstrating that the use of a 25-mm circular stapler results in a decreased incidence of stenosis compared to the results of a 21-mm circular stapler (6.2 vs. 15.9%, $P = 0.03$). One potential drawback of the larger-diameter stapler is the possibility for impaired long-term weight loss due to decreased restriction. We sought to determine the impact of circular stapler diameter on excess weight loss up to 5 years after surgery.

Methods—Our initial technique for creating the gastrojejunostomy after laparoscopic gastric bypass involved the transgastric passage of a 21-mm circular stapler anvil (group 1). After a large initial experience, we switched to a 25-mm circular stapler (group 2). Follow-up data were entered prospectively into a computer database. Weight loss was recorded as percent of excess weight lost. Only patients with follow-up beyond 3 years postoperatively were eligible for inclusion.

Results—Group 1 consisted of 145 consecutive patients and group 2 consisted of 116 consecutive patients. There was no significant difference in weight loss between the groups at 3 (66.1 vs. 65.2%, $P = 0.76$, $n = 134$), 4 (66.4 vs. 58.6%, $P = 0.1$, $n = 66$), and 5 years after gastric bypass (62.7 vs. 57.5%, $P = 0.24$, $n = 75$).

Correspondence to: Jon Gould, gould@surgery.wisc.edu.

Presented at the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) 2010 annual meeting, National Harbor, MD, 14–17 April 2010.

Disclosures Drs. Smith and Garren have no conflicts of interest or financial ties to disclose.

Conclusions—The use of a 25-mm circular stapler in laparoscopic gastric bypass operations instead of a 21-mm stapler does not result in significantly different long-term weight loss. The 25-mm stapler is preferred with our technique.

Keywords

Gastrojejunostomy; Stenosis; Laparoscopic gastric bypass; Weight loss

Roux-en-Y gastric bypass is the most commonly performed operation for the treatment of morbid obesity in the United States. A steady increase in the number of surgeons performing bariatric surgery has been seen recently. Surgeon membership in the American Society for Metabolic and Bariatric Surgery (ASMBS) has grown rapidly. Worldwide, approximately 344,000 bariatric procedures were performed in 2008, of which 220,000 were done in the United States and Canada [1]. The majority of these operations were laparoscopic gastric bypass procedures.

There is a wide variety of technical variations in the performance of Roux-en-Y gastric bypass, particularly when the approach is laparoscopic. Three techniques are commonly used in creating the gastrojejunostomy: hand-sewn, linear stapled, and circular stapled approaches. We have previously presented data demonstrating that the use of a larger-diameter circular stapler (25 vs. 21 mm) to create the gastrojejunostomy results in a decreased incidence of stenosis (6.2 vs. 15.9%, $P = 0.03$) [2]. One potential concern not addressed by the original study was the impact of this larger-caliber gastrojejunostomy on long-term weight loss. Multiple contemporary reports describe the relationship between gastrojejunostomy dilation and weight regain following gastric bypass, suggesting that this is a potentially valid concern [3, 4]. We sought to examine the effect of circular stapler diameter on long-term weight loss up to 5 years after laparoscopic gastric bypass surgery.

Patients and methods

Between July 2002 and March 2005, we performed 261 laparoscopic Roux-en-Y gastric bypass procedures at our institution. Our surgical technique involves the transgastric placement of a circular stapler anvil, a circular stapled gastrojejunostomy placed antegastrically, and an antecolic Roux limb. This technique and the technique used to create and size the pouch have been consistent throughout the entire series and have been previously described in detail [5]. In short, a window is created between the lesser curve neurovascular bundle (which is preserved) and the gastric wall 2–3 cm distal to the gastroesophageal junction. The circular stapler anvil is passed through the anterior stomach adjacent to the lesser curve. A linear stapler is then fired transversely across the stomach just distal to the anvil. Subsequent firings of the stapler are used to create a narrow, lesser curve-based tubular pouch. The angle of His is the target for the lateral staple line of the pouch.

In January 2004, after the successful performance of 145 cases, we switched from a 21- to a 25-mm circular stapler. This change was prompted by what we perceived to be a high incidence of anastomotic stenosis with the 21-mm stapler used to create the gastrojejunostomy. The next 116 consecutive patients underwent a laparoscopic gastric bypass using the 25-mm circular stapler.

Patients are followed longitudinally for 5 years and beyond in our multidisciplinary bariatric clinic. Clinical data were prospectively recorded in our HIPAA (Health Insurance Portability and Accountability Act)-compliant database. Ideal body weight was calculated using the Hamwi formula (female: 100 lbs for first 5 feet + 5 lbs for each inch over 5 feet and male: 106 lbs for first 5 feet + 6 lbs for each inch over 5 feet). Data and demographics were retrospectively reviewed. Mean data were compared using Student's *t* test and assuming equal variance. Chi-squared analysis was used for gender proportion comparison. This study was approved by the University of Wisconsin Institutional Review Board.

Results

Of the 261 patients in the original study, 3-year follow-up data was available on 83 patients from the 21-mm (group 1) and 51 patients from the 25-mm stapled anastomosis (group 2). Four-year follow-up data was available on 38 patients from group 1 and 28 from group 2; and 5-year follow-up data was available from 47 patients from group 1 and 28 patients from group 2. Demographics for the study patients are listed in Table 1. There was no significant difference in preoperative body mass index (BMI), weight, percentage of female patients, or age prior to surgery. ASA classification, ethnicity, and other demographic data were not recorded in our database. Percentage of excess weight loss (%EWL), total weight loss (TWL), and percentage excess body mass index (%EBMIL) for each group at 3, 4, and 5 years are given in Table 2. Neither %EWL, TWL, nor %EBMIL were statistically different between the study groups at any follow-up time period.

Discussion

In evaluating anastomotic techniques for gastric bypass, factors to consider include the speed of execution, technical difficulty, reproducibility, and the absence of immediate (leak) or late (stenosis) complications. These factors must be balanced against the impact of each technique on long-term weight loss. Our preferred technique is the circular stapled gastrojejunostomy.

Stenosis of the gastrojejunostomy anastomosis is a common complication following gastric bypass for all techniques [6–9]. One approach to reduce the rate of symptomatic gastrojejunostomy stenosis is to increase the diameter of the anastomosis when constructed. A potential pitfall to this approach is the possible undesired impact that a larger-diameter gastrojejunostomy may have on long-term weight loss. Owens and Sczepaniak compared the 21-mm circular stapler and a 45-mm linear stapler in terms of both stricture rate [10] and weight loss [10, 11]. They found that the stricture rate was reduced with the use of the linear stapled technique but that weight loss was compromised at 12 months. The authors estimated the size of the linear stapled anastomosis to be slightly larger than that of a 25-mm stapler with a circumference of 55–60 mm. This corresponds with an average internal diameter of roughly 17.5–19 mm.

Stahl et al. [12] retrospectively compared outcomes of a 21-mm (n = 31) and 25-mm (n = 19) circular stapled gastrojejunostomy and saw no difference in weight loss, but also no difference in nausea, vomiting, or dysphagia. Nguyen et al. [8] also saw increased rates of

stenosis with the 21-mm stapler (n = 71) compared to the 25-mm stapler (n = 114) and noted no difference in weight loss at 1 year. Cottam et al. [13] found no significant difference in weight loss at 1 or 2 years when comparing 200 patients randomized to either a 21- or a 25-mm stapler. There was, however, a higher rate of stenosis among patients in the 21-mm group [14]. More recently, Suggs et al. [15] compared complication rates of gastrojejunostomies performed with the 21-mm (n = 64) and the 25-mm (n = 374) circular stapler, with a mean follow-up of 13.8 months (range = 1–42). They found an increased rate of gastrojejunostomy stenosis in the 21-mm group, but no difference in the incidence of leaks, ulcers, or acute bleeding. They also reported no significant difference in weight loss between the groups. These findings are similar to our preliminary results in this cohort.

Roberts et al. [16] showed that pouch size also has an impact on weight loss. Their results found a statistically significant negative correlation between pouch size and excess weight loss at 6 and 12 months. Our study did not specifically address or evaluate pouch size, but the technique for creation of the pouch was not altered throughout the study. It is reasonable to conclude that the mean pouch size probably did not differ between the groups.

Based on our data, we believe that the use of the 25-mm circular stapler results in a gastrojejunostomy of sufficient caliber to prevent the development of symptomatic stenosis in most patients (6% stenosis rate [2]). Once fired, the internal anastomotic diameter of a circular stapler is roughly 12 mm for the 21-mm stapler and 16 mm for a 25-mm circular stapler. The cross-sectional area of the stoma is therefore 78% larger with a 25-mm circular stapler (113 vs. 201 mm^2). The impact of progressively larger stomal sizes on weight loss is unknown, but there is likely to be a point where the stoma size is too large to produce patient dietary restriction. Evidence to support the contention that gastrojejunostomy diameter is important for restriction and ultimately long-term weight loss following the procedure comes from a growing experience with gastrojejunostomy reduction in patients who have gained weight years after gastric bypass [17, 18]. In most published series of endoscopic gastrojejunostomy reduction, patients experience a moderate amount of additional weight loss following the procedure after mostly short-term follow-up. Our experience suggests that an initial internal gastrojejunostomy diameter of 16 mm is not too large as to impact weight loss long term.

Our study is limited by a small sample size and a lack of complete long-term follow-up. Although we have demonstrated that a statistically significant difference in long-term weight loss is not observed between the two stapler sizes, this is not the same as proving that the outcomes are equivalent. Proving equivalence requires rigorous testing, since failing to find a difference may just indicate that the sample size is too small to detect what could be considered a meaningful difference. Nonetheless, these data support the observations that other authors have made regarding weight loss for the different stapler sizes. We did not observe any immediate or long-term disadvantages to the use of the larger stapler. In our opinion, the 25-mm stapler for creation of the circular stapled gastrojejunostomy is preferred to the 21-mm stapler.

Acknowledgments

Dr. Gould is a speaker for Covidien for which he receives an honorarium.

References

1. Buchwald H, Oien DM. Metabolic/bariatric surgery worldwide 2008. Obes Surg. 2009; 19:1605–1611. [PubMed: 19885707]
2. Gould JC, Garren M, Boll V, Starling J. The impact of circular stapler diameter on the incidence of gastrojejunostomy stenosis and weight loss following laparoscopic Roux-en-Y gastric bypass. Surg Endosc. 2006; 20:1017–1020. [PubMed: 16763928]
3. Catalano MF, Rudic G, Anderson AJ, Chua TY. Weight gain after bariatric surgery as a result of a large gastric stoma: endotherapy with sodium morrhuate may prevent the need for surgical revision. Gastrointest Endosc. 2007; 66:240–245. [PubMed: 17331511]
4. Loewen M, Barba C. Endoscopic sclerotherapy for dilated gastrojejunostomy of failed gastric bypass. Surg Obes Relat Dis. 2008; 4:539–542. discussion 542–543. [PubMed: 18069073]
5. Gould JC, Garren MJ, Starling JR. Lessons learned from the first 100 cases in a new minimally invasive bariatric surgery program. Obes Surg. 2004; 14:618–625. [PubMed: 15186628]
6. Higa KD, Ho T, Boone KB. Laparoscopic Roux-en-Y gastric bypass: technique and 3-year follow-up. J Laparoendosc Adv Surg Tech A. 2001; 11:377–382. [PubMed: 11814129]
7. Wittgrove AC, Clark GW. Laparoscopic gastric bypass, Roux-en-Y-500 patients: technique and results, with 3–60 month follow-up. Obes Surg. 2000; 10:233–239. [PubMed: 10929154]
8. Nguyen NT, Stevens CM, Wolfe BM. Incidence and outcome of anastomotic stricture after laparoscopic gastric bypass. J Gastrointest Surg. 2003; 7:997–1003. discussion 1003. [PubMed: 14675709]
9. Csendes A, Burgos AM, Burdiles P. Incidence of anastomotic strictures after gastric bypass: a prospective consecutive routine endoscopic study 1 month and 17 months after surgery in 441 patients with morbid obesity. Obes Surg. 2009; 19:269–273. [PubMed: 18696171]
10. Sczepaniak JP, Owens ML. Results of gastrojejunal anastomotic technique designed to reduce stricture. Surg Obes Relat Dis. 2009; 5:77–80. [PubMed: 19095504]
11. Owens ML, Sczepaniak JP. Size really does matter—role of gastrojejunostomy in postoperative weight loss. Surg Obes Relat Dis. 2009; 5:357–361. [PubMed: 18996770]
12. Stahl RD, Sherer RA, Seevers CE, Johnston D. Comparison of 21 vs. 25 mm gastrojejunostomy in the gastric bypass procedure—early results. Obes Surg. 2000; 10:540–542. [PubMed: 11175962]
13. Cottam DR, Fisher B, Sridhar V, Atkinson J, Dallal R. The effect of stoma size on weight loss after laparoscopic gastric bypass surgery: results of a blinded randomized controlled trial. Obes Surg. 2009; 19:13–17. [PubMed: 19002741]
14. Fisher BL, Atkinson JD, Cottam D. Incidence of gastroenterostomy stenosis in laparoscopic Roux-en-Y gastric bypass using 21- or 25-mm circular stapler: a randomized prospective blinded study. Surg Obes Relat Dis. 2007; 3:176–179. [PubMed: 17331806]
15. Suggs WJ, Kouli W, Lupovici M, Chau WY, Brolin RE. Complications at gastrojejunostomy after laparoscopic Roux-en-Y gastric bypass: comparison between 21- and 25-mm circular staplers. Surg Obes Relat Dis. 2007; 3:508–514. [PubMed: 17686661]
16. Roberts K, Duffy A, Kaufman J, Burrell M, Dziura J, Bell R. Size matters: gastric pouch size correlates with weight loss after laparoscopic Roux-en-Y gastric bypass. Surg Endosc. 2007; 21:1397–1402. [PubMed: 17332953]
17. Mikami D, Needleman B, Narula V, Durant J, Melvin WS. Natural orifice surgery: initial US experience utilizing the StomaphyX device to reduce gastric pouches after Roux-en-Y gastric bypass. Surg Endosc. 2010; 24:223–228. [PubMed: 19633885]
18. Mullady DK, Lautz DB, Thompson CC. Treatment of weight regain after gastric bypass surgery when using a new endoscopic platform: initial experience and early outcomes (with video). Gastrointest Endosc. 2009; 70:440–444. [PubMed: 19555944]

Table 1

Demographic data for all study subjects prior to surgery

	BMI (kg/m^2)	Age (years)	Gender (% female)	Pre-op weight (lbs)
21-mm	49.7 ± 7.0	44.9 ± 10.2	83.7% (87/104)	307.0 ± 49.3
25-mm	50.1 ± 6.3	45.2 ± 10.6	81.5% (53/65)	315.4 ± 49.8
P value	0.70	0.86	0.72	0.28

The *P* values for BMI, age, and pre-op weight were obtained using Student's *t* test, assuming equal variance to compare means. The *P* value for gender was obtained by using χ^2 analysis

Table 2

Long-term weight loss

	21-mm	25-mm	*P* value
3 year (*n* = 134)			
%EWL	66.1 ± 19.08 (*n* = 83)	65.2 ± 15.95 (*n* = 51)	0.76
TWL	118.4 ± 40.2 (*n* = 83)	117.7 ± 40.5 (*n* = 51)	0.92
%EBMIL	76.2 ± 23.0 (*n* = 83)	75.0 ± 19.2 (*n* = 51)	0.74
4 year (*n* = 66)			
%EWL	66.4 ± 18.34 (*n* = 38)	58.6 ± 18.78 (*n* = 28)	0.10
TWL	106.3 ± 32.7 (*n* = 38)	98.2 ± 41.0 (*n* = 28)	0.38
%EBMIL	78.3 ± 22.8 (*n* = 38)	68.9 ± 22.2 (*n* = 28)	0.10
5 year (*n* = 75)			
%EWL	62.7 ± 20.33 (*n* = 47)	57.5 ± 13.71 (*n* = 28)	0.24
TWL	102.0 ± 36.8 (*n* = 47)	104.0 ± 37.1 (*n* = 28)	0.83
%EBMIL	74.2 ± 25.4 (*n* = 47)	65.9 ± 16.4 (*n* = 28)	0.16

%EWL percent excess weight loss; *TWL* total weight loss; *EBMIL* percent excess body mass index loss