Shorter circular staple is height associated with lower anastomotic stricture rate in laparoscopic gastric bypass

Kenny Hanna, M.D. a, Christopher W. Seder, M.D. a, David Chengelis, M.D. a, Peter A. McCullough, M.D., M.P.H. b, Kevin Krause, M.D., F.A.C.S. a,*

aDepartment of Surgery, Oakland University William Beaumont School of Medicine, William Beaumont Hospital, Royal Oak, Michigan
bDepartment of Medicine, Division of Nutrition and Preventative Medicine, Oakland University William Beaumont School of Medicine, William Beaumont Hospital, Royal Oak, Michigan

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Abstract

Background: Anastomotic stenosis, leak, and hemorrhage are common stapler-related complications of laparoscopic Roux-en-Y gastric bypass. In May 2007, we transitioned from a 25-mm diameter, 4.8-mm-height circular stapler to a 25-mm, 3.5-mm-height circular stapler. We hypothesized that the staple height would be associated with a decreased incidence of perioperative complications.

Methods: The records of 360 consecutive patients who had undergone laparoscopic Roux-en-Y gastric bypass from May 1, 2006 to March 31, 2008 were retrospectively abstracted. The National Surgical Quality Improvement Project and Michigan Bariatric Surgery Collaborative databases were used to collect the patient demographics and track complications of laparoscopic Roux-en-Y gastric bypass. Data were collected on the rates of anastomotic stenosis requiring dilation of the gastrojejunostomy, anastomotic leak, hemorrhage requiring transfusion, and wound infection. Patients with a 4.8-mm staple height gastrojejunostomy were compared with those with a 3.5-mm staple height gastrojejunostomy for differences in complications.

Results: The groups were similar with respect to age, gender, body mass index, hypertension, hyperlipidemia, diabetes, sleep apnea, and surgery duration. In the 4.8- and 3.5-mm staple height groups, 15% and 6.1% required gastrojejunal dilation, respectively (P = .01). A trend was seen toward a decrease in postoperative hemorrhage (5% versus 2.8%) with the shorter staple height. No anastomotic leaks occurred, and the incidence of wound infection (1.7% versus 2.2%) was similar between the 2 groups.

Conclusion: In the present study, the use of a 25-mm, 3.5-mm staple height circular stapler was associated with a decreased rate of anastomotic stenosis. (Surg Obes Relat Dis 2012;8:181–184.) © 2012 American Society for Metabolic and Bariatric Surgery. All rights reserved.

Keywords: Laparoscopic Roux-en-Y gastric bypass; Perioperative complications; Gastric bypass circular stapling devices; Gastrojejunostomy stenosis
stapling devices discontinued the 4.8-mm staple height and switched to production of the 3.5-mm staple height, which we began to use in May 2007.

Methods

After approval by William Beaumont Hospital’s institutional review board, data were retrospectively collected from 360 consecutive patients who had undergone LRYGB at our institution from May 1, 2006 to March 31, 2008. All procedures were performed by one of two fellowship-trained laparoscopic surgeons. Our technique included transgastric placement of a 25-mm circular anvil and creation of a stapled gastrojejunostomy with an antecolic Roux limb. Two lateral 3-0 Vicryl sutures were placed between the gastric pouch and jejunum at the anastomosis. All bilipancreatic limbs were 50 cm in length, and the Roux limbs varied from 75 to 150 cm, depending on the patient’s body mass index. Both antecolic and jejunjejunostomy mesenteric defects were closed with running suture. From May 2006 to May 2007, 180 patients underwent LRYGB using the 4.8-mm height circular stapling device (catalog no. EEA25, Covidien Health Care, Mansfield, MA) to create the gastrojejunosotmy. From May 2007 to March 2008, another 180 consecutive patients underwent LRYGB using the 3.5-mm staple height circular stapler (catalog no. EEA2535, Covidien Health Care). All other aspects of the surgery remained constant during the study period.

Postoperatively, all patients were admitted to the regular surgical floor with telemetry monitoring, patient-controlled analgesia, and nothing by mouth for the first 24 hours. If the patient was progressing well, a clear liquid diet and oral pain medications were initiated on postoperative day 1. Contrast studies were ordered sparingly at the discretion of the operating surgeon. If the patients tolerated their diet and their pain was well-controlled, they were discharged home as early as postoperative day 1.

The National Surgical Quality Improvement Project and Michigan Bariatric Surgery Collaborative databases were used to collect patient demographics and track complications of the LRYGB performed at our institution. The following data points were collected: age, gender, weight, body mass index, hypertension (requiring medication), hyperlipidemia (requiring medication), diabetes mellitus (requiring medication), surgery duration, sleep apnea, 30-day wound infection (superficial incisional, deep incisional) characterized by erythema, cellulites, and purulent drainage, 30-day anastomotic leak, hemorrhage (requiring transfusion of packed red blood cells in the first 72 h), and gastrojejunosotmy stenosis. Anastomotic stenosis was defined as the signs and symptoms of gastric outlet obstruction combined with the inability to allow passage of a 10-mm gastroscope. The indications for endoscopy included prolonged vomiting, dysphagia, or new onset epigastic pain >4 weeks postoperatively. All stenotic gastrojejunosotmies were treated with serial endoscopic balloon dilation. Dilations were continued ≤15 mm, unless mucosal injury occurred, at the discretion of the endoscopist.

The patient demographics and complications were then compared according to the staple height using the Pearson chi-square test, as appropriate (expected frequency >5), otherwise Fisher’s exact test was used. Continuous variables were tested for normality. None were normally distributed; thus, all were examined using a Wilcoxon rank test. Continuous variables are given as the mean ± standard deviation, followed by the median and 25th and 75th percentiles, as needed. All analyses were performed using the SAS system for Windows, version 9.2 (SAS Institute, Cary, NC).

Results

With the exception of age and hyperlipidemia, the demographics did not vary between the patients with 3.5-mm staples and those with 4.8-mm staples (Table 1). Anastomotic stricture developed in 27 (15%) of 180 patients with 4.8-mm staples and 11 (6.1%) of 180 patients with 3.5-mm staples (P = .01, Table 2). The median point for the occurrence of gastrojejunosotmy stenosis for the 4.8-mm and 3.5-mm stapler group occurred at postoperative day 26 and 21 days, respectively (Table 2). A second dilation for gastrojejunosotmy stenosis was required in 8 of 27 patients with 4.8-mm staples and 2 of 11 patients with 3.5-mm staples within 90 days of their operation (P = .69). No patients in either group required revision of LRYGB because of anastomotic stenosis. No anastomotic leaks developed in either group, and no difference was found between the 2 groups with respect to hemorrhage or wound infection. All wound infections occurred at the EEA stapler incision.

<table>
<thead>
<tr>
<th>Variable</th>
<th>3.5-mm Stapler (n = 180)</th>
<th>4.8-mm Stapler (n = 180)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y)</td>
<td>48 ± 12</td>
<td>46 ± 10</td>
<td>.024*</td>
</tr>
<tr>
<td>Men</td>
<td>45 (25)</td>
<td>47 (26)</td>
<td>.81</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>134 ± 26</td>
<td>139 ± 29</td>
<td>.19</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>47.7 ± 7.7</td>
<td>48.6 ± 8.2</td>
<td>.57</td>
</tr>
<tr>
<td>Hypertension</td>
<td>112 (63)</td>
<td>117 (65)</td>
<td>.63</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>131 (73)</td>
<td>95 (53)</td>
<td>&lt; .0001*</td>
</tr>
<tr>
<td>Diabetes</td>
<td>95 (53)</td>
<td>84 (47)</td>
<td>.22</td>
</tr>
<tr>
<td>Surgery duration (min)</td>
<td>127 ± 35</td>
<td>129 ± 42</td>
<td>.94</td>
</tr>
<tr>
<td>Sleep apnea</td>
<td>101 (56)</td>
<td>90 (50)</td>
<td>.22</td>
</tr>
</tbody>
</table>

Data presented as numbers, with percentages in parentheses, or mean ± standard deviation.

* Statistically significant.
site and were treated with open packing and antibiotics. The 4.8-mm group had a greater number of patients with hemorrhage requiring transfusion than the 3.5-mm group; however, statistical significance was not achieved. In our study group, 17 patients required transfusion, 10 in the 4.8-mm stapler group and 7 in the 3.5-mm stapler group. The mean number of blood transfusions in the 4.8- and 3.5-mm stapler group was 5.3 and 4.6, respectively. Of those in the 4.8-mm stapler group, 7 patients required a blood transfusion secondary to intraluminal bleeding and 2 required transfusion for an unknown etiology. In the 3.5-mm staple group, 5 patients required a blood transfusion because of intraluminal bleeding and 2 required transfusion for an unknown etiology. No patient in either group required reoperation for bleeding.

Discussion

Narrowing of the gastrojejunostomy is known to occur after gastric bypass, regardless of whether a hand-sewn, linear-stapled, or circular-stapled technique is used. The use of a circular stapling device stemmed from our desire to produce a consistent outlet size with a low rate of anastomotic leakage [7,11] and personal preference. Initially, all LRYGB procedures were performed using a 21-mm circular stapler; however, this resulted in an unacceptably high rate of symptomatic stenosis, prompting us to adopt the 25-mm circular stapler to create the gastrojejunostomy during LRYGB. Currently, all LRYGB procedures at our institution are performed before our change in the staple height. In addition, the temporal distribution of anastomotic stenosis was evenly distributed within the individual groups. Finally, given the retrospective nature of our study and the relatively short surgical follow-up period, it is possible that some patients might have received treatment at outside facilities without our knowledge.

Conclusion

Our results suggest that the use of a 3.5-mm-height circular stapler to create the gastrojejunostomy during LRYGB is associated with a lower stricture rate than the 4.8-mm stapler. In addition, a trend was seen toward a reduction in hemorrhage, although this did not achieve statistical significance. These benefits were achieved without an increase in anastomotic leakage or wound infection. Currently, all LRYGB procedures at our institution are performed with a 25-mm circular stapler with 3.5-mm staples. The transition to a shorter staple height has not increased the cost of the procedure and might reduce the overall cost by preventing the need for secondary interventions.

Disclosures

K. Krause is a consultant for Covidien and receives consultant fees. The remaining authors have no commercial associations that might be a conflict of interest in relation to this article.

References


