Surgical Management of Marginal Ulcers and Reflux after Bariatric Surgery

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Marginal Ulcers

• Marginal ulcers represent one of the most problematic postoperative complications following Roux-en-Y gastric bypass

• A marginal ulcer, or stomal ulceration, refers to the development of mucosal erosion at the gastrojejunal anastomosis, typically on the jejunal side

• Incidence of marginal ulcers is quite variable, ranging from 0.6 to 16 percent.


Marginal Ulcers

• Risk Factors
  – smoking
  – nonsteroidal anti-inflammatory agents
  – large gastric pouches
  – partial anastomotic stricture
  – “stitch ulcers” permanent suture in mucosal erosion
  – alcohol use, steroids, Helicobacter pylori, nonadherence, and chronic anticoagulation
Marginal Ulcers

• Post-gastric bypass patients often present with a constellation of upper gastrointestinal symptoms that can be difficult to interpret and differentiate.

• Patients with marginal ulcers typically present with:
  – abdominal pain,
  – nausea
  – vomiting
  – hematemesis
  – stomal obstruction
  – perforation

• *Endoscopy is the diagnostic study of choice*
Marginal Ulcers
Medical Management

• Dependent on its etiology
  – smokers, smoking cessation
  – proton pump inhibitors in the immediate postoperative period
  – sucralfate suspension (1g oral liquid q6hr) for a period of 3 to 6 months
  – medical eradication H. pylori
  – prostaglandins?
  – excise suture/staples?

• Repeat endoscopy to make sure ulcers heals
Marginal Ulcers
Surgical Intervention

- Medical intractability
- Chronic anemia
- Gastro-gastric fistula
Marginal Ulcers
Surgical Intervention

• Revision of a gastric bypass for marginal ulcer management can be performed either through an open or laparoscopic approach
• Standard surgical treatment involves resection of the entire ulcer bed at the gastrojejunostomy and reconstructing the anatomy with a new gastrojejunostomy
• Intraoperative endoscopy is critical for revisional bariatric surgery as it helps to clarify the anatomy, gastric pouch, gastrojejunostomy, and the distal jejunum.

Treatment for severe GERD after Sleeve Gastrectomy

- **Almogy et al.**
  - Symptomatic GERD present in 35 of 119 patients, 17 required PPI preoperatively
  - 13 of 17 required postoperative PPI
  - 12 reported worsening GERD

- **Carter PR et al.**
  - Symptomatic GERD found in 34.6% of 176 patients
  - 47% of patients had symptoms of GERD > 1 month out from SG (majority of these patients were taking medications for GERD)

- **Ben-David et al.**
  - 28 consecutive patients undergoing LSG
  - 39% had new-onset GERD based on barium swallow

- **Soricelli E et al.**
  - 378 consecutive patients undergoing LSG
  - De novo GERD Symptoms developed in 23% of patients undergoing SG alone
## Patient Demographics

- **28 patients – 18 females, 10 males**

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>42</td>
<td>18-60 years</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>166</td>
<td>106-291 kg</td>
</tr>
<tr>
<td><strong>Body Mass Index</strong></td>
<td>55.5</td>
<td>39-80 kg/m2</td>
</tr>
<tr>
<td><strong>OR time</strong></td>
<td>90</td>
<td>45-125 min</td>
</tr>
<tr>
<td><strong>Estimated Blood Loss</strong></td>
<td>75</td>
<td>50-100 ml</td>
</tr>
<tr>
<td><strong>Follow up</strong></td>
<td>30</td>
<td>8-92 weeks</td>
</tr>
<tr>
<td><strong>Excess Weight Loss</strong></td>
<td>60</td>
<td>40-83 %</td>
</tr>
<tr>
<td><strong>Postoperative Leak</strong></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Mortality</strong></td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
UGI Results

<table>
<thead>
<tr>
<th>N=28</th>
<th>Preoperative GERD</th>
<th>1</th>
<th>3.6%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Postoperative GERD</td>
<td>11</td>
<td>39%</td>
</tr>
<tr>
<td></td>
<td>Repeat film 4 weeks later</td>
<td>11/11</td>
<td>100%</td>
</tr>
</tbody>
</table>

45% of the 11 patients had no preoperative symptoms of GERD
# GERD Score Questionnaire

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>% of patients that responded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worsening GERD symptoms</td>
<td>23%</td>
</tr>
<tr>
<td>No improvement or worsening GERD symptoms</td>
<td>59%</td>
</tr>
<tr>
<td>Improvement in GERD symptoms</td>
<td>18%</td>
</tr>
<tr>
<td>Satisfied with weight loss to date</td>
<td>100%</td>
</tr>
<tr>
<td>Would choose a laparoscopic sleeve gastrectomy again</td>
<td>100%</td>
</tr>
</tbody>
</table>
LSG in Patients With Preexisting GERD: A National Analysis

A total of 4832 patients underwent LSG and 33 867 underwent GB, with pre-existing GERD present in 44.5% of the LSG cohort and 50.4% of the GB cohort.

Theories – Why Increased GERD

• Reduced LES pressure ?
• Reduced gastric compliance ?
• Reduced gastric volume ?
• Dispensability issues ?
• Increased gastric pressure ?
• Delayed gastric emptying ?
• Change in acid production ?
SG lowers LES pressure and shortens abdominal length of esophagus

Table 1. Lower esophageal sphincter length before and after sleeve gastrectomy

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal length</td>
<td>20</td>
<td>6</td>
</tr>
<tr>
<td>Total &gt; 3.5 cm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abdominal length &gt; 1 cm</td>
<td>11</td>
<td>30%</td>
</tr>
<tr>
<td>Incompetent</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>Total length &gt; 3.5 cm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abdominal length &lt; 1 cm</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Total length &lt; 3.5 cm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abdominal length &lt; 1 cm</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

Stretta used for GERD post-RYGB

Original articles

DOI: 10.1007/s00464-006-0513-6
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Treatment of refractory gastroesophageal reflux disease with radiofrequency energy (Stretta) in patients after Roux-en-Y gastric bypass

S. G. Mattar, F. Qureshi, D. Taylor, P. R. Schauer

Department of Surgery, Indiana University, Emerson Hall, 545 Barnhill Drive, Suite 242, Indianapolis, IN 46202, USA
Efficacy of Stretta in post-RYGB GERD

Seven patients received post-LRYGB Stretta for refractory GERD.

Fig. 2. The 48-h Bravo pH monitoring before and after Stretta (*p < 0.05).

Gastroesophageal Reflux Management with the LINX® System for Gastroesophageal Reflux Disease Following Laparoscopic Sleeve Gastrectomy

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Received: 22 May 2015 / Accepted: 20 June 2015
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Abstract
Background Laparoscopic sleeve gastrectomy (LSG) has gained significant popularity in the USA, and consequently resulted in patients experiencing new-onset gastroesophageal reflux disease (GERD) following this bariatric procedure. Patients with GERD refractory to medical therapy present a more challenging situation limiting the surgical options to further treat the de novo GERD symptoms since the gastric fundus to perform a fundoplication is no longer an option.

Objectives The aim of this study is to determine if the LINX® magnetic sphincter augmentation system is a safe and effective option for patients with new gastroesophageal reflux disease following laparoscopic sleeve gastrectomy.

Settings This study was conducted at the University Medical Center.

Methods This is a retrospective review of seven consecutive patients who had a laparoscopic LINX® magnetic sphincter device placement for patients with refractory gastroesophageal reflux disease after laparoscopic sleeve gastrectomy between July 2014 and April 2015.

Results All patients were noted to have self-reported greatly improved gastroesophageal reflux symptoms 2–4 weeks after their procedure. They were all noted to have statistically significant improved severity and frequency of their reflux, regurgitation, epigastric pain, sensation of fullness, dysphagia, and cough symptoms in their postoperative GERD symptoms compared with their preoperative evaluation.

Conclusion This is the first reported pilot case series, illustrating that the LINX® device is a safe and effective option in patients with de novo refractory gastroesophageal reflux disease after a laparoscopic sleeve gastrectomy despite appropriate weight loss.
### Table 1  Patient demographics

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age</th>
<th>Gender</th>
<th>Initial weight (kg)</th>
<th>Current weight (kg)</th>
<th>Initial BMI (kg/m²)</th>
<th>Current BMI (kg/m²)</th>
<th>Excess weight loss (%)</th>
<th>DeMeester score</th>
<th>Time of implant from initial surgery (months)</th>
<th>Preoperative GERD score</th>
<th>Postoperative GERD score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>53</td>
<td>Male</td>
<td>118</td>
<td>93</td>
<td>44.6</td>
<td>35.2</td>
<td>21.1</td>
<td>25.8</td>
<td>7</td>
<td>17</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>53</td>
<td>Male</td>
<td>142</td>
<td>103</td>
<td>47.4</td>
<td>34.4</td>
<td>27.5</td>
<td>123.9</td>
<td>9</td>
<td>17</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>53</td>
<td>Female</td>
<td>161</td>
<td>92</td>
<td>59.1</td>
<td>33.6</td>
<td>43.1</td>
<td>71.1</td>
<td>12</td>
<td>17</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>58</td>
<td>Male</td>
<td>134</td>
<td>89</td>
<td>39.9</td>
<td>26.6</td>
<td>33.3</td>
<td>N</td>
<td>24</td>
<td>17</td>
<td>5</td>
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<tr>
<td>5</td>
<td>36</td>
<td>Female</td>
<td>137</td>
<td>97</td>
<td>55</td>
<td>39.1</td>
<td>28.9</td>
<td>76</td>
<td>27</td>
<td>17</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>48</td>
<td>Male</td>
<td>176</td>
<td>126</td>
<td>68.5</td>
<td>49.1</td>
<td>28.4</td>
<td>25.7</td>
<td>12</td>
<td>17</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>52</td>
<td>Male</td>
<td>114</td>
<td>84</td>
<td>40.5</td>
<td>29.9</td>
<td>26.2</td>
<td>17</td>
<td>36</td>
<td>18</td>
<td>6</td>
</tr>
</tbody>
</table>

GERD score: severity and frequency of their reflux, regurgitation, epigastric pain, sensation of fullness, dysphagia, and cough symptoms
Approach to control de-novo GERD refractory to LSG

- Application of the LINX® Reflux Management System to control GERD in LSG patients
- LINX® is an implantable magnetic sphincter
Magnetic sphincter augmentation for GERD after LSG.mov
Summary

• LSG is a popular surgical option for weight control in morbidly obese patients
• LSG reduces incidence of GERD in 2.8-20% of post-operative patients
• However patients can still present GERD refractory to LSG (8.6%-22%)
• Due to anatomic removal of fundus, few surgical options exist for refractory GERD after LSG
  – Conversion to RYGB risky and may not be a viable option for some patients due to gastrointestinal anatomy or issues with malabsorption
Implications

• Application of the Laparoscopic LINX® magnetic sphincter device presented here is a viable alternative
  – Fewer surgical complications
  – Implanted in area not disturbed by LSG
  – Shown to significantly reduce GERD in FDA clinical trails

• Common adverse events include dysphagia
  – Identified in 43% patients in trials

• First case series of LINX® placement after LSG
  – All patients with improvement in GERD symptoms
  – Further multicenter trial is currently underway.
• We conclude that LINX® placement after LSG for refractory GERD is feasible and safe
• It can be easily explanted and does not preclude conversion to RYGB