Management of Sleeve Strictures

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Disclosures

• Research support, speaker, and/or consultant:
  – Covidien
  – Ethicon Endo-Surgery
  – Endobetix
Overview

• Review risks of LSG from literature
• Strictures
• Endoscopic Therapy
• Surgical Therapy
Outcomes after Sleeve Gastrectomy

<table>
<thead>
<tr>
<th></th>
<th>High Risk Patients/Staged Approach&lt;sup&gt;6-18&lt;/sup&gt;</th>
<th>Primary Procedure&lt;sup&gt;3-5,8,19-38&lt;/sup&gt;</th>
<th>All Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Studies* (number of patients)</td>
<td>13 (821)</td>
<td>24 (1,749)</td>
<td>36 (2,570)</td>
</tr>
<tr>
<td>Preoperative BMI range (mean) kg/m²</td>
<td>49.1 – 69.0 (60.0)</td>
<td>37.2 – 54.5 (46.6)</td>
<td>37.2 – 69.0 (51.2)</td>
</tr>
<tr>
<td>Postoperative BMI range (mean) kg/m²</td>
<td>36.4 – 53.0 (44.9)</td>
<td>26.0 – 39.8 (32.2)</td>
<td>26.0 – 53.0 (37.1)</td>
</tr>
<tr>
<td>Follow-up</td>
<td>4 mo – 5 years</td>
<td>3 mo – 3 years</td>
<td>3 mo – 5 years</td>
</tr>
<tr>
<td>% Excess Weight Loss range (mean)</td>
<td>33.0 – 61.4% (46.6%)</td>
<td>36.0 – 85.0% (60.7%)</td>
<td>33.0 – 85.0% (55.4%)</td>
</tr>
<tr>
<td>Complication rate All studies (mean)</td>
<td>0 - 23.8% (9.4%)</td>
<td>0 - 21.7% (6.2%)</td>
<td>0 – 23.8%</td>
</tr>
<tr>
<td></td>
<td>Studies with n&gt;100</td>
<td>3.3 – 15.3%</td>
<td>0 – 14.1%</td>
</tr>
<tr>
<td></td>
<td>Leaks</td>
<td>8/686 (1.2%)</td>
<td>45/1,681 (2.7%) +</td>
</tr>
<tr>
<td></td>
<td>Bleeding</td>
<td>11/686 (1.6%)</td>
<td>17/1,681 (1.0%)</td>
</tr>
<tr>
<td></td>
<td>Strictures</td>
<td>6/686 (0.9%)</td>
<td>9/1,681 (0.5%)</td>
</tr>
<tr>
<td>Mortality</td>
<td>2 / 821 (0.24%)</td>
<td>3/1,749 (0.17%)</td>
<td>5/2,570 (0.19%)</td>
</tr>
</tbody>
</table>
Sleeve Complications

• The American College of Surgeons Bariatric Surgery Center Network longitudinal database (n=28,616, 109 hospitals)

• 30-day, 6-month, and 1-year outcomes of LSG, LAGB, and RYGB
  – morbidity and mortality
  – readmissions
  – reoperations
  – reduction in body mass index (BMI)
  – weight-related comorbidities.
<table>
<thead>
<tr>
<th>Occurrence*</th>
<th>LSG, N (%)</th>
<th>LAGB, N (%)</th>
<th>LRYGBP, N (%)</th>
<th>ORYGBP, N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anastomotic leak</td>
<td>7 (0.74)</td>
<td>0†</td>
<td>113 (0.78)</td>
<td>15 (1.52)</td>
</tr>
<tr>
<td>Readmission</td>
<td>2 (0.21)</td>
<td>0†</td>
<td>42 (0.29)</td>
<td>5 (0.51)</td>
</tr>
<tr>
<td>Reoperation</td>
<td>7 (0.74)</td>
<td>0†</td>
<td>99 (0.68)</td>
<td>14 (1.42)</td>
</tr>
<tr>
<td>Gastrointestinal Perforation</td>
<td>0</td>
<td>6 (0.05)</td>
<td>17 (0.12)</td>
<td>1 (0.10)</td>
</tr>
<tr>
<td>Readmission</td>
<td>0</td>
<td>3 (0.02)†</td>
<td>7 (0.05)</td>
<td>0</td>
</tr>
<tr>
<td>Reoperation</td>
<td>0</td>
<td>5 (0.04)</td>
<td>14 (0.10)</td>
<td>1 (0.10)</td>
</tr>
<tr>
<td>Abdominal Sepsis</td>
<td>1 (0.11)</td>
<td>3 (0.02)</td>
<td>30 (0.21)</td>
<td>2 (0.20)</td>
</tr>
<tr>
<td>Readmission</td>
<td>0</td>
<td>0</td>
<td>11 (0.08)</td>
<td>1 (0.10)</td>
</tr>
<tr>
<td>Reoperation</td>
<td>1 (0.11)</td>
<td>3 (0.02)</td>
<td>25 (0.17)</td>
<td>1 (0.10)</td>
</tr>
<tr>
<td>Fluid, electrolyte, nutritional depletion</td>
<td>18 (1.91)</td>
<td>45 (0.37)†</td>
<td>220 (1.52)</td>
<td>21 (2.13)</td>
</tr>
<tr>
<td>Readmission</td>
<td>18 (1.91)</td>
<td>43 (0.35)†</td>
<td>210 (1.45)</td>
<td>21 (2.13)</td>
</tr>
<tr>
<td>Reoperation</td>
<td>1 (0.11)</td>
<td>4 (0.03)</td>
<td>18 (0.12)</td>
<td>1 (0.10)</td>
</tr>
<tr>
<td>Stricture causing Obstruction</td>
<td>4 (0.42)</td>
<td>16 (0.13)†</td>
<td>206 (1.42)†</td>
<td>3 (0.30)</td>
</tr>
<tr>
<td>Readmission</td>
<td>1 (0.11)</td>
<td>8 (0.07)</td>
<td>60 (0.41)</td>
<td>0</td>
</tr>
<tr>
<td>Reoperation</td>
<td>3 (0.32)</td>
<td>13 (0.11)</td>
<td>187 (1.29)</td>
<td>3 (0.30)</td>
</tr>
</tbody>
</table>
Michigan Bariatric Surgery Collaborative

- 25 hospitals
- 62 surgeons
- 30-day complication rates
- 15,275 patients between 2006 and 2009
MBSC

• Overall 7.3% complication rate
• Life-threatening complications highest in RYGB (3.1%), followed by LSG (2.2%), the band (0.78%) (p<0.001)
• Sleeve Complications
  – 0.35% leaks
  – 0.6% stricture/obstruction
  – 0.5% abscess
  – 0.6% reoperation rate
Sleeve Gastrectomy

• Unique complications
• Increasing in number
• Leaks:
  – Usually at E-G junction
  – Stapler too close
  – Obstruction at incisura
Stent Technology

- Metal versus plastic
- Fully versus partially covered
Stent Technology

- Self-expanding metal stents exert greater radial force
  - May decrease migration rates
- Partially covered stents allow for better native tissue in-growth to anchor stent
- In-growth may make retrieval more difficult
  - Requires stent exchanges for longer duration of therapy
  - Usually not required for treatment of foregut complications
Technique of Stent placement

• Contrast injection with fluoroscopy in OR
• Diet reinstituted
• Follow-up weekly with symptom reports and plain x-ray films
• Reintervention:
  – Change in symptoms
  – Clinical parameters
  – Stent migration prompted reintervention
Sleeve Gastrectomy
• 18 patients underwent stent placement
• 15 bariatric complications
• Primary outcome:
  – Resolution of leak, stricture, fistula after stent removal
• Secondary outcomes:
  – Symptom improvement, time to enteral feeds, duration of stent therapy, stent complications
Endoscopic stent management of leaks and anastomotic strictures after foregut surgery

Primary operation
• RYGB- 6
• Sleeve- 6
• BPD-DS- 2
• Gastrectomy for CA- 3
• Iatrogenic perforation- 1

Indication for stent
• Leak- 13
• Stricture- 3
• Fistula- 2
Endoscopic stent management of leaks and anastomotic strictures after foregut surgery

• Types of stents used:
  – Partially or fully covered metal self-expanding metal stents (SEMS)
  – Silicone-coated polyester stent
  – Prototype salivary silicone stent with anchoring mechanism

• Evaluated every 2-4 weeks
Endoscopic stent management of leaks and anastomotic strictures after foregut surgery

- 31 stents placed in 18 patients
- 61% oral feeds within 48 hours
- Average stent removal at 51 days (range 22-88)
- 17 pts report improvements of symptoms
- 13 complete resolution at endoscopy
  - 11 of 13 leaks
  - 1 of 3 strictures
  - 1 of 2 fistulae
Endoscopic stent management of leaks and anastomotic strictures after foregut surgery

- Stent-related complications
  - 5 patients total (28%)
  - 4 stent migrations
    - All successfully retrieved
    - No difference in partially covered versus uncovered
    - Overall rate of 12.9%
  - 1 stent collapse (polyester)
Endoscopic Approaches

• Endoscopy offers:
  – Less invasive approach
  – Endoluminal approach circumvents operative field

• Newer stents are coming with specific applications
  – Absorbable?
  – Prophylactic use in high risk patients?

• Still need to adhere to surgical principles
Case Studies
Symptom Relief

• Refractory Stricture or functional obstruction at incisura
  – RYGB
  – ?Seromyotomy

• Refractory GERD
  – RYGB
Angulation at Incisura
Seromyotomy for Long Stricture
Seromyotomy for Long Stricture

PRE

POST
Video of Revision for Refractory Stricture
Summary

- Strictures occur in 1-3% of LSG patients
- Can minimize risk with careful technique
- Aggressive multimodal approach if stricture occurs
- Endoscopic adjunctive therapy is valuable
- Most with severe angulation require surgical revision