Sleeve gastrectomy is still a good option for patients with GERD…

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Financial Disclosures

- Covidien (consultant / speaker)
- Cook Medical (consultant / speaker)
- W.L. Gore (consultant / speaker)
- Teleflex (consultant)
FACTS

• GERD is very common (up to 50-70%) in morbidly obese patients 1-4

• The presence of hiatal hernia is common (> 15%) in morbidly obese patients 5-6

• There is some (but not perfect) correlation between symptoms of GERD and the presence of hiatal hernia

• The hiatus is not routinely interrogated and dissected to see if an occult hernia is present (when it is not clearly visible)
VIDEO - HH seen only with better liver retraction
VIDEO - loose hiatus
RYGB VIDEO – posterior HH and large PEH lipoma
SG VIDEO – loose hiatus and posterior HH
VIDEO – solid hiatus
FACTS CONT

• Hiatal hernias are commonly found after bariatric surgery when the patients are undergoing EGD or UGI series for various indications, including GERD

• Majority of patients who had GERD symptoms pre-op, improve post-op; however, the symptoms may persist or recur
## Improvement of GERD after SG

<table>
<thead>
<tr>
<th>STUDIES</th>
<th># Patients</th>
<th>Pre-op GERD</th>
<th>Improvement in GERD</th>
<th>Follow-up (mos)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nocca et al.</td>
<td>163</td>
<td>10 (6.1%)</td>
<td>4 (40%)</td>
<td>24</td>
</tr>
<tr>
<td>Himpens et al.</td>
<td>40</td>
<td>8 (20%)</td>
<td>6 (85%)</td>
<td>36</td>
</tr>
<tr>
<td>Cottam et al.</td>
<td>126</td>
<td>45 (36%)</td>
<td>36 (80%)</td>
<td>12</td>
</tr>
<tr>
<td>Melissas et al.</td>
<td>23</td>
<td>8 (34%)</td>
<td>4 (50%)</td>
<td>12</td>
</tr>
<tr>
<td>Soricelli et al.</td>
<td>245</td>
<td>4 (3%)</td>
<td>4 (100%)</td>
<td>4</td>
</tr>
<tr>
<td>Soricelli et al.</td>
<td>378</td>
<td>60 (15.8%)</td>
<td>44 remission (73%)</td>
<td>18</td>
</tr>
<tr>
<td>Daes et al.</td>
<td>134</td>
<td>66 (49.2%)</td>
<td>64 (98.5%)</td>
<td>6-12</td>
</tr>
</tbody>
</table>

### 40-100% improvement
- From weight loss?
- Rapid gastric emptying?
- Decreased acid production?
## Incidence of Post-op GERD after SG

<table>
<thead>
<tr>
<th>Authors</th>
<th>No. of patients</th>
<th>Follow-up (months)</th>
<th>Postoperative incidence of GERD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nocca et al. [36]</td>
<td>163</td>
<td>24</td>
<td>11.8%</td>
</tr>
<tr>
<td>Himpens et al. [37]</td>
<td>40</td>
<td>36</td>
<td>21.8% (1 year)</td>
</tr>
<tr>
<td>Hamoui et al. [38]</td>
<td>118</td>
<td>13</td>
<td>3.1% (3 years)</td>
</tr>
<tr>
<td>Menenakos et al. [39]</td>
<td>261</td>
<td>12</td>
<td>12.7%</td>
</tr>
<tr>
<td>Arias et al. [40]</td>
<td>130</td>
<td>24</td>
<td>24.9%</td>
</tr>
<tr>
<td>Cottam. et al. [41]</td>
<td>126</td>
<td>12</td>
<td>2.1%</td>
</tr>
<tr>
<td>Lakdawala et al. [42]</td>
<td>50</td>
<td>12</td>
<td>20%</td>
</tr>
<tr>
<td>Melissas et al. [43]</td>
<td>23</td>
<td>12</td>
<td>9%</td>
</tr>
<tr>
<td>Present series</td>
<td>245</td>
<td>24</td>
<td>7.8%</td>
</tr>
</tbody>
</table>
Sleeve gastrectomy and crural repair in obese patients with gastroesophageal reflux disease and/or hiatal hernia

Emanuele Soricelli, M.D., Angelo Iossa, M.D., Giovanni Casella, M.D., Francesca Abbatini, M.D., Benedetto Calì, M.D., Nicola Basso, M.D.*

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Background: Gastroesophageal reflux disease (GERD) with or without hiatal hernia (HH) is now recognized as an obesity-related co-morbidity. Roux-en-Y gastric bypass has been proved to be the most effective bariatric procedure for the treatment of morbidly obese patients with GERD and/or HH. In contrast, the indication for laparoscopic sleeve gastrectomy (SG) in these patients is still debated. Our objective was to report our experience with 97 patients who underwent SG and HH repair (HHR). The setting was a university hospital in Italy.

Methods: From July 2009 to December 2011, 378 patients underwent a preoperative workup for SG. In 97 patients, SG was performed with HHR. The clinical outcome was evaluated considering GERD symptom resolution or improvement, interruption of antireflux medications, and radiographic evidence of HH recurrence.

Results: Before surgery, symptomatic GERD was present in 60 patients (15.8%), and HH was diagnosed in 42 patients (11.1%). In 55 patients (14.5%), HH was diagnosed intraoperatively. The mean follow-up was 18 months. GERD remission occurred in 44 patients (73.3%). In the remaining 16 patients, antireflux medications were diminished, with complete control of symptoms in 5 patients. No HH recurrences developed. “De novo” GERD symptoms developed in 22.9% of the patients undergoing SG alone compared with 0% of patients undergoing SG plus HHR.

Conclusion: SG with HHR is feasible and safe, providing good management of GERD in obese patients with reflux symptoms. Small hiatal defects could be underdiagnosed at preoperative endoscopy and/or upper gastrointestinal contrast study. Thus, a careful examination of the crura is always recommended intraoperatively. (Surg Obes Relat Dis 2012;xx:xxx.) © 2012 American Society for Metabolic and Bariatric Surgery. All rights reserved.
35/60 (58%) had esophagitis
Found during pre-op endoscopy
# GERD Symptom Score

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Patients (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 1, mild symptoms, no PPIs</td>
<td>22</td>
</tr>
<tr>
<td>Grade 2, moderate symptoms, periodic PPIs</td>
<td>8</td>
</tr>
<tr>
<td>Grade 3, severe symptoms, continuous PPIs</td>
<td>30</td>
</tr>
</tbody>
</table>

# Incidence of HHR and Intraoperative HH Diagnosis

<table>
<thead>
<tr>
<th></th>
<th>June 2009 to December 2010 (n = 223)</th>
<th>January 2011 to December 2011 (n = 155)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SG + HHR</td>
<td>29 (13%)</td>
<td>68 (43.8%)</td>
</tr>
<tr>
<td>Intraoperative HH diagnosis</td>
<td>9/29 (31%)</td>
<td>46/68 (67.6%)</td>
</tr>
</tbody>
</table>

# Clinical Outcome (n = 378 SG with or without HHR)

<table>
<thead>
<tr>
<th>Variable</th>
<th>SG (n = 281)</th>
<th>SG + HHR (n = 97)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperative GERD</td>
<td>19</td>
<td>41</td>
</tr>
<tr>
<td>GERD remission</td>
<td>11/19 (57.9%)</td>
<td>33/41 (80.4%)</td>
</tr>
<tr>
<td>GERD improvement</td>
<td>0</td>
<td>5/41 (12.1%)</td>
</tr>
<tr>
<td>GERD persistence</td>
<td>8/19 (42.2%)</td>
<td>3/41 (7.5%)</td>
</tr>
<tr>
<td>GERD “de novo”</td>
<td>60/262 (22.9%)</td>
<td>0</td>
</tr>
</tbody>
</table>

Intra-op diagnosis increased with time

Post-op GERD
- overall 44/60 (73%) remission
- GERD persistence higher in SG only
- GERD de novo seen only in SG only
49 pts underwent pre-op mano

26 SG pts underwent post mano

No difference in mean GERD score at 9 months.

22 had normal LES pressure
-16 reported GERD pre-op
(no significant difference post-op)

4 had low LES pressure
-1 reported GERD pre-op
(had worsening GERD post-op)

-1 without GERD pre-op,
devolved worsening GERD
FACTS CONT

• No level 1 data to prove/disprove any algorithm in the management of hiatal hernia and GERD in patients who are undergoing weight loss surgery

• BUT, these facts outlined above need to be reconciled
Cause(s) of GERD in the morbidly obese

• Not clearly understood

• Obesity causes increase in intra-abdominal pressure disrupting the LES mechanism for preventing reflux \(\Rightarrow\) GERD.

• Presence of hiatal hernia contributes to the problem
How do you define a “hiatal hernia?”

- No HH
- Diastasis
- Fatty GE Junction / PE lipoma
- “Dynamic” HH
- Small HH
- Large HH

Dx by BS or EGD unreliable

Clinical significance?
Wide range of practice (at GE junction)

My current practice

- **Preserve the angle of His area**
  - Why? - Avoid unnecessary dissection
  - Why? - Disruption of angle of His (increase risk of reflux?)

- **Dissect out left crural pillar, but preserve the angle of His fibers**
  - Why? - Minimize risk of proximal pouch dilation
  - Why? - Identify small hiatal hernias and fix them (missing them may increase risk of reflux)

- **Dissect out left crural pillar and divide the angle of His fibers**

- **Complete hiatal dissection**
## Wide range of practice (mid-stomach)

<table>
<thead>
<tr>
<th>SURGEONS</th>
<th>Cases (n)</th>
<th>Average BMI</th>
<th>Bougie Size (Fr)</th>
<th>Stricture (%)</th>
<th>Leak (%)</th>
<th>Post-op GERD (%)</th>
<th>Wt Regain Poor Wt Loss (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jossart</td>
<td>617</td>
<td>47</td>
<td>32</td>
<td>0</td>
<td>0.6</td>
<td>20</td>
<td>1.6</td>
</tr>
<tr>
<td>Himpens</td>
<td>710</td>
<td>43</td>
<td>32</td>
<td>1</td>
<td>2.9</td>
<td>23</td>
<td>NR</td>
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<tr>
<td>Ramos-Galvao</td>
<td>714</td>
<td>45</td>
<td>32</td>
<td>0.14</td>
<td>0.42</td>
<td>6.02</td>
<td>0.84</td>
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<tr>
<td>Arvidsson</td>
<td>700</td>
<td>35</td>
<td>32</td>
<td>0.3</td>
<td>1.1</td>
<td>10</td>
<td>NR</td>
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<tr>
<td>Zundel</td>
<td>892</td>
<td>42</td>
<td>34</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>12</td>
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<tr>
<td>Baker</td>
<td>828</td>
<td>54</td>
<td>34</td>
<td>0.12</td>
<td>0.5</td>
<td>15</td>
<td>15</td>
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<td>France</td>
<td>716</td>
<td>43</td>
<td>34</td>
<td>1.4</td>
<td>0.7</td>
<td>7</td>
<td>8</td>
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<tr>
<td>Bellanger</td>
<td>675</td>
<td>44</td>
<td>34</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>23</td>
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<td>Jacobs</td>
<td>526</td>
<td>45</td>
<td>36</td>
<td>0.19</td>
<td>1.5</td>
<td>NR</td>
<td>28</td>
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<tr>
<td>Shah-Todkar</td>
<td>498</td>
<td>49</td>
<td>36</td>
<td>0.2</td>
<td>0.4</td>
<td>28</td>
<td>1</td>
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<td>Aceves</td>
<td>1127</td>
<td>42</td>
<td>36</td>
<td>0.35</td>
<td>0.62</td>
<td>18</td>
<td>1</td>
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<tr>
<td>Noca</td>
<td>700</td>
<td>46</td>
<td>36</td>
<td>0</td>
<td>3.9</td>
<td>15</td>
<td>2.8</td>
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<td>Lakdawala</td>
<td>484</td>
<td>44</td>
<td>36</td>
<td>0</td>
<td>1.2</td>
<td>10</td>
<td>3.3</td>
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<tr>
<td>Vix</td>
<td>350</td>
<td>46</td>
<td>36</td>
<td>0.5</td>
<td>3</td>
<td>10</td>
<td>3.5</td>
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<td>Jorgenson</td>
<td>512</td>
<td>45</td>
<td>36</td>
<td>0.5</td>
<td>0</td>
<td>10</td>
<td>NR</td>
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<tr>
<td>Rosenthal</td>
<td>547</td>
<td>45</td>
<td>42</td>
<td>0.2</td>
<td>0.36</td>
<td>27</td>
<td>NR</td>
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<tr>
<td>Basso</td>
<td>505</td>
<td>47</td>
<td>48</td>
<td>0</td>
<td>2.7</td>
<td>10</td>
<td>6.1</td>
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<td>Prager</td>
<td>267</td>
<td>50</td>
<td>48</td>
<td>0.8</td>
<td>3.3</td>
<td>31</td>
<td>4.9</td>
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<tr>
<td>Boza</td>
<td>1431</td>
<td>37</td>
<td>50</td>
<td>0.06</td>
<td>0.5</td>
<td>0.5</td>
<td>18.5</td>
</tr>
</tbody>
</table>

Average: 43.86, SD: 4.47, TOTAL (n): 12799

Data from International Sleeve Gastrectomy Expert Panel Consensus Statement

Rosenthal RJ et al. SOARD 2012; 8: 8-19
Recommended bougie size is 32-36 Fr
(International SG Expert Panel 2012)
Wide range of practice (mid-stomach)

How tight do you hug your Bougie?

Recommendation ???
(International SG Expert Panel 2012)
Wide range of practice (distal stomach)

- Most common area of sleeve dilation is the antrum
- *However, partial antrectomy is associated with higher post-op GERD*

**Recommendation 2 – 6 cm**
*(International SG Expert Panel 2012)*

- Increase risk of GERD
- Increase risk of weight regain

2 CM 6 CM
The diameter and the length of the pyloric antrum is highly variable.
Radical Resection of the Pyloric Antrum and Its Effect on Gastric Emptying After Sleeve Gastrectomy

David Michalsky · Petr Dvorak · Jaromír Beláček · Mojmír Kasalický

Abstract

**Background** The surgical technique of laparoscopic sleeve gastrectomy (LSG) has not been fully standardized yet and there is the unresolved question of what is the optimum size of retained pyloric antrum. The aim of our research was to prove that even after a radical resection of the pyloric antrum the physiological stomach evacuation function can still be preserved.

**Methods** Our study was based on 12 patients, who were randomly divided into two groups. Patients undergoing radical antrum resection (RA group) underwent gastric emptying scintigraphy to determine the evacuation half-time (T1/2) and food retention in the 90th minute of the test (%GE) both before the operation and 3 months afterward. Patients in whom the antrum was preserved (PA group) served as a control group for comparison of postoperative weight loss (in kilogram), decrease in body mass index (BMI), and decline in excess weight (%EWL). The resulting changes were statistically processed.

**Results** In the RA group, the average time T1/2 declined from 57.5 to 32.25 min \((p=0.016)\) and average retention %GE dropped from 20.5 to 9.5 \%(p=0.073). Differences in the average values of weight, BMI, or %EWL between both groups were of no statistical significance \((p>0.8)\).

**Conclusions** In the RA group, an increase in gastric emptying postoperatively was noted. Complications such as failure of stomach evacuation were not observed in the RA group. Our results suggest that even more radical resection of the pyloric antrum performed by LSG is possible without concerns of postoperative disorder of the stomach evacuation function.
Potential causes of GERD after sleeve gastrectomy

- Decrease in gastric compliance (lead pipe)
- Increased intraluminal pressure with intact pylorus
- Missing hiatal hernias
- Lowers LES pressure and shortens abdominal length of esophagus
- “Pouch” effect in the proximal part of the sleeve and the shape of the sleeve

Functional obstruction at the incisura or the pylorus

Figure from Shah S et al. Br J Radiol 2011; 84: 101-111
What do I do?

• Pre-op EGD
  - esophagitis / Barrett’s
  - bile reflux
  - gastritis / gastric ulcer
  - gastric tumor

If they GERD and/or significant HH, I have serious discussion of post-op GERD and risk of sleeve herniation.
What do I do? CONT

• Intra-operative assessment for occult hiatal hernias

• Selective hiatal hernia repair
  - significant GERD history
  - presence of HH (based on EGD and/or intra-op assessment)

• Method of HHR
  - Perform a posterior cruroplasty +/- mesh repair
  - Mesh repair if tissue quality poor and can be done in an expedient manner
Variations on “hiatal hernia repair”

Variations on “hiatal hernia repair” CONT
Closing the hiatus

• When re-approximating the crural fibers, the tension on the closure should be snug, not too tight (muscle fibers can necrose)

• Try to preserve the peritoneum on the diaphragmatic crural edges

• Posterior placement of sutures have less tension than anterior placement of sutures (diaphragm anterior to the esophagus is more tendon-like)
Mesh or no mesh?

- No clear data that the use of mesh decreases recurrence rate of hiatal hernias (based on non-bariatric surgery data)

- There is data to prove that the use of mesh is at least safe.

- So...I use mesh **selectively** in patients that have poor tissue quality AND it can be done in an expedient manner.
Occult PE Lipoma
Large HHR (ant and post cruroplasty)
HHR with BIO-A™
HHR with Biodesign™
NEGATIVE CAMPAIGN FOR MY CAUSE

• Post-op GERD is not only a problem with SG, but also with AGB and RYGB

• A significant cause of post-op GERD is due to dietary indiscretion (i.e. eating too fast or too much at a time).

• Some patients confuse dyspepsia for GERD.
NEGATIVE CAMPAIGN FOR MY CAUSE CONT

• 5-10% of RYGB patients develop marginal ulcers… should we make smoking (former or active) and/or those with frequent NSAID use an absolute contraindication to RYGB?

• Non-compliance and lost to follow-up are two major contributors of poor outcome post-op… should we refuse WLS in patients who miss 1-2 pre-op appointments?
In summary…

• YES, GERD can be a problem after sleeve gastrectomy, but chances are, GERD will actually improve or not be a major issue for the majority of patients.

• But GERD is also a problem with other bariatric procedures and “dyspepsia” is often confused with GERD.

• If we use GERD as an excuse not to allow sleeve gastrectomy in our surgical patients, we should not stop there and extend it to smokers, chronic NSAID users, and those who miss clinic appointments.
Which one of these statements is FALSE regarding GERD in bariatric surgery?

A) The main cause of post-op GERD after sleeve gastrectomy is not identifying the occult hiatal hernias and repairing them at the time of surgery.

B) Patients can develop GERD after a “picture perfect” sleeve due to functional obstruction at the incisura and/or pylorus.

C) The use of resorbable mesh at the hiatus is safe, but its efficacy in decreasing the recurrence rate is still unknown.

D) When evaluating a post-bariatric surgery patient for GERD, dietary indiscretion should be ruled out first.
There is a good correlation between EGD, barium swallow, and intra-operative interrogation of the hiatus. Therefore, just doing one of these three modalities is sufficient to diagnose (or exclude) hiatal hernias in patients.

A) TRUE.

B) FALSE.