Laparoscopic Vertical Sleeve Gastrectomy: A Novel Bariatric Procedure – Superior to Established Operations?

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American College of Surgeons
90th Annual Clinical Congress, New Orleans, LA
Bariatric Operations

- Adjustable gastric band placement
- Gastroplasty
- Roux-en-Y gastric bypass
- Biliopancreatic diversion (BPD)
- BPD with duodenal switch
  - vertical gastrectomy with duodenal switch

A heavy burden on hospitals

The number of Americans who are extremely obese has quadrupled in recent years, a study shows. This presents a challenge to hospitals who aren’t equipped to treat the extremely obese who may not fit imaging equipment, operating tables or wheelchairs.

Obese growth rates, percent of increase 1986-2000

- Extremely obese (at least 100 pounds overweight)
- Obese (about 30 pounds overweight)

Schematic from the CDC
Origin of the Laparoscopic VG:
Operation Needed for the Supermorbidly Obese

Vertical Gastrectomy & Duodenal Switch
■ Morbidity rate of 25-30%
How can we reduce risk, and yet achieve satisfactory weight loss in the supermorbidly obese? Answer: **Staged Procedures**

1st Stage  
**Vertical Gastrectomy**  
**Lap Band®**

2nd Stage  
**RGB**  
**Duodenal Switch**  
**Band removal/RGB**

Final Result  
**RGB**  
**VGDS**  
**Band-DS**

- **Advantages:**
  - Reduced operative time
  - 2nd stage technically easier after some weight loss
Methods:
Laparoscopic Vertical Gastrectomy

- Starting point 6 cm from pylorus
- Staple along a 32 Fr bougie
- Greater curvature gastrectomy resulting in a 60-80 cc gastric tube
- Methylene blue leak test
Postoperative Video Esophogram After Laparoscopic Vertical Gastrectomy

GE Junction

Pylorus
Methods:
Laparoscopic VG Compared to Band, RGB, DS

- Band Around Stomach (inflatable)
- Port Placed Below skin to adjust
- Gastric Band

- 15-20cc Gastric Pouch
- Roux-en-Y Gastric Bypass

- 60-80cc Gastric Tube
- Portion of Stomach Removed
- Digestive Juice Limb
- Food Limb
- Common Channel

- Vertical Gastrectomy with Duodenal Switch (Hess)
**Comparison:**
**Laparoscopic VG Compared to Band, RGB, DS**

- Retrospective review from Feb 02 - Present
- Compared results of 4 operations

<table>
<thead>
<tr>
<th></th>
<th>VG (n=68)</th>
<th>BAND (n=156)</th>
<th>RGB (n=245)</th>
<th>DS (n=66)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>46 ± 11</td>
<td>41 ± 11</td>
<td>44 ± 10</td>
<td>42 ± 8</td>
</tr>
<tr>
<td>Sex (male)</td>
<td>19 (28%)†</td>
<td>16 (10%)</td>
<td>35 (14%)†</td>
<td>5 (8%)‡</td>
</tr>
<tr>
<td>OR Time (mins)</td>
<td>102 ± 29‡</td>
<td>92 ± 23‡</td>
<td>142 ± 32</td>
<td>229 ± 43</td>
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<tr>
<td>Conversions</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pts. with LOS &gt;5</td>
<td>1 (1.5%)</td>
<td>4 (2.6%)</td>
<td>14 (5.7%)</td>
<td>4 (6.1%)</td>
</tr>
</tbody>
</table>

† P<0.05 versus BAND, RGB, DS
‡ P<0.05 versus RGB, DS
Results: Postoperative BMI
After Laparoscopic Vertical Gastrectomy, Band, Roux-en-Y Gastric Bypass, Duodenal Switch

* P<0.05 vs All
Results: Weight Lost
After Laparoscopic Vertical Gastrectomy, Band, Roux-en-Y Gastric Bypass, Duodenal Switch

![Graph showing weight loss over time postoperatively](image-url)
Readmits, Reops, Complications:
After Laparoscopic Vertical Gastrectomy, Band, Roux-en-Y Gastric Bypass, Duodenal Switch

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<th>RGB (n=245)</th>
<th>DS (n=66)</th>
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</thead>
<tbody>
<tr>
<td>Non-op Readmits</td>
<td>1.5%</td>
<td>1.3%</td>
<td>3.3%</td>
<td>6.1%</td>
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<tr>
<td>Reoperations</td>
<td>0†</td>
<td>2.6%</td>
<td>6.4%</td>
<td>16.6%†</td>
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<tr>
<td>Major Complications</td>
<td>1.5%</td>
<td>2.6%</td>
<td>6.5%</td>
<td>22.7%‡</td>
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<tr>
<td>Total Complications</td>
<td>5.9%†</td>
<td>3.8%†</td>
<td>15.1%</td>
<td>28.8%‡</td>
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</table>

† P<0.05 versus RGB
‡ P<0.05 versus All
Summary: Laparoscopic Vertical Gastrectomy

Compared to RGB, DS:

- Purely restrictive, no malabsorption
- Decreased OR time
- Decreased morbidity, 0% mortality in high risk group
- Similar weight loss
- Safe 1st step procedure in superobese and/or high-risk patients

But…
Unanswered Questions:
Laparoscopic Vertical Gastrectomy

- Durability?
- Second stage?
  - Necessary?
  - Timing
  - What operation?
- Mechanism?
Durability?

Gastroplasty: Inadequate Long-Term Weight Loss

- Horizontal Gastroplasty
- Slilastic Ring Vertical Banded Gastroplasty
- Vertical Banded Gastroplasty (Mason)
Durability?
Similar operation - Magenstrasse & Mill

- 1987 – David Johnston, Leeds, UK
- 230 patients
- 4% major complications
- 0% mortality
Durability?
Magenstrasse & Mill operation – 5 year follow-up

Body Weight (kg)

0  6m  1y  2y  3y  4y  5y

0  60  80  100  120  140  160
# Importance of Bougie Size

<table>
<thead>
<tr>
<th>Study</th>
<th>No. Pts.</th>
<th>%EWL Loss</th>
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<tbody>
<tr>
<td>Voellinger (Gagner) 2002</td>
<td>24</td>
<td>23% at 3 m</td>
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<tr>
<td>60 Fr bougie</td>
<td></td>
<td>32% at 6 m</td>
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<tr>
<td>Elariny 2002</td>
<td>30</td>
<td>20lbs at 1 m</td>
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<tr>
<td>60 Fr bougie</td>
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<tr>
<td>Crookes 2003</td>
<td>14</td>
<td>47% at 1 y</td>
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<tr>
<td>48Fr bougie, open</td>
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<td></td>
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<tr>
<td>Cottam (Schauer) 2003</td>
<td>102</td>
<td>46% at 1 y</td>
</tr>
<tr>
<td>48Fr bougie, lap</td>
<td></td>
<td></td>
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<tr>
<td>Johnston 2003</td>
<td>230</td>
<td>63% at 1 yr</td>
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<tr>
<td>M&amp;M, 32 Fr bougie, open</td>
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<td></td>
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<tr>
<td>Adamo 2003</td>
<td>25 VG 6</td>
<td>63% at 1 yr</td>
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<tr>
<td>M&amp;M, 32 Fr bougie, open/lap</td>
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<td>73% at 18m</td>
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<td>Lee 2004</td>
<td>68</td>
<td>44% at 6 m</td>
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<tr>
<td>32 Fr bougie</td>
<td></td>
<td>55% at 1 y</td>
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Second Stage?
Is it Necessary? If so, when? What?

1st Stage
Vertical Gastrectomy
Lap Band®

2nd Stage
RGB
Duodenal Switch
Band removal/ RGB

Final Result
RGB
VGDS
Band-DS
Second Stage? Is it Necessary?

BMI Decrease In Individual Patients After VG With Initial BMI >50
Two-Stage Laparoscopic DS
Weight Change based on BMI

From Chu, Gagner et al
Second Stage? Is it Necessary?

BMI Decrease In Individual Patients After VG With Initial BMI <50
Mechanism?
Hormonal Control of Weight Homeostasis

- Ghrelin
- Insulin
- Leptin
- PYY
Mechanism?

Ghrelin Controls Energy Balance, and Appetite after RGB

- Mechanism after VG?
  - Ghrelin?
    - Fundus gone
    - No hunger
  - Other hormones
  - Dystmotility?

Long-term Results?
Predictions for the Laparoscopic VG

- Durability - promising
  - Smaller bougie better weight loss

- Second stage
  - Not necessary if BMI <45
  - Timing & operation – further study needed

- Mechanism
  - Further study needed

- Insurance participation
Laparoscopic Associates of San Francisco
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San Francisco, California, USA
Results: % Excess Weight Loss
After Laparoscopic Vertical Gastrectomy, Band, Roux-en-Y Gastric Bypass, Duodenal Switch

% Excess Weight Loss (%)

Time Postoperatively (mos)

VG, BAND, RGB, DS

* P<0.05 vs. DS, RGB
Results: Postoperative Weight
After Laparoscopic Vertical Gastrectomy, Band, Roux-en-Y Gastric Bypass, Duodenal Switch

![Graph showing weight loss over time postoperatively for different procedures.](image)