Current Trends in Bariatric Surgery

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Outline

- Why consider surgery
- Bariatric surgery as metabolic surgery
- Considering surgery at lower BMIs
- Change in the types of cases being performed
- Emergence of robotic bariatric surgery
Why consider surgery?
Surgery shown to improve survival


- Prospective cohort study
- SOS Study 4047 pts.
  - 2010 patients in surgery group
    (68% VBG, 19% Band, 13% GBP)
- 10.9Y avg. f/u
- weight loss 25% GBP, 16% VBG, 14% Band
- Overall mortality reduced 24% in surgery group
- 40% fewer cancer deaths, 50% fewer MI deaths
Surgery shown to improve survival

Adams et al. Long-Term Mortality after Gastric Bypass Surgery. (NEJM, 2007)

- 7925 GBP and 7925 Matched Controls
  - Age, sex, BMI from DMV records, year
- All cause and disease specific mortality
  - Avg. f/u 7.1Y
- Overall Mortality 40% less in GBP group
  - 59% fewer deaths due to MI, 92% fewer due to diabetes, and 60% to cancer
Remission of comorbid conditions

Bariatric surgery increasingly seen as **metabolic surgery**

- The GI tract is more than just plumbing.
- The alterations in anatomy lead to hormonal changes in the gut-brain hormonal axis that lead to weight loss and changes in glucose homeostasis.
45 medical societies support surgery to treat diabetes

- Diabetes Surgery Summit II (2015)
- Recommend metabolic surgery to treat T2DM BMI > 40 and BMI 35-39.9 hyperglycemia inadequately controlled.
- Consider for patients with T2DM and BMI 30-34.9 if inadequately controlled despite optimal medical treatment with either oral meds or injectables
- Endorsed by 45 worldwide medical and surgical societies

Multiple RCTs have shown effectiveness of surgery

- No mortalities
- major complication rates < 5%
- Surgery effective against diabetes and reduced medications taken, weight, and dyslipidemia


Randomized groups:
intensive medical therapy (n=60) vs RYGB + intensive medical therapy (n=60)

Inclusion: A1C > 8%, BMI 30-39.9, T2DM for >6 months

avg BMI 34, avg A1C 9.6%

Primary endpoint:
Triple control - A1C < 7%, LDL < 2.59 mmol/L, SBP < 130mmHg

24 months:
Meeting triple control endpoint: RYGB+IMT 43% vs IMT 14%
A1C < 7: RYGB+IMT 75% vs IMT 24%

Gastric bypass group had a greater number of adverse events including falls, fractures, infections and nutritional deficiencies despite use of nutritional supplements
Mingrone et al. Bariatric Surgery versus Conventional Medical Therapy for Type 2 Diabetes

- RCT
- RYGB vs BPD vs MT (lifestyle, exercise, nutrition)
- n= 60 (inclusion: BMI > 35, A1C > 7, DM > 5 years)
- Primary endpoint: HbA1C < 6.5 + fasting glucose < 5.6, without meds x1 year

<table>
<thead>
<tr>
<th></th>
<th>EWL 2 yrs</th>
<th>EWL 5 yrs</th>
<th>DM remission 2yrs</th>
<th>DM remission 5yrs</th>
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</thead>
<tbody>
<tr>
<td>RYGB</td>
<td>68%</td>
<td>67%</td>
<td>75%</td>
<td>37%</td>
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<tr>
<td>BPD</td>
<td>69%</td>
<td>73%</td>
<td>95%</td>
<td>63%</td>
</tr>
<tr>
<td>Medical</td>
<td>9%</td>
<td>16%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

- Patients who relapsed diabetes at 5 years able to maintain A1C 6.7% with diet +/- metformin alone

Schauer et al. Bariatric Surgery versus Intensive Medical Therapy in Obese Patients with Diabetes

- RCT
- RYGB vs SG vs MT (lifestyle, exercise, nutrition)
- n = 150 (avg preop A1C 9.3, BMI 36)
- Primary endpoint: A1C < 6% +/- DM medications

<table>
<thead>
<tr>
<th></th>
<th>%EWL 3 yrs</th>
<th>%EWL 5 yrs</th>
<th>Primary endpoint 3 yrs</th>
<th>Primary endpoint 5 yrs</th>
<th>HgA1C base</th>
<th>HgA1C 5 yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>RYGB</td>
<td>73%</td>
<td>68%</td>
<td>38%</td>
<td>29%</td>
<td>9.3</td>
<td>7.3</td>
</tr>
<tr>
<td>SG</td>
<td>72%</td>
<td>61%</td>
<td>24%</td>
<td>23%</td>
<td>9.5</td>
<td>7.4</td>
</tr>
<tr>
<td>Medical</td>
<td>14%</td>
<td>8%</td>
<td>5%</td>
<td>5%</td>
<td>8.8</td>
<td>8.5</td>
</tr>
</tbody>
</table>

Who Qualifies?

• BMI > 40
• BMI > 35 with comorbidity

• Medically fit and optimized to undergo surgery
• No psychiatric contraindications
• Needs to be able to understand and be committed to behavior changes necessary to ensure safety and success
• No strict age limits (adolescents and elderly have special considerations)
Should surgery be considered at lower BMIs?

- Most insurances currently still require BMI > 35 for diabetics to qualify for surgery
- Data suggests that BMI is not a good predictor of effectiveness of surgery
- Recent meta-analysis showed no difference in remission of diabetes if BMI < 35 vs BMI > 35 (Panunzi, 2015)
- Strong support of DSS-II consensus statement aiming to get change in insurance policies for lower BMI

How safe is it?
Minimally Invasive Bariatric Surgery is Safe

Use and Outcomes of Laparoscopic Sleeve Gastrectomy vs Laparoscopic Gastric Bypass: Analysis of the American College of Surgeons NSQIP

Monica T Young, MD, Alana Gebhart, BA, Michael J Phelan, PhD, Ninh T Nguyen, MD, FACS

(JACS, 2015)

- Analysis of ACS NSQIP database
- 24,117 patients (20% SG, 80% GB)
<table>
<thead>
<tr>
<th>Variable</th>
<th>Laparoscopic gastric bypass (n = 19,172)</th>
<th>Laparoscopic sleeve gastrectomy (n = 4,945)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operative time, min, mean (SD)</td>
<td>133 (56)</td>
<td>101 (50)*</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Anesthesia time, min, mean (SD)</td>
<td>187 (70)</td>
<td>147 (65)*</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Complications, %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urinary tract infection</td>
<td>0.91</td>
<td>0.71</td>
<td>0.21</td>
</tr>
<tr>
<td>Wound infection</td>
<td>0.2</td>
<td>0.06*</td>
<td>0.05</td>
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<tr>
<td>Abscess</td>
<td>0.63</td>
<td>0.69</td>
<td>0.73</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>0.5</td>
<td>0.38</td>
<td>0.37</td>
</tr>
<tr>
<td>Pulmonary embolism</td>
<td>0.21</td>
<td>0.18</td>
<td>0.79</td>
</tr>
<tr>
<td>Deep venous thrombosis</td>
<td>0.21</td>
<td>0.47*</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Acute renal failure</td>
<td>0.11</td>
<td>0.14</td>
<td>0.72</td>
</tr>
<tr>
<td>Bleeding requiring transfusion</td>
<td>1.5</td>
<td>0.65*</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Stroke/CVA</td>
<td>0.03</td>
<td>0.02</td>
<td>0.82</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>0.1</td>
<td>0.06</td>
<td>0.53</td>
</tr>
<tr>
<td>Sepsis</td>
<td>0.58</td>
<td>0.34*</td>
<td>0.05</td>
</tr>
<tr>
<td>Cardiac arrest</td>
<td>0.08</td>
<td>0.04</td>
<td>0.55</td>
</tr>
<tr>
<td>Serious morbidity, %</td>
<td>5.8</td>
<td>3.8*</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Length of stay, d, mean (SD)</td>
<td>2 (6)</td>
<td>2 (11)</td>
<td>0.99</td>
</tr>
<tr>
<td>30-day readmission, %</td>
<td>6.08</td>
<td>4.05*</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>30-day reoperation, %</td>
<td>2.46</td>
<td>1.6*</td>
<td>&lt;0.01</td>
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<tr>
<td>30-day mortality, %</td>
<td>0.15</td>
<td>0.1</td>
<td>0.58</td>
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</table>

*p ≤ 0.05, compared to laparoscopic gastric bypass.  
1Based on 2011 data only.  
CVA, cerebrovascular accident.

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<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
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<tbody>
<tr>
<td>Total</td>
<td>158,000</td>
<td>173,000</td>
<td>179,000</td>
<td>193,000</td>
<td>196,000</td>
</tr>
<tr>
<td>RNY</td>
<td>36.7%</td>
<td>37.5%</td>
<td>34.2%</td>
<td>26.8%</td>
<td>23.1%</td>
</tr>
<tr>
<td>Band</td>
<td>35.4%</td>
<td>20.2%</td>
<td>14%</td>
<td>9.5%</td>
<td>5.7%</td>
</tr>
<tr>
<td>Sleeve</td>
<td>17.8%</td>
<td>33%</td>
<td>42.1%</td>
<td>51.7%</td>
<td>53.8%</td>
</tr>
<tr>
<td>BPD/DS</td>
<td>0.9%</td>
<td>1%</td>
<td>1%</td>
<td>0.4%</td>
<td>0.6%</td>
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<tr>
<td>Revisions</td>
<td>6%</td>
<td>6%</td>
<td>6%</td>
<td>11.5%</td>
<td>13.6%</td>
</tr>
<tr>
<td>Other</td>
<td>3.2%</td>
<td>2.3%</td>
<td>2.7%</td>
<td>0.1%</td>
<td>3.2%</td>
</tr>
<tr>
<td>Balloons</td>
<td>~700 cases</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V-Bloc</td>
<td>18 cases</td>
<td></td>
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</tbody>
</table>

Robotic Bariatric Surgery
Pros and Cons

**Pros**
- great visualization (high resolution, 3D, stable camera position, great magnification)
- more stable retraction
- more dexterity and precision
- increased autonomy
- better ergonomics for the surgeon
- Stapler can assess thickness of the tissue
- potential of future development on the platform

**Cons**
- increased cost
- increased OR time
- learning curve (both surgeon and staff)
- can’t feel the tissue (haptics)
- less global experience with the robotic stapler and instruments relative to the lap equivalents – is the technology reliable?
Utilization and outcome of laparoscopic versus robotic general and bariatric surgical procedures at Academic Medical Centers
• HealthSystem Consortium clinical database from 10/2010 to 2/2014
• Shorter LOS for heller myotomy
• Costs were significantly higher for all procedures
• For SG and GB - no increase in hospital mortality, major complications and 30-day readmissions with robotic surgery

Robotic versus laparoscopic sleeve gastrectomy for morbid obesity: systematic review and meta-analysis
Magouliotis (Obes Surg, 2017)
• Included 16 studies and 29,787 patients
• Majority of studies found increased costs and OR times associated with robotic sleeve gastrectomy
• No differences in rates of leaks or bleeding
Laparoscopic versus robotic roux-en-y gastric bypass: lessons and long-term follow-up learned from a large prospective monocentric study.

Buchs et al. (Obesity Surgery, 2014)

- 2003-2013
- 389 lap GB, 388 robotic GB
- Robotic bypass had lower conversion rate (0.8% vs 4.9%), fewer complications (11% vs 16%), fewer leaks (0.3% vs 3.6%), shorter hospital stay
- Handsewn GJ for robotic, circular stapled GJ for lap
Current studies are limited

• Are early studies just capturing the results and costs of the learning curve?
• Older generation robot
• Unclear on technique used during the surgery
• Lack of uniformity on technique
Future for robotic bariatric surgery

• Once people get over the learning curve, will we see an improvement in outcomes, OR efficiency, and costs?
• Will better visualization and precision translate into better results?
• Increased competition (Google/J&J, medtronic, others) over next few years
• Decreased costs
• Innovations in technology (single-site, embedded imaging, haptics)
• Decreased size of the platform – system to become more mobile
Summary

• Metabolic surgery is the most effective treatment currently available for morbid obesity and diabetes
• Minimally invasive bariatric surgery is safe
• Push towards offering metabolic surgery to lower BMIs
• Mix of cases continues to evolve
• May see an increased role for robotics with greater surgeon experience, increased industry competition and lower cost.
Thank you

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