Bariatric surgery: Value and remote complications

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Cardiometabolic risk and obesity

Metabolic Syndrome
Characteristics of Metabolic Syndrome

- Obesity
- High blood pressure
- Glucose intolerance
- Elevated triglycerides (atherogenic dyslipidemia)
- Low HDL-cholesterol

Risk Factors of Metabolic Syndrome

- Obesity
- Body fat distribution
- Physical inactivity
- Excess caloric intake
- Poor diet
- Medications (Exposure to antipsychotic medications)
- Family history
- Socioeconomic factors
- Low Vitamin D 25-Hydroxy
**Cardiometabolic Risk:** Metabolic Syndrome Associated With Increased CV Morbidity and Mortality


Cardiometabolic Risk

Abdominal Adiposity Is Associated With Increased Risk of Diabetes

Therapeutic Objectives

- To reduce the underlying causes of metabolic syndrome:
  - Overweight and obesity
  - Physical inactivity
  - Treat lipid and non-lipid risk factors
    - Dyslipidemia
    - Hypertension
    - Cardiovascular complication prevention
Options for Weight Loss and treating metabolic syndrome

- Diet/Exercise/Behavior Modification
- Medications
- Surgery
  - Gastric bypass
  - Sleeve gastrectomy
  - Laparoscopic gastric banding

Does the surgery have a real effect?

Does the effect last long enough?

Surgery effect vs drug effect

Surgery is expensive !!!
Does the surgery have a real effect?

96 patients compared immediately before and 1 year after

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Postoperative</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI (kg/m²)</td>
<td>44.3</td>
<td>31.5</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Waist circumference (cm)</td>
<td>128.5</td>
<td>97.9</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>102.2</td>
<td>72.4</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Fasting glucose (mg/dL)</td>
<td>117</td>
<td>85</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Fasting insulin (µIU/dL)</td>
<td>14.61</td>
<td>7.97</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>HbA1c (%)</td>
<td>7.03</td>
<td>5.55</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Total cholesterol (mg/dL)</td>
<td>195</td>
<td>167</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>LDL-C (mg/dL)</td>
<td>125</td>
<td>95</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>HDL-C (mg/dL)</td>
<td>36</td>
<td>52</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Triglycerides (mg/dL)</td>
<td>171</td>
<td>95</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>HOMA-IR</td>
<td>4.45</td>
<td>1.93</td>
<td>&lt; 0.0001</td>
</tr>
</tbody>
</table>

Impact of Roux-en-Y Gastric Bypass on Metabolic Syndrome and Insulin Resistance Parameters

The effect of laparoscopic gastric bypass surgery on dyslipidemia in severely obese patients.

<table>
<thead>
<tr>
<th></th>
<th>Preoperative</th>
<th>Postoperative</th>
<th>Percentage change</th>
<th>Mean change per Patient</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-year cohort (n = 96)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TC mg/dL (mmol/L)</td>
<td>194.5 ± 35.4</td>
<td>170 ± 33.7</td>
<td>-12.5%</td>
<td>-24.3 ± 15.6</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>(LDL mg/dL (mmol/L)</td>
<td>111.5 ± 51.7</td>
<td>89.6 ± 26.8</td>
<td>-19.4%</td>
<td>-21.6 ± 29.5</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>HDL mg/dL (mmol/L)</td>
<td>50.1 ± 11.8</td>
<td>61.7 ± 12.8</td>
<td>+23.2%</td>
<td>+11.6 ± 11.8</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>TG mg/dL (mmol/L)</td>
<td>156.3 ± 66.9</td>
<td>91.9 ± 45.3</td>
<td>-41.5%</td>
<td>-64.4 ± 16.0</td>
<td>&lt; .001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
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<th>Postoperative</th>
<th>Percentage change</th>
<th>Mean change per Patient</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-year cohort (n = 38)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TC mg/dL (mmol/L)</td>
<td>186.7 ± 32.2</td>
<td>173.2 ± 32.4</td>
<td>-7.2%</td>
<td>-13.6 ± 25.2</td>
<td>.36</td>
</tr>
<tr>
<td>(LDL mg/dL (mmol/L)</td>
<td>112.2 ± 24.7</td>
<td>87.9 ± 26.0</td>
<td>-28.7%</td>
<td>-24.3 ± 19.0</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>HDL mg/dL (mmol/L)</td>
<td>42.9 ± 6.8</td>
<td>60.2 ± 13.1</td>
<td>+40.3%</td>
<td>+17.3 ± 11.0</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>TG mg/dL (mmol/L)</td>
<td>133.2 ± 65.3</td>
<td>111.4 ± 68.2</td>
<td>-27.3%</td>
<td>-41.8 ± 68.2</td>
<td>.15</td>
</tr>
</tbody>
</table>
Does the surgery have a real effect?

YES

Does the effect last long enough?

Surgery effect vs drug effect

Surgery is expensive !!!
Does the effect last long enough?

- Serum cholesterol
- Serum TG levels
- Serum HDL cholesterol
- Serum LDL cholesterol
Mean follow up 3.4 years

Does the surgery have a real effect?

Does the effect last long enough? YES

Surgery effect vs drug effect

Surgery is expensive !!!
Surgery vs drug

Roux-en-Y Gastric Bypass Versus Medical Treatment for Type 2 Diabetes Mellitus in Obese Patients: A Systematic Review and Meta-Analysis of Randomized Controlled Trials.

- TG
- TC
- LDL
- HDL
Does the surgery have a real effect?

Does the effect last long enough?

Surgery effect vs drug effect

YES

Surgery is expensive !!!
The Effect of Roux-en-Y Gastric Bypass on Prescription Drug Costs

<table>
<thead>
<tr>
<th>Morbidity</th>
<th>Preop</th>
<th>6 months postop</th>
<th>1 year postop</th>
<th>2 years postop</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>No. Pts.</td>
<td>No. %</td>
<td>No. %</td>
</tr>
<tr>
<td>HT / HT CVD</td>
<td>96</td>
<td>51</td>
<td>34</td>
<td>65</td>
</tr>
<tr>
<td>Type 2 Diabetes</td>
<td>46</td>
<td>28</td>
<td>4</td>
<td>91</td>
</tr>
<tr>
<td>Pulmonary Insufficiency</td>
<td>40</td>
<td>24</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>Osteoarthritis</td>
<td>47</td>
<td>32</td>
<td>12</td>
<td>75</td>
</tr>
<tr>
<td>Anxiety / Depression</td>
<td>46</td>
<td>34</td>
<td>22</td>
<td>52</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>23</td>
<td>20</td>
<td>10</td>
<td>57</td>
</tr>
<tr>
<td>GERD</td>
<td>23</td>
<td>21</td>
<td>6</td>
<td>74</td>
</tr>
<tr>
<td>Urinary incontinence</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>324</td>
<td>70</td>
<td>112</td>
<td>67</td>
</tr>
</tbody>
</table>

HT=hypertension, CVD=cardiovascular disease, GERD=gastroesophageal reflux disease, Pts=patients.

<table>
<thead>
<tr>
<th>Time (years)</th>
<th>Surgery cost</th>
<th>Drug costs, P=.047</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Drug cost: $369 6 Mos $119 1 Yr $105 2 Yrs
Savings in drug costs: $250 68% 68% 72%
Does the surgery have a real effect?

Does the effect last long enough?

Surgery effect vs drug effect

Surgery is cost effective

Which type of surgery?
### Gastric Bypass Results
- Diabetes: 90%
- Dyslipidemia: 70%
- Hypertension: 65%
- Sleep apnea: 90%
- Reflux: 98%

### Lap Banding
- Diabetes: 50%
- Dyslipidemia: 50%
- Hypertension: 60%
- Sleep Apnea: 90%

### Sleeve Gastrectomy
- Diabetes: 80%
- Dyslipidemia: 60%
- Hypertension: 60%
- Sleep apnea: 95%

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**Surgery is not an “easy way out”**
- Lifestyle changes
- Emotional Issues
- Discomfort
- Risks
- Side effects
Risks- All Procedures

- Death
- Pulmonary embolus
- Bleeding
- Gastrointestinal injury or perforation
- Pneumonia
- Wound infections
- Hernias

Risks- Gastric Bypass

- Leak 1-4%
- Bowel obstruction 5%
- Stricture 2%
- Ulcer 9%
- Splenic injury <1%
Risks - Laparoscopic Banding

- Stomach slippage 2%
- Food obstruction 10%
- Erosion of the band 0.6%
- Stoma swelling 2%
- Port/mechanical complications 5%

Source: Favretti, 500 patients.

Risks - Sleeve Gastrectomy

- Leaks 1-2%
- Strictures 1%
Remote complication

- **SURGICAL COMPLICATIONS**
  - Infections
  - Strictures
  - Intestinal Leaks
  - Nausea & Vomiting
  - Hernia
  - Obstruction
  - Death <1%

- **METABOLIC COMPLICATIONS**
  - Nutritional Deficiencies
  - Anemia
  - Bone Disease
  - Neuropathy
  - Vit. A Deficiency
  - Vit. D Deficiency

: (Non-Compliance with Behavior & Exercise)
  - Depression 12%
  - Sexual Concerns 4%
  - Relationship Problems 2% (>90%)
  - Medical Complications due to Surgery 9%
  - Lack of Exercise Being the Most Likely Area of Non-Compliance

Who Is a Surgical Candidate?

- Meets NIH criteria
- Acceptable operative risk
- Understands surgery, risks and aftercare
- Dedicated to life-style change and follow-up
Who is NOT a Candidate?

- Patients with:
  - Some previous gastric surgeries
  - Uncontrolled psychological conditions
  - Active drug or alcohol abuse
  - Active smoking habits
  - History of medical noncompliance

Conclusion

Bariatric surgery is one of the effective tools to manage and prevent metabolic syndrome and the cardio-metabolic risk

It is cost effective

However it carries its own risk and side effects
Thank you