The Obese Transplant Patient: Is There A Role For Bariatric Surgery?

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Obesity Trends* Among U.S. Adults
(*BMI ≥30, or about 30 lbs. overweight for 5’4” person)

Economic Costs of Morbid Obesity
US Citizens with BMI >30
Total Cost: 150 Billion Dollars

No Data <=10% 10%-14% 15%-19% 20%-24% 25%-29% 30%-35% >35%

Indirect costs: $55 billion
Weight loss programs: $35 billion
Direct costs: $60 billion
Obesity in Patients Awaiting Kidney Transplant

- More blood transfusions, wound infections
- Higher rates of delayed graft function
- Higher rates of early graft loss
- Higher rates of overall graft failure
- More post-op cardiac events

Does obesity affect outcomes after transplant?

**KIDNEY**
- More post-op wound, pulmonary and cardiovascular complications
- Higher PNF rates (6% vs. 10%)
- Longer length of stay
- Worse survival even when corrected for MELD
- 30% higher cost of hospitalization

**LIVER**

Nair, S, et al. AJG 2001, Hepatol 2002

BMI and Graft Survival after Kidney Transplant

- BMI <25
- BMI >35

Survival after Liver Transplant according to MELD and BMI

- BMI<25, MELD<22
- BMI>40, MELD>22
- BMI<25, MELD>22
- BMI>40, MELD>22

BMI And Survival After Pancreas Transplant

- Graphs showing graft and patient survival rates.
- Mainly SPK grafts for survival.

Implications for Transplant Centers

- Cost Implications
  - Reimbursement limits are relatively fixed
  - Txp in obese pts incurs higher costs (longer OR times, more SSI, DGF, etc)
  - Total expenditure in Medicare-insured morbidly obese pts was higher than in normal weight pts ($23,924 at 1 yr, $39,085 at 3 yrs) (Modaniou, et al. AJT 2009)
- Increasing scrutiny of transplant centers by UNOS, CMS, private insurance carriers
  - Some adjustment for BMI, but this measure is imperfect and categories are too broad (BMI>25,30)

Management of Obese Transplant Candidates

- Center-specific BMI cutoffs for listing/transplant
- BMI > 38 (non-diabetic), > 34 (diabetic) are contraindications to kidney transplant
- BMI > 40 relative contraindication, BMI > 50 absolute contraindication to liver transplant
- Patients referred to weight loss programs through their PCP's
- Achievement and maintenance of weight loss is generally poor (<10%)

Non-Surgical Treatment

Behavior Therapy
- Weight loss not substantial for 95 - 97% of patients
- Weight is usually regained within 3-5 years

Physical Activity
- Minimal weight loss if primary treatment modality
- Useful as adjunctive therapy

Pharmacotherapy
- Orlistat: 8-10% weight loss over 2 years
- Phen/Fen: pulmonary hypertension, valvular disease
- SSRIs, Leptin analogues

SUSTAINED WEIGHT LOSS WITH MEDICAL THERAPY IS MINIMAL (5-10%)
Bariatric Surgery

- Restrictive
  - Roux-en-Y Gastric Bypass
  - Adjustable Gastric Banding
  - Sleeve (Vertical) Gastrectomy

- Criteria:
  - BMI >40 kg/m² or >35 with significant comorbidities (DM, sleep apnea, HTN)
  - Has failed other medically-managed weight loss programs
  - 20,000,000 adults in U.S. meet criteria

- Efficacy:
  - 60-70% EBW loss (60-250+ lbs/1-2yrs)
  - Best medical regimens achieve 10-25 lb weight loss

Resolution of Co-morbidities

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- Best medical regimens achieve 10-25 lb weight loss

Unique Challenges in Transplant Candidates

- More comorbidities (ESRD, ESLD, coagulopathy, DM, CVASD, HTN, CHF)
- Complex peri- and postoperative fluid management
- Sensitivity to anesthesia
- Limited imaging options if CKD and not yet on dialysis
- Unique nutritional requirements: protein, Ca/Vitamin D, iron
- Multiple medications and unpredictable absorption rates
- Most bariatric surgeons are not comfortable managing patients with end-stage organ disease

Cumulative Mortality

Difference due to fewer CVD and cancer events

Effects of Bariatric Surgery on Mortality in Swedish Obese Subjects
Sjöström et al. NEJM. 2007; 357 (8):741-52
What Is The Best Procedure For A Patient Awaiting Transplant?

- **Lap GBP**
  - **Pros:** effective, longest experience
  - **Cons:** complex, potential for nutritional deficiencies, difficulty in taking meds, may affect absorption of meds, EGD/ERCP impossible

- **LAGB (lap band)**
  - **Pros:** short OR time, “reversible”
  - **Cons:** less weight loss, intensive follow-up, difficulty in taking meds, foreign body, EGD/ERCP difficult

- **DS**
  - **Pros:** rapid weight loss
  - **Cons:** complex, rapid weight loss, malnutrition, exacerbation of liver disease

Laparoscopic Sleeve Gastrectomy

- **Pros:**
  - technically easy, no anastomoses, short OR time
  - does not affect med/nutrient intake/absorption
  - lower risk of oxalate nephropathy
  - allows full endoscopic evaluation
  - beneficial effect on gut hormones

- **Cons:**
  - less weight loss
  - long-term efficacy?
  - high pressure system – more reflux?
  - complications difficult to treat
**Weight Loss and Resolution of Comorbidities**

- **Schauer, P., et al. NEJM 2012**

- Significant reduction in use of BP meds, lipid-lowering agents

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**Patient Selection and Timing - Kidney**

- BMI ≥ 40 or ≥ 35 w/ severe comorbidities, failed supervised weight loss program
- Referred at time of listing – consider delaying procedure in CRT candidates until 2-3 years from trays
- Comprehensive CV evaluation before surgery
- CAPD candidates switch to HD (at least in early post-op period)

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**Weight Loss**

- 13/26 patients had diabetes
  - Post-LSG: 7 (53.8%) had complete, 1 (7.7%) had partial resolution
- Reduction in BP meds in all pts with HTN
- 1 pt had improvement in renal function and was taken off waitlist

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**Resolution of Co-Morbidities and Nutritional Stability**

- 13/26 patients had diabetes
  - Post-LSG: 7 (53.8%) had complete, 1 (7.7%) had partial resolution
- Reduction in BP meds in all pts with HTN
- 1 pt had improvement in renal function and was taken off waitlist
Patient Selection and Timing - Liver

- BMI > 40 or > 35 w/ severe comorbidities, failed supervised weight loss program
- Childs A or B
- Minimal ascites
- ≤ Grade 2 esophageal varices or TIPS
- Transplant workup completed before surgery

Lap Sleeve Gastrectomy in Patients Awaiting Liver transplant

<table>
<thead>
<tr>
<th>Parameter (N=20)</th>
<th>Mean +/- SD</th>
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<tbody>
<tr>
<td>Mean Age (y)</td>
<td>56 ± 6</td>
</tr>
<tr>
<td>% Female</td>
<td>60</td>
</tr>
<tr>
<td>Etiology Liver Disease</td>
<td>NASH (8), HCV (8), ETOH (2), AIH (2)</td>
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<tr>
<td>Preop BMI</td>
<td>46 ± 5</td>
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<tr>
<td>Mean Follow-up (y)</td>
<td>2.5 ± 1.7</td>
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<tr>
<td>BMI at 12 mos</td>
<td>33 ± 8</td>
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<tr>
<td>% EWL at ≥12 mos</td>
<td>45 ± 21</td>
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<tr>
<td>Hospitalization (days)</td>
<td>4 (range 3-8)</td>
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<tr>
<td>Operative Time, min</td>
<td>138 (range 103-196)</td>
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<tr>
<td>Mean EBL, mL</td>
<td>100</td>
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<tr>
<td>Transplant candidate at ≥6 months</td>
<td>19/20</td>
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<tr>
<td>Underwent Transplant</td>
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Lap Sleeve Gastrectomy in Patients Awaiting Liver transplant

Complications in 5/20 Patients:
- 2 superficial skin infections
- 1 staple line leak caused by retained NGT
- 1 transient encephalopathy
- 1 transient renal insufficiency

Post-Transplant Weight Profiles
LSG after Liver Transplant

**Excess Body Weight Loss**

- 16.4%, 8 pts.
- 38.1%, 9 patients
- 55.5%, 4 patients
- 65.4%, 3 patients

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**Conclusions**

- Class III obesity (BMI > 40) is increasingly common in patients with end-stage kidney and liver disease and compromises patient survival and transplant outcomes.
- Conservative weight loss regimens are ineffective.
- Results show LSG:
  - Safe, but with higher complication rates due to underlying physiology.
  - Technically feasible.
  - Provides excellent weight loss.
  - Improves candidacy for transplantation.
- Weight loss is similar to non-transplant patients and is maintained after transplant.

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**Future Directions**

- Prospective randomized trials comparing supervised diet to bariatric surgery are needed.
- Improve acceptance by bariatric community.
- Define optimal procedure (LSG, GBP, balloon, endoscopic plication, endoluminal sleeve?)
- Define optimal timing.
- Long-term outcomes and effect on post-transplant course.
Thank You!

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