Surgical Considerations in the Treatment of Morbid Obesity

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Introduction

- Obesity epidemic
- Pathophysiology of obesity and comorbidities
- Bariatric Surgery indications
- Multidisciplinary Team
- Treatment options
- Results
Obesity Epidemic

- First procedures in 1950’s
- Malabsorptive procedures, Ileocolic bypass, then Jejunoileal Bypass
- Lead to understanding of alterations of metabolism and that long-term followup is essential
- Explosion of procedures and surgeons and centers to provide care, “Bariatric Revolution”
- Bariatric Surgery has experienced more growth than any other area of general surgery in last several years

Measure of Weight Status

BMI (Body Mass Index)

= Weight in Kg/(Height in Meters)²
Do You Know Your Own BMI?

Weight (lbs)

<table>
<thead>
<tr>
<th>Height</th>
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<th>130</th>
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Obesity Epidemic

It is estimated that 65% of Americans are overweight and nearly half of those individuals (30%) are considered obese.

That translates into more than 60 million people 20 years of age and older with a body mass index (BMI) of 30 or greater.

Approximately 5% of all Americans are Morbidly Obese.

Obesity Epidemic

Estimated that 35% of the adolescent population in the U.S. is obese compared with about 20% in European countries

(being 40% above Ideal Body Weight)

Economic Costs of Morbid Obesity

US Citizens with BMI >30
Total Cost: 133 Billion Dollars

- Indirect costs: $48 billion
- Direct costs: $52 billion
- Weight loss programs: $33 billion

Wolf, Obesity Research, 1998
Heavier men and women in all age groups had an increase risk of death resulting in approximately 300,000 deaths per year.

Total number of deaths per year from colon and breast cancer is only about 90,000.

"Taken together, the diseases associated with morbid obesity markedly reduce the odds of attaining an average life span and raise annual mortality tenfold or more."

American College of Surgeons, Recommendations for facilities performing bariatric surgery, ST-34, Bull Am Col Surg, 2000;85:
Obesity and Mortality Risk

![Graph showing the relationship between BMI and mortality ratio.](chart.png)

**BMI**


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**Obesity* Trends Among U.S. Adults**

*BRFSS, 1991, 1995 and 2000*

(*BMI ≥ 30, or ~30 lbs overweight for 5’4” person*)

1991

1995

2000

Complex Disease

- Pathophysiology is poorly understood
- Clear familial predisposition
- Historical trends suggest environmental impact
- Lack of satiety in obese
- Role of hormones on satiety is incomplete; Ghrelin (produced in proximal stomach) produces increased food intake
- Ghrelin is elevated in individuals on low-calorie diets, but suppressed in patients undergoing RYGB

Obesity Related Co-Morbidities

<table>
<thead>
<tr>
<th>Co-Morbidity</th>
<th>Occurrence in the Obese</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes</td>
<td>14–20%</td>
</tr>
<tr>
<td>Hypertension</td>
<td>25–55%</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>35–53%</td>
</tr>
<tr>
<td>Cardiac disease</td>
<td>10–15%</td>
</tr>
<tr>
<td>Respiratory disease</td>
<td>10–20%</td>
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<tr>
<td>Sleep apnea</td>
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<tr>
<td>Arthritis</td>
<td>20–25%</td>
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<tr>
<td>Depression</td>
<td>70–90%</td>
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<tr>
<td>Stress Incontinence</td>
<td>50%</td>
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<tr>
<td>Menstrual irregularity</td>
<td></td>
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</tbody>
</table>
Non-Medical Co-Morbidities

- Physical
- Economic
- Psychological
- Social

Physical Co-Morbidity

- Clothing choice
- Tying shoelaces
- Furniture incapacity
  - seats in theater, planes, buses
  - restaurant booths
  - toilet and shower cubicles
- Personal hygiene (limits of reach)
Economic Co-Morbidity

- Employment discrimination
  - getting hired
  - promotions
  - special projects or accounts

- Education discrimination
  - select schools and universities

Psychological Co-Morbidity

- Major psychiatric illness same as rest of population
- Low self-esteem common
- Depression very common
  - normal weight 20–25%
  - moderately obese 60%
  - morbidly obese 90%
Social Co-Morbidity

- Weight harassment and prejudice
- Studies show society has low respect for morbidly obese
  - same as for alcoholics and drug addicts
- Many have limited number of friends
- Dating and marriage is less common

Medical vs. Surgical Treatment
Medical Treatment of Obesity

- **Diet** – low in calories, fat and carbohydrates
- **Exercise** – 40 minutes 5 times per week
- **Behavior Modification** – eat 3 sensible meals per day, avoid snacking
- **Drugs/Prescription medications**
  - Stimulants/appetite suppressants
  - Antidepressants (Meridia®)
  - Reduce fat absorption (Xenical®)

Disadvantages of medical treatment

- Most patients (95-97%) regain most or all of the weight that was lost within 2-5 years following diet or drug treatment
- The average amount of weight loss is relatively small -- 10-40 pounds
- Drug therapy may be associated with severe complications (Fen-Phen and heart disease).
Disadvantages of medical treatment

- Most insurance companies do not cover costs associated with these programs
- Very difficult for most people to maintain these programs in the long term
- “Yo-Yo” effect of many different programs leads to significant weight fluctuations

Why Surgery?

- Diet and exercise are not effective long term in the morbidly obese
- Surgery is an accepted and effective approach
- Improves co-morbid health problems
- Weigh benefits of surgery vs. the risks for the morbidly obese
  - risks of surgery
  - risks of staying morbidly obese
NIH Consensus Conference 1992

- Surgery is an accepted and effective approach that provides consistent, permanent weight loss for morbidly obese patients
- Surgery indicated in patients with:
  - BMI of 40 or over with co-morbid conditions
  - Documented dietary attempts ineffective

Who Is a Surgical Candidate?

- Meets NIH criteria
- No endocrine cause of obesity
- Acceptable operative risk
- Understands surgery and risks
- Absence of drug or alcohol problem
- No uncontrolled psychological conditions
- Consensus after bariatric team evaluation:
  - psychologist, internist, dietitian
- Dedicated to life-style change and follow-up
Bariatric surgical procedures

“Shortened Bowel”
- Biliopancreatic diversion
- Jejunal-ileal bypass

“Small Stomach”
- Vertical banded gastroplasty (VBG)
- Lap Band

“Combination procedure”
- Gastric Bypass

BPD with Duodenal Switch

- Malabsorptive
- Larger stomach pouch
- Higher amount of weight loss
- Lesser degree of nutrient absorption
- 77% EBW 5yr follow-up

Scopinaro 1998
Vertical Banded Gastroplasty (VBG)

- Restrictive
- Minimal metabolic effects
- Defeated by junk food diet, liquids
- > 50% EBW 5yr follow-up
- 40% re-op rate to maintain weight loss

Laparoscopic Adjustable Gastric Banding

- Restrictive
- Good results in Europe and Australia
- Bioenterics Lap Band™ FDA approved 6/01
- US results TBD
Roux-en-Y Gastric Bypass

- Combination
- Most frequently performed bariatric procedure in the US
- First done in 1967
- Laparoscopically since 1993
- 50% EBW 14yr follow-up

How Does the Roux-en-Y Work?

- Surgery factors:
  - Small meals
  - Limited digestion of food
  - decreased appetite
- Patient factors:
  - calorie intake=WATCH WHAT YOU EAT!
  - calorie expenditure=EXERCISE!
Advantages of Laparoscopy

- Fewer wound infections
- Less pulmonary complications
- Less hernias
- Less blood loss
- Less pain and faster recovery
- Surgeon has better view of the anatomy


Laparoscopic Approach
Open Surgical Approach

Laparoscopic RYGB

Laparoscopic Roux-en-Y Gastric Bypass
Antecolic Linear Gastrojejunostomy
Results of Bariatric Surgery

- Weight loss
- Reduction or improvement in health problems
- Live longer
- Improved quality of life
  - health
  - social
  - personal
  - work

Improvement in Comorbidities

- Type 2 diabetes remission in 76.8% and significantly improved in 86% of patients
- Hypertension eliminated in 61.7% and significantly improved in 78.5% of patients
- High cholesterol reduced in more than 70% of patients
- Sleep apnea was eliminated 85.7% of patients
- Surgery patients lost between 62 and 75 percent of excess weight

JAMA, 2004
## Resolution of Comorbidities

<table>
<thead>
<tr>
<th>Condition</th>
<th>N= 104</th>
<th>Number Prior to Surgery</th>
<th>% Worse</th>
<th>% No - change</th>
<th>% Improved</th>
<th>% Resolved</th>
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<tbody>
<tr>
<td>Osteoarthritis</td>
<td>64</td>
<td>2</td>
<td>10</td>
<td>47</td>
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<td>Hypercholesterinemia</td>
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<td>4</td>
<td>33</td>
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<td>GERD</td>
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<td>4</td>
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<td>Hypertension</td>
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<td>12</td>
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<td>Sleep Apnea</td>
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<td>5</td>
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<td>Hypertriglyceridemia</td>
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<td>Peripheral Edema</td>
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<td>4</td>
<td>55</td>
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<td>Stress Incontinence</td>
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<td>11</td>
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<td>Asthma</td>
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<td>12</td>
<td>69</td>
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<td>Diabetes</td>
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<td>0</td>
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<td>18</td>
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<tr>
<td><strong>Average</strong></td>
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<td></td>
<td>1.6%</td>
<td>7.6%</td>
<td>35.1%</td>
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</table>

**90.8% Improved or Resolved**

## Results of Bariatric Surgery

According to a recent study from the Agency for Healthcare Research and Quality (AHRQ), the mortality rate associated with bariatric surgery dropped by a staggering 78.7 percent, from 0.89 percent in 1998 to 0.19 percent in 2004.

Meanwhile, the mortality rate from morbid obesity was reduced by 89 percent after bariatric or metabolic surgery, according to a study published in the *Annals of Surgery* in 2004.
UHC Bariatric Surgery Benchmarking Project

- University HealthSystem Consortium (UHC) conducted the Bariatric Surgery 2005 Benchmarking Project
- 29 UHC members submitted patient-level data
- 1,144 cases were enrolled
- Data were collected on 40 consecutive patients discharged during the first quarter of 2004
- Cases from the last quarter of 2003 were accepted if additional cases were necessary to reach 40
- 27 UHC members submitted operational data
- Site visits to 4 better performing organizations were conducted

Participating Healthcare Organizations

- Albany Medical Center
- Brigham and Women’s Hospital
- Emory Crawford Long
- Emory University Hospital
- Fairview University Medical Center
- Hennepin County Medical Center
- Johns Hopkins Bayview Medical Center
- Medical University of South Carolina
- The Methodist Hospital (Houston)
- NYU Medical Center
- The Ohio State University Medical Center
- Oregon Health & Science University
- Penn State M.S. Hershey Medical Center
- Robert Wood Johnson University Hospital
- Rush University Medical Center
- Shands HealthCare
- Truman Medical Centers
- UC Davis Medical Center
- UC Irvine Medical Center
- UHHS University Hospitals of Cleveland
- UMass Memorial Health Care
- University Hospital of the SUNY Upstate Medical University
- University of North Carolina Hospitals
- University of Pennsylvania Health System
- University of Virginia Health System
- Vanderbilt University Medical Center
- Virginia Commonwealth University Health System
- Wake Forest University Baptist Medical Center
- Yale-New Haven Hospital
Top 4 Performing Organizations

- The Ohio State University Medical Center (OSU)
- Brigham and Women’s Hospital
- Penn State M.S. Hershey Medical Center
- NYU Medical Center

Data

- 932 patients (81.5%) were women
- Median age was 44 years (18 to 64 years)
- Common co-morbidities:

<table>
<thead>
<tr>
<th>Most Common Comorbid Conditions</th>
<th>%</th>
<th>n</th>
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<tbody>
<tr>
<td>Hypertension</td>
<td>56.7</td>
<td>677</td>
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<tr>
<td>Degenerative joint disease</td>
<td>37.4</td>
<td>428</td>
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<tr>
<td>Sleep apnea causing respiratory disturbance</td>
<td>31.9</td>
<td>363</td>
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<tr>
<td>Gastroesophageal reflux disease</td>
<td>31.8</td>
<td>362</td>
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<tr>
<td>Diabetes</td>
<td>30.8</td>
<td>352</td>
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<tr>
<td>Prior abdominal surgery</td>
<td>26.8</td>
<td>307</td>
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<tr>
<td>Asthma</td>
<td>21.2</td>
<td>243</td>
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</table>

*Image 4 – Source: Regional data*
Eleven out of the 29 organizations performed Roux-en-Y procedures exclusively.

One organization, however, performed gastric banding for 85% of its patients.

Key performance

- Steering committee identified 14 Key Performance Measures
- Associated with providing safe and effective bariatric surgery
- Clinical measures are evidence-based and the operational measures are based on the ASBS’s Centers of Excellence criteria
- The concept of a care “bundle” suggests that optimal outcomes are achieved by administering all of the required components of care to each patient.
Outcomes of UHC Benchmarking Project

- Only 2 study patients (0.17%) died during their inpatient stay (both of multisystem failure following Roux-en-Y gastric bypass)
- Two other patients died within 30 days of discharge (1 died of DVT/PE and the other of multisystem failure)
- Mortality rate was within the 95% confidence interval of its risk-adjusted expected mortality rate
- Recent meta-analysis found that the 30-day mortality rates are 0.1% for restrictive procedures, 0.5% for gastric bypass, and 1.1% for biliopancreatic diversion or duodenal switch, which compare favorably with the accepted operative mortality rates for other major surgical procedures

Additional Outcomes of UHC

### Outcomes by Use of Pathways/Plans

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Pathway (n = 860)</th>
<th>No Pathway (n = 284)</th>
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<tbody>
<tr>
<td>Mean LOS, days</td>
<td>4.64 ± 1.76</td>
<td>3.88 ± 1.76</td>
<td>&lt;0.01</td>
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<tr>
<td>Mean cost</td>
<td>$19,083 ± 12,722</td>
<td>$15,242 ± 4,081</td>
<td>0.03</td>
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<tr>
<td>30-day readmission</td>
<td>6.6% (57)</td>
<td>5.4% (16)</td>
<td>0.65</td>
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<tr>
<td>30-day mortality</td>
<td>0.1% (1)</td>
<td>1.1% (3)</td>
<td>0.65</td>
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</table>

### Outcomes by Inpatient Care Teams

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Care Team (n = 826)</th>
<th>No Care Team (n = 318)</th>
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<tbody>
<tr>
<td>Mean LOS, days</td>
<td>3.30 ± 1.64</td>
<td>5.15 ± 1.77</td>
<td>0.17</td>
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<tr>
<td>Mean cost</td>
<td>$12,094 ± 12,797</td>
<td>$13,340 ± 2,810</td>
<td>0.19</td>
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<tr>
<td>Inpatient complications</td>
<td>12.1% (122)</td>
<td>14.2% (45)</td>
<td>0.68</td>
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<tr>
<td>30-day readmission</td>
<td>7.9% (60)</td>
<td>11.1% (13)</td>
<td>0.02</td>
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<tr>
<td>30-day mortality</td>
<td>0.4% (3)</td>
<td>0.3% (1)</td>
<td>1.00</td>
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</table>

### Median Time in OR for Each Component of Procedure

- **Laparoscopic cases:**
  - In-room to procedure start (median minutes): 36
  - Procedure start to procedure finish (median minutes): 160
  - Procedure finish to out of room (median minutes): 12

- **Open cases:**
  - In-room to procedure start (median minutes): 30
  - Procedure start to procedure finish (median minutes): 144
  - Procedure finish to out of room (median minutes): 11
Outcomes for Better Performing Group of 4

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<thead>
<tr>
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<tbody>
<tr>
<td>Prophylactic antibiotics, given 30 minutes prior to incision</td>
<td>74.7% (122)</td>
<td>60.0% (59)</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Prophylactic antibiotics, given 45 minutes prior to incision</td>
<td>86.4% (149)</td>
<td>68.9% (60)</td>
<td>&lt; 0.01</td>
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<td>30 day mortality</td>
<td>89.9% (179)</td>
<td>68.7% (60)</td>
<td>&lt; 0.01</td>
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<tr>
<td>GFR prophylaxis until first ampicillin</td>
<td>96.5% (192/200)</td>
<td>88.8% (185/207)</td>
<td>&lt; 0.01</td>
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<tr>
<td>Reoperations with complications</td>
<td>11.7% (19)</td>
<td>14.5% (31)</td>
<td>0.23</td>
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<tr>
<td>Postprocedure LOS for laparoscopic procedures (days)</td>
<td>2.3 ± 3.3</td>
<td>3.1 ± 3.6</td>
<td>0.12</td>
</tr>
<tr>
<td>Postprocedure LOS for open procedures (days)</td>
<td>3.4 ± 2.9</td>
<td>4.6 ± 3.4</td>
<td>0.02</td>
</tr>
<tr>
<td>30-day readmission rate</td>
<td>2.5% (4)</td>
<td>7.6% (12)</td>
<td>0.01</td>
</tr>
<tr>
<td>OR time for laparoscopic procedure (minutes)</td>
<td>141.0 ± 47.3</td>
<td>231.6 ± 68.0</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>OR time for open procedure (minutes)</td>
<td>205.4 ± 71.3</td>
<td>205.4 ± 71.5</td>
<td>0.95</td>
</tr>
<tr>
<td>30-day mortality</td>
<td>0.0% (0)</td>
<td>0.4% (4)</td>
<td>1.00</td>
</tr>
<tr>
<td>Total cost (dollars)</td>
<td>11,249 ± 7,989</td>
<td>15,407 ± 11,454</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>

These “better performers” demonstrated that clinical and financial results were improved when superior care was provided.

Average cost per case was $4,000 less than other participating hospitals.

Critical Success Factors

- Patient selection and education
- Patient-centered philosophy
- Multidisciplinary team approach
- Committed physician champion
- Active support of senior leadership
- Sensitivity to the obese patient
- Culture of quality improvement
Patient Selection and education

- Patients are pre-screened by nurse, dietician, physician assistant, psychologist/psychiatrist before being accepted as surgical candidate
- NIH guidelines are mandatory

Patient centered philosophy

- Commitment to patient before, during, and after surgery
- Years of post surgical education/followup
- Constant access to the “team”
- Bariatric “buddy” programs
- Support groups
Multidisciplinary Team

- Surgeons
- Nurse Coordinator
- Dietician
- Educators
- Physician assistants/nurse practitioners
- Psychologist/psychiatrist
- Consulting physicians
- Surgical Team including Bariatric Anesthesiologist
- Electronic Medical Record

Bariatric Surgery Strategy Map

- Challenges
- Key Performance Measures
- Project Focus/Objectives
- Critical Success Factors
- Goal

For more information on the Bariatric Surgery Strategy Map, please contact the Bariatric Surgery Program at (555) 123-4567.