Rethinking Obesity and Bariatric Surgery

Disclosures

No Disclosures

Learning Objectives

• Recognize the complex pathophysiology of body weight regulation and obesity
• Understand the indications and available options for bariatric surgery
• Discuss modern bariatric surgery outcomes
• Consider the future directions for obesity treatment
Introductions


Obesogenic Environment

Rethinking Medicine

- Siddhartha Mukherjee’s TED talk

Disease Environment

Medicine vs Organism

Target Cells
A BIG Issue

America’s Obesity Epidemic Hits a New High

Global Obesity: A Growing Epidemic

By Steven Blumberg, M.D.

America’s Obesity Epidemic Reaches Record High, New Report Says

By Anne Schuchat, M.D., and Dr. Nancy K. Kaelber

Obesity Epidemic "Astronomical"

The prognosis for the nation is bad and getting worse as obesity takes its toll on the health of adults and children alike.

Prevalence of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2011

Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.

*Sample size <50 or the relative standard error (dividing the standard error by the prevalence) ≥ 30%.

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Prevalence of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2015

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Prevalence\(^*\) of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2016

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Obesity Stats & Trends

- In US 2013-2014 (NHANES):
  - 32.7% Overweight (BMI 25-29.9 kg/m\(^2\))
  - 37.9% Obese (BMI 30-39.9 kg/m\(^2\))
  - 7.7% Severely obese (BMI ≥ 40 kg/m\(^2\))
- “Globesity”
  - In 2014 an estimated 640 million obese adults
  - Increase by a factor of 6 since 1975
- Majority of today’s children will be obese at age 35 -> 57%

Why should we care?

- Chronic disease (same as HTN, T2DM)
  - Altered physiology -> impaired health
- Decreased QOL
- Missed employment
- Higher rates of comorbid illness
- Increased risk of cancer
- Increased mortality
"The fundamental problem is that severe obesity is widely regarded as a failure of self-control or regulation regarding eating and self-imposed inactivity.....leading to, the attitude that the treatment of severe obesity does not justify the use of healthcare resources”

—Dr. Bruce M. Wolfe
Obesity Bias

• Stereotypes → Stigma → Prejudice → Discrimination → Adverse Outcomes
• Stigmatizing obesity as a tool to motivate individuals to loose weight
• Workplace discrimination: lower wages, hired less often
• Healthcare discrimination
  — ≥50% of providers regard obese patients as awkward, unattractive, and non-compliant
  — Lower rates of colorectal and breast cancer screening

Obesity & Medical Education

• Only ~25% of medical schools meet the minimum required hours of nutrition education
• Obesity curriculum absent from many medical schools
• Physicians from multiple specialties report:
  — substantial ambivalence around weight management
  — Inadequate training to do so

Myths about metabolism

• Obesity is solely an individual problem
• It's all genetics
• “Just eat less”
• “Just need to exercise more”
• “If I could just get this weight off, I could maintain it”
Why is it so hard to lose weight?

- Chronic excess energy intake → dysregulation of body weight homeostatic mechanisms
- Complex homeostatic mechanisms defend higher body weight
- Decreased energy expenditure, due to:
  - Reduced lean muscle mass
  - Reduced sympathetic activity
- Altered hormonal signals
- Altered brain responses to food cues

Hormone Pathophysiology

- Leptin Resistance
- Blunted response of GI hormones to ingested nutrients
  - Decreased circulating PYY and GLP-1
- Dysregulation of ghrelin
- Altered gut microbiome

Central Nervous System

- Increased stimulation of reward pathways in response to food
- High sugar and fat foods perceived as more pleasurable
- Eating behavior becomes dissociated from perceptions of satiety and hunger
So what diet should I be on?

- Best results in clinical trials:
  - Modest weight loss
  - 4% over long term
- "Alternate day fasting doesn’t improve your chances of losing weight, just being hangry"
- Keto diet may demonstrate adverse effects on lipids despite weight loss
- Recommendation: any diet that a patient will adhere to
- Improved cardiac risk profiles

And Exercise?

The science is in: exercise won’t help you lose much weight

Why you shouldn’t exercise to lose weight, explained with 60+ studies
Rethinking Medicine

• Siddhartha Mukherjee’s TED talk

Disease  Environment

Medicine  vs  Organism

Target  Cells

“Remodel”

Weight Loss, >5 years

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Weight Change (Mean)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensive Lifestyle Intervention</td>
<td>4.9 ± 5.3%</td>
</tr>
<tr>
<td>Phentermine</td>
<td>15 ± 12%</td>
</tr>
<tr>
<td>Liquid Meal Replacement</td>
<td>15%</td>
</tr>
<tr>
<td>Surgery</td>
<td>53%</td>
</tr>
</tbody>
</table>

References


How does Bariatric Surgery Work?
Bariatric Surgery: Historical Perspective

- 1950s: small intestine resection -> weight loss
- 1953 first weight loss procedure: Jejunoileal bypass
  - Weight loss through **malabsorption**
  - Electrolyte imbalances, nutritional deficiencies, diarrhea, liver failure
- Gastric resection for PUD resulted in weight loss
  - Weight loss through **restriction**
- 1967 first gastric bypass
  - Hybrid procedure combine **restriction** and **malabsorption**

Bariatric Surgery: Modern Perspective

- Mechanisms other than **Restriction** & **Malabsorption** are at play
- Multifactorial mechanisms are incompletely understood
- Main driver: **Reduced energy intake**
  - Through altered **eating behavior**
- Changes in central appetite-regulating circuits
- Better understanding of pathophysiology fueling new innovations and research

<table>
<thead>
<tr>
<th>Measure</th>
<th>Weight Loss Through Dieting</th>
<th>Weight Loss Through Bariatric Surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ghrelin</td>
<td>Levels increase with dieting</td>
<td>Reduction with SG, possible reduction with RYGB in the immediate postoperative period</td>
</tr>
<tr>
<td>PYY</td>
<td>Reduced levels[1,2]</td>
<td>Increased levels[3,4]</td>
</tr>
<tr>
<td>GLP-1</td>
<td>Reduced levels[1,2]</td>
<td>Increased levels[3,4]</td>
</tr>
<tr>
<td>Leptin</td>
<td>Reduced levels[1,2]</td>
<td>Reduced levels[5,6]</td>
</tr>
<tr>
<td>Bile acids</td>
<td>Unclear:</td>
<td>Increased secretion</td>
</tr>
<tr>
<td>Intestinal microbiome</td>
<td>Improvement with weight loss[7,8]</td>
<td>Altered (“leaner”) microbiome[9,10]</td>
</tr>
<tr>
<td>Perceived satiety</td>
<td>Lower satiety[11]</td>
<td>Increased satiety</td>
</tr>
<tr>
<td>Food quantity</td>
<td>---</td>
<td>Altered food volume[1]</td>
</tr>
<tr>
<td>Long-term outcomes</td>
<td>Average 80% weight regain in 5y</td>
<td>Average weight loss of 25% at 15y, 15% at 25 y post RYGB[12,13]</td>
</tr>
<tr>
<td>Body weight</td>
<td>Muscle wasting</td>
<td>Reduced body weight “set point” to lower weight[14]</td>
</tr>
</tbody>
</table>
Who is Eligible?

- Patients with BMI ≥ 40 kg/m² without coexisting medical problems
- Patients with BMI ≥ 35 kg/m² and 1 or more severe obesity-related co-morbidities
  - HTN, T2DM, HLD, OSA, Obesity-hypoventilation syndrome (OSHS), OA, NAFLD/NASH, pseudotumor cerebri, GERD, asthma, venous stasis, urinary incontinence, & impaired QOL
- Some pts w/ BMI 30-34.9 kg/m² with diabetes or metabolic syndrome

(**Insurance coverage may differ from above)

Insurance coverage in OR?

- Most plans follow the last slide
- Oregon Health Plan
  - 35-39.9 kg/m² w/ DM or both OSA & HTN
  - ≥ 40 kg/m²
  - Abstinence from nicotine, illegal drugs (6 months)
- *Many plans require specific duration diet or preoperative weight loss goal
- Employers that cover:
  - Amazon, Farmer Ins, Adidas, Nike, Powell’s Books, Target, Winco, Starbucks, HP, New Seasons, Rite Aid, Comcast, Quest diagnostics, OHSU, Fred Meyer

"There is no data to support the practice of insurance mandated preoperative weight loss. The discriminatory, arbitrary, and scientifically unfounded practice of insurance-mandated preoperative weight loss contributes to patient attrition, causes unnecessary delay of live-saving treatment, leads to progression of life-threatening co-morbid conditions, and is unethical and should be abandoned" - ASMBS position statement
Bariatric Surgery Key Points

- Majority of procedures are done laparoscopically
  - OR time 45 min – 3 hours
- Very safe, minimal blood loss
- Mortality <0.2%
- 0-2 night hospital stay
- Early ambulation
- Preoperative and postoperative modified diet
Laparoscopic Adjustable Gastric Band

- Less utilized in last decade
- Band concerns
  - Slip
  - Erosion
- Port site concerns
  - Requires percutaneous access
  - Specialized needle

Laparoscopic Duodenal Switch (DS)

- Numbers starting to increase in US
- Most malabsorption
- Vitamin compliance
- Dietary compliance
- Best diabetes remission and long term weight loss maintenance

4 Most Common Weight Loss Surgery Procedures in the United States

- Adjustable Gastric Band (Lap Band)
- Roux-en-Y Gastric Bypass (RYGB)
- Duodenal Switch (DS)
- Sleeve Gastrectomy (Lap Band)
RCT: 107 LSG, 110 LRYGB (Switzerland 2007-2011)
- 5 year follow-up reported (ongoing)
- Weight loss: 61.1% vs 68.3%
- GERD:
  - Improved: 25% vs 68.3%
  - Worsened: 31.8% vs 6%
- Reoperations 15.8% vs 22.1%


RCT: 121 LSG, 119 LRYGB (Finland 2008-2010)
- 5 year follow-up reported (ongoing)
- Weight loss: 49% vs 57%
- Diabetes remission: 37% vs 45%
- D/c HTN meds: 29% vs 51%
- Reoperations 8% vs 16%


Long-term benefits
- Reduces risk of premature death 30-40%
- Resolution/Improvement of obesity-related comorbid illness
  - OSA
  - Diabetes Remission
  - Heart disease
- Decreased risk of cancer
**Bariatric Surgery: Effect on Cancer Incidence**

<table>
<thead>
<tr>
<th>Study</th>
<th>Control</th>
<th>Surgery</th>
<th>Follow-up</th>
<th>RR</th>
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<tbody>
<tr>
<td>Utah</td>
<td>9442</td>
<td>6896</td>
<td>12.5</td>
<td>0.76</td>
</tr>
<tr>
<td>Sweden</td>
<td>2037</td>
<td>2010</td>
<td>10.9</td>
<td>0.67</td>
</tr>
<tr>
<td>Kaiser</td>
<td>66,481</td>
<td>22,211</td>
<td>3.5</td>
<td>0.67</td>
</tr>
</tbody>
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**Kaiser Cohort**

Schauer: Ann Surg 2017

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**Complications**

- Mortality 0.1%
- Modern era: complication rates low
  - Comparable to gallbladder or hip surgery
  - Major adverse event <5%
  - Safer than remaining severely obese
- Early post-operative vs Long-term
- Varies by operation
Early Post-op Complications

- Bleeding
- Infection
- DVT/PE
- LEAK
- Cardiopulmonary

Gastric Bypass

- GJ Stenosis
- Marginal ulcer
  - NSAIDs, Smoking, H. Pylori
- Internal hernia
  - SBO, short gut
- Intussusception
- Cholelithiasis

Gastric Bypass

- Nutritional deficiencies
  - Iron, Ca, B12, folate, thiamine
- Dumping syndrome
- Hypoglycemia
- Kidney stones/renal
Gastric Sleeve
- Mechanical issues
  - Stenosis
  - Twisting
- GERD
- Nutritional deficiencies?
- Portomesenteric vein thrombosis

Gastric Band
- Obstruction
- Erosion
  - Port site infection
- Slippage
- Port malfunction
- Esophageal dilation
- Esophagitis

Other Long-Term Issues
- Increased rates of suicide
- Increased risk of EtOH abuse
- Weight loss failure
- Weight regain
- Revisional bariatric surgery

Variable Results
LABS 7 Year Weight Loss

Rethinking Medicine

- Siddhartha Mukherjee’s TED talk

Disease vs. Environment

Medicine vs. Organism

Target vs. Cells

“Change the milieu”
Emerging Research

• Importance of gut microbiome
• Nutrigenomics
• Changes in intestinal mucosa
• Maternal obesity & prenatal period

Individualized Obesity Treatment

• Obesity is a heterogeneous disease
• Wide individual variability of weight loss
• Study extreme and poor responders
• Identify populations at greatest risk
  – Biomarkers
  – Comorbid illnesses

Multi-modal, Patient Specific

• Intensive Lifestyle Modification
  – Diet & Exercise
• Pharmacotherapy
• Behavior Therapy
• Emerging endoscopic therapies
• Bariatric Surgery
• New Innovations?
• Policy & Prevention
15 million Americans with BMI ≥ 40 kg/m²

Less than 1% of eligible population undergoes surgery

Bariatric Surgery Barriers

- Lack of public awareness
- Patient misunderstanding or bias about surgery
  - “Easy way out”
- Lack of insurance coverage
- Patient cost
- Provider misunderstanding or bias about surgery
- Social bias and obesity discrimination
- Gender, age

Conclusions

- Obesity is a growing public health issue in US, globally
- Multiple detrimental physiologic effects
- Heterogeneous disease with variable response to treatment
- Bariatric surgery is currently most effective treatment
- Future: Individualized obesity treatment
- Need continues emphasis on Prevention
Thank You

Questions?