

# General and Bariatric Surgery in the Obese Patient

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## General Surgery in Morbidly Obese Patients

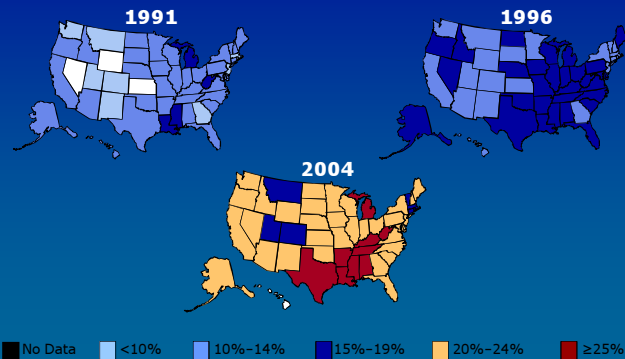
- Obesity Associated Comorbidities
- Obesity Associated Complications

## Bariatric Surgery in Morbidly Obese Patients

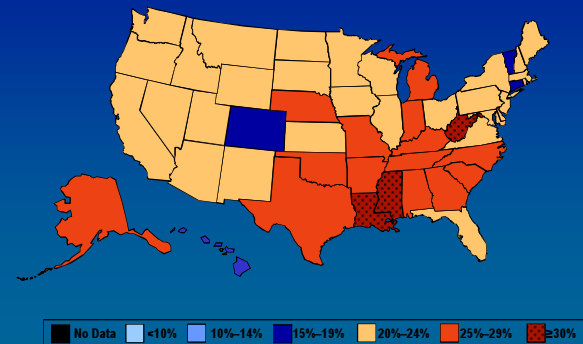
- Patient Selection
- Laparoscopic Gastric Bypass or Band
- Outcomes

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

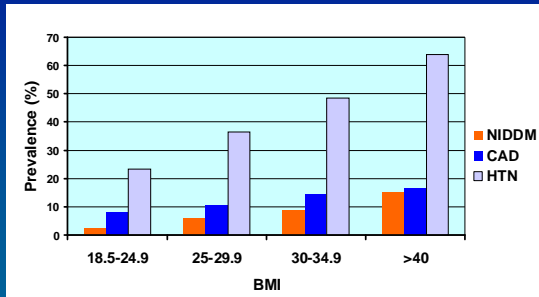
(\*BMI  $\geq 30$ , or about 30 lbs overweight for 5'4" person)



## Obesity Trends Among U.S. Adults 2005



## Prevalence of Comorbidities



NHANES III, 1988 - 1994



## Obesity Associated Comorbidities

- Osteoarthritis
- Rheumatoid Arthritis
- Birth Defects
- Breast Cancer
- Cancers of Esophagus and Stomach
- Colorectal Cancer
- Endometrial Cancer
- Renal Cell Cancer
- Cardiovascular Disease
- Carpal Tunnel Syndrome
- Chronic Venous Insufficiency
- Daytime Sleepiness
- Deep Vein Thrombosis
- Diabetes (Type 2)
- End Stage Renal Disease
- Gallbladder Disease
- Gastroesophageal Reflux Disease
- Heat Disorders
- Hypertension
- Impaired Immune Response
- Infertility
- Liver Disease
- Ob&Gyn Complications
- Pancreatitis
- Sleep Apnea
- Stroke
- Surgical Complications
- Urinary Stress Incontinence



NHANES III, 1988 - 1994

## Obesity Increases Mortality

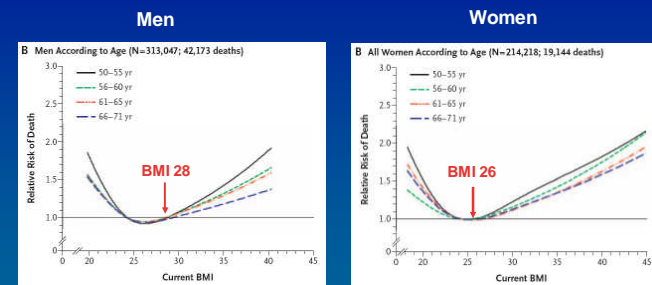
**“Obesity is one of the most common medical problems in the United States and a risk factor for illnesses such as hypertension, diabetes, degenerative arthritis and myocardial infarction. It is a cause of significant morbidity and mortality and generates great social and financial costs.”**

*Ethan M. Berke, MD and Nancy E. Morden, MD, Medical Management of Obesity, American Family Physician, American Academy of Family Physicians website.*

**“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.*

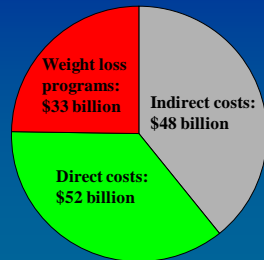
## BMI and Risk of Death



Adams, KF, et al. NEJM 2006

## Economic Costs of Morbid Obesity

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



*Wolf, Obesity Research, 1998*



## Surgery In the Obese Patient

### Multidisciplinary Team Approach

- Anesthesia
- Gastroenterology
- Endocrinology
- Cardiology – ICU
- Radiology
- Nursing

## Surgery In the Obese Patient

### Important Concerns

- OSA
- Diabetes
- DVT/PE
- Gerd
- Surgical Complications
- CVASD

## Surgery In the Obese Patient

### Obstructive Sleep Apnea

- 3% prevalence in general population
- 91% prevalence in morbidly obese (sleep study)
- Associated with:
  - CHF, arrhythmias, **pulm HTN**, MI
  - Hypercoagulability
  - Increased post-op respiratory distress, prolonged hosp stay

Hallowell PT et al. Am J Surg.193(3):364-7, 2007  
O'Keeffe T, Patterson EJ. Obesity Surgery. 14, 23-26, 2004

## Obesity, OSA and Anesthesia

- Pre-op polysomnography to r/o OSA
- Induction/Intubation
  - 2 experienced personnel
  - Consider wake fiberoptic (oral or nasal) intubation
- Intraoperative
  - Poor tolerance of pneumoperitoneum
  - Increased need for relaxation
- Emergence/post-op
  - Overnight intubation, ICU stay

Hallowell PT et al. Am J Surg.193(3):364-7, 2007  
O'Keeffe T, Patterson EJ. Obesity Surgery. 14, 23-26, 2004

## Diabetes Mellitus

- 35% prevalence in patients with BMI >40
- 90% type II, therefore insulin resistant
- Post-operative Management
  - liberal use of insulin gtt
  - early resumption of preop OHA or long-acting insulin
  - may need high doses of insulin (>60-100U/day) once taking po's

## Hypercoagulability

- Obesity strong risk factor for DVT/PE
- Increased risk with prolonged surgery
- Reverse Trendelenberg, pneumoperitoneum increase venous stasis
- SCD's, SQ heparin or enoxaparin (better) recommended
- Consider removable IVC filter in high risk pts

## Surgical Complications

### Rhabdomyolysis

Few studies:

Bostanjian (UCLA)

- 6 pts with severe rhabdo due to gluteal muscle ischemia
- 5/6 male, median BMI 67 (BMI 55 in controls)
- Median operative time 5.7 hrs (4 hrs in controls)
- Peak CPK 26,000-29,000 (controls 450-9,000)
- 3/6 developed ARF – all died

Mognol (France)

- CPK >1,000 in 3/50 LAGB pts, 12/16 Lap GBP pts
- CPK >10,000 in 4/12 Lap GBP pts; all had BMI >60
- Long operative time and high BMI were risk factors

#### Recommendations:

- team effort to minimize anesthesia and operative time
- better padding
- routine CPK monitoring in high risk pts, treat CPK's >5000

## Surgical Complications

### Incisional Hernias

Sugerman AJS 1996

- Open GBP vs. Total abdominal colectomy in IBD pts on chronic steroids
- 20% incisional hernia rate in obese
- 4% hernia rate in pts on steroids
- diabetes, wound infection, sleep apnea independent risks
- 20-30% recurrence rates after repair

#### Recommendations:

- weight loss BEFORE elective surgery
- broad spectrum abx
- nonabsorbable suture +/- internal retentions
- binder
- use mesh for hernia repair

## Surgical Complications

### Wound Infections

Smith AnnSurg 2004

- Wound infections after colorectal surgery (176 pts)
- 26% infection rate!
- OR 2.5 for BMI 25-29, OR 3.0 for BMI >30
- OR 2.6 for intraop hypotension
- 20-30% recurrence rates after repair

#### Recommendations:

- weight loss BEFORE elective surgery
- broad spectrum abx, consider sq drains
- multilayer closure
- good glucose control in diabetics
- supplemental oxygen
- laparoscopic approach when possible

## Non-Surgical Treatment

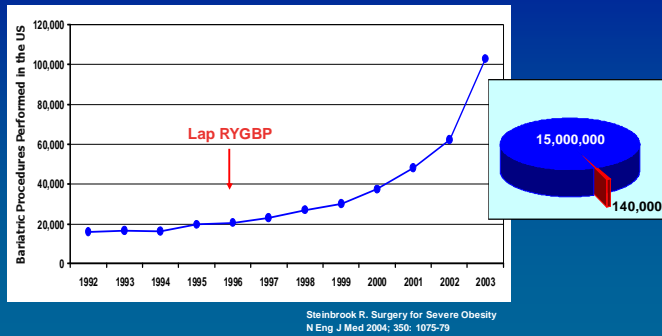
### Diet Therapy

- 48 RCT's
- Avg weight loss 8-12% after 3-12 mos.
- Most weight regained within 2-5 yrs.

### Physical Activity

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

## Bariatric Procedures Performed Annually in the U.S.



## Criteria for Surgery

- Body Mass Index of 40 kg/m<sup>2</sup> or greater
- BMI between 35 and 40 kg/m<sup>2</sup> with significant comorbidities
- Has failed other medically managed weight-loss programs

### Preop evaluation:

Cardiac, Pulmonary  
HCM

r/o Endocrine causes of obesity

Psychiatric and Nutritionist assessment

Mandatory weight loss and attendance at group sessions

## Types of Surgery

### • Restrictive

- Vertical Banded Gastroplasty (VGB)
- Adjustable Gastric Banding
- Sleeve (Vertical) Gastrectomy

### • Malabsorptive

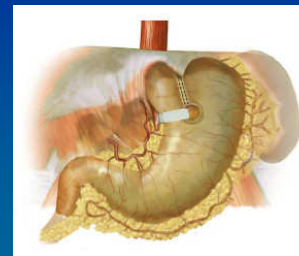
- Jejunioileal Bypass (JIB)
- Biliopancreatic Diversion (BPD)
- Duodenal Switch
- Long Limb Gastric Bypass

### • Restrictive with Malabsorptive Component

- Roux-en-Y Gastric Bypass (RYGPB)

## Restrictive Surgery

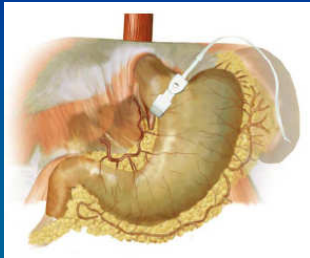
### Vertical Banded Gastroplasty (VGB)



- Original restrictive procedure
- 40-50% EBW loss
- Staple disruptions
- Band erosions
- Uncommon today

## Restrictive Surgery

### Laparoscopic Adjustable Gastric Band (LAGB)



- FDA approved 2001
- Weight Loss Similar to VBG
- 30% Surgical Revision Rate
- Fewer serious complications
- Frequent post-op adjustments

## Restrictive Surgery

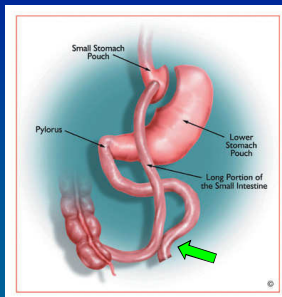
### Pro

- Relatively easy
- No protein-calorie malabsorption
- No vitamin or mineral deficiencies

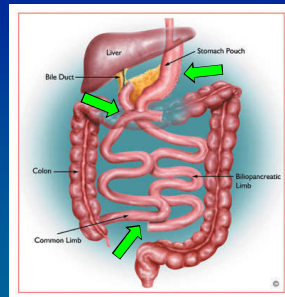
### Con

- Less weight loss
- More late failures due to dilation
- Less effective with sweet eaters
- Significant dietary non-compliance

## Malabsorptive Surgery



Long Limb Gastric Bypass

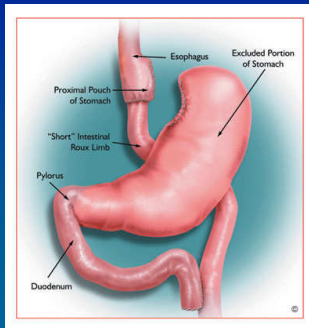


Biliopancreatic Diversion with Duodenal Switch

## Malabsorptive Surgery

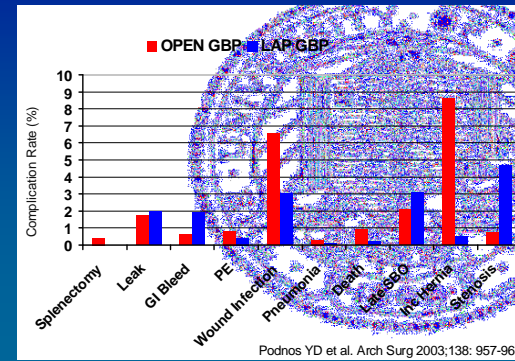
- Greater sustained weight loss with less dietary compliance
- Increased risk of malnutrition and vitamin deficiency
- Constant follow-up to monitor increased risk
- Chronic diarrhea

## Roux-en-Y Gastric Bypass



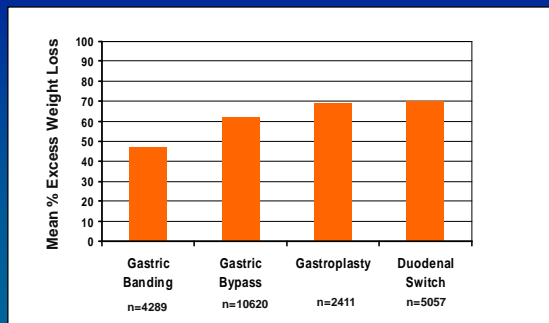
- **Most commonly performed bariatric procedure**
- **Long-term sustained weight loss**
- **No protein-calorie malnutrition**
- **Few vitamin or mineral deficiencies**
- **Technically difficult**

## Laparoscopic vs. Open RYGBP Complications



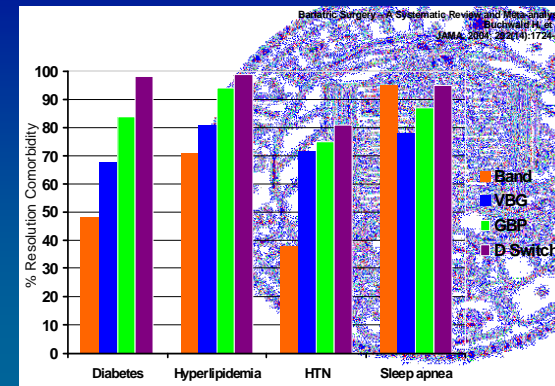
## Bariatric Surgical Outcomes

136 Studies – 22094 Patients



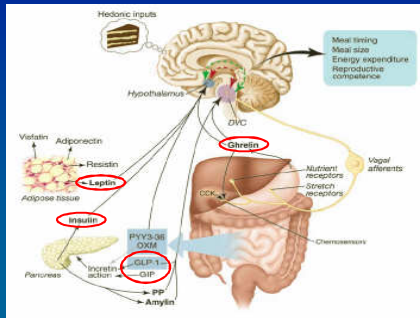
Bariatric Surgery – A Systematic Review and Meta-analysis  
Buchwald H, et al.  
JAMA. 2004; 292(14):1724-37

## Resolution of Comorbidities





## Hormonal Regulation of Body Weight and Glucose Metabolism



### Appetite

- + Insulin (pancreas)
- Ghrelin (stomach)
- Leptin (adipose tissue)
- CCK (duodenum)
- PYY (small bowel)
- Central Peptides
  - NPY, AgRP
  - alpha-MSH, CART

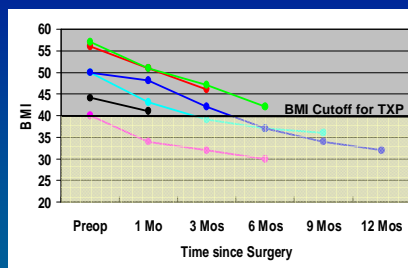
### Glucose Metabolism

- Insulin (pancreas)
- Glucagon (pancreas)
- GLP-1 (distal small bowel)
- GIP (proximal small bowel)

## Weight Loss after GBP

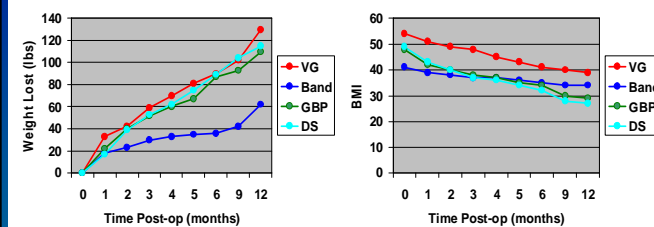
- Reduced caloric intake
- Delayed gastric emptying
- Malabsorption
- Dumping syndrome (?)
- Alterations in gut hormonal milieu
  - ↓ - Ghrelin
  - ↓ - Leptin
  - ↓ - Incretins (GLP-1)
  - ↓ - Other centrally-acting satiety peptides (PYY, PP, OXM)

## Lap GBP in Patients with ESRD



Mean BMI: 50 (40-56)  
 Mean Operative Time: 189min  
 Mean LOS: 3d  
 Mean EBL: 75cc  
 Complications: 0

## Post-operative Weight Loss



## Conclusions

- Obesity greatly increases anesthetic and surgical risks
- Obesity prolongs postoperative recovery
- Non-surgical weight loss methods ineffective in morbidly obese patients
- Bariatric surgery best option; may be combined with other procedures