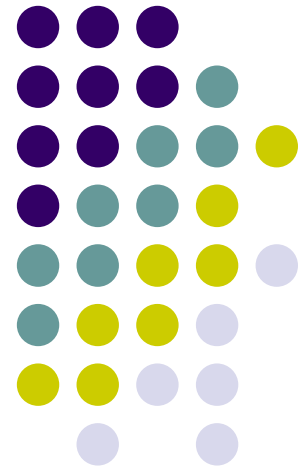
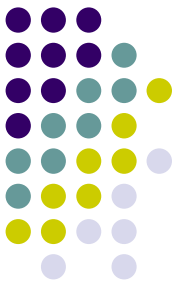


Bariatric Surgery: A Review for the Primary Care Doctor

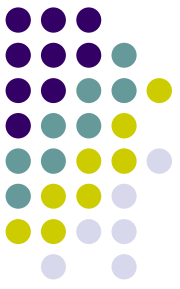
Jeanne M. Martin, MD
Internal Medicine/Pediatrics
Morning Report
04/02/08



Case Presentation

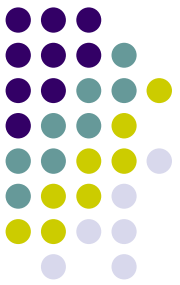


- A.C. is a 42 y/o female with a history of severe obesity, HTN, OSA s/p laparoscopic Roux-en-Y gastric bypass 6 months prior, who presented to her PMD c/o nausea & vomiting x 2days. Patient has had complete intolerance to solid foods, but has managed to keep liquids down. Vomiting is NB/NB and contains food particles. The patient reports a sensation of food getting stuck in her chest, in addition to worsening GERD symptoms. The patient had previously tolerated her transitioning diet well, and denied any dietary indiscretions. On review of systems, the patient denies fever, chills, abdominal pain.
- PE:
 - Vitals: T 98.5 BP 130/80 P 80 RR 16
 - Gen: NAD, A&O x 3, pleasant
 - CV: RRR no m/r/g
 - Ch: CTA bilaterally
 - Abd: Soft, epigastric tenderness to palpation, no rebound/guarding, NABS
 - Ext: no c/c/e, 2+pulses



Overview

- **Background Information**
- Referral & Pre-Operative Evaluation
- Post-Operative Complications
- Mortality Rates and Outcomes
- Post-Operative Follow-up
- Conclusions/Recommendations



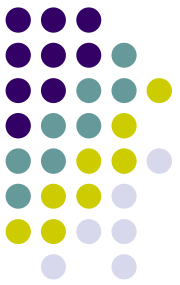
Background Information

- Obesity Epidemic
 - Increasing trends between 1980's-2000:
 - Overweight (BMI $\geq 25\text{kg/m}^2$) 55.9% → **64.5%**¹
 - Obesity (BMI $\geq 30\text{kg/m}^2$) 22.9% → **30.5%**¹
 - Severe Obesity (BMI $\geq 40\text{kg/m}^2$) **QUADRUPLED**²
 - “Super” Obesity ($\geq 50\text{kg/m}^2$) **QUINTUPLED**²
 - Bariatric Surgery Rates:
 - Between 1998-2002: 13,365 → 72,177³

1. Flegal KM, Carroll MD, Ogden CL, Johnson CL. Prevalence and Trends in Obesity Among US adults, 1999-2000. *JAMA* 2002; 288(14):1723-7.

2. Sturm R. Increases in Clinically Severe Obesity in the United States, 1986-2000. *Archives of Internal Medicine* 2003; 163(18): 2146-8.

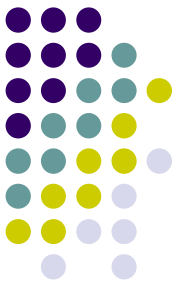
3. Santry HP, Gillen DL, Lauderdale DL. Trends in Bariatric Surgical Procedures. *JAMA* 2005; 294:1909-1917.



Background Information

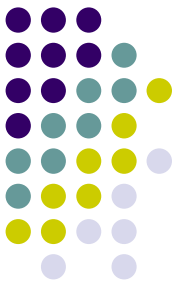
- Cross Sectional Survey of PCP's⁴:
 - 85% treated a patient undergoing bariatric surgery
 - 76% referred a patient to a bariatric surgeon
 - 35% felt unprepared to provide long-term follow-up
 - 45% felt competent to address medical complications

4. Balduf LM. Farrell TM. Attitudes, beliefs, and referral patterns of PCPs to bariatric surgeons. Journal of Surgical Research 2008; 144 (1):49-58.



Background Information

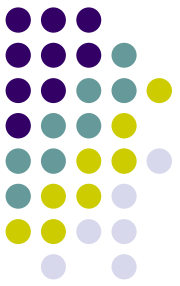
- The Problem of Obesity
 - High risk for developing **multiple medical problems:**
DM II, HTN, CVA, HLD, OA, OSA, NASH, CA
Independent risk factor for **CAD
 - Increase in **psychiatric/psychologic illness**
depression, binge-eating, PTSD, etc.
 - **Patho-physiology:**
 - Multi-factorial, poorly understood
 - Genetic, behavioral, psychological, etc
 - **Multiple Approaches to treatment**
 - Diet, exercise, counseling, behavioral therapy, medical therapy
 - **BARIATRIC SURGERY**



Overview

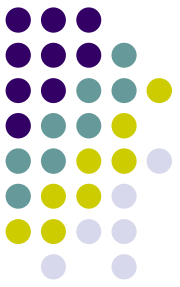
- Background Information
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Referral to a Bariatric Surgeon



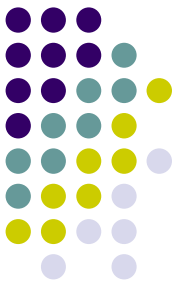
- 1998 NHLBI Guidelines⁵
 - **BMI $\geq 40\text{kg/m}^2$ or BMI $\geq 35\text{ kg/m}^2$ with *serious comorbid conditions***
 - *Failure* of non-operative weight loss efforts
 - Well informed, compliant and highly motivated
 - Absence of contra-indications:
 - Mental/cognitive impairment
 - Active cancer
 - Advanced liver disease with portal HTN
 - Unstable coronary artery disease
 - Severe OSA with pulmonary HTN

5. *Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults: The Evidence Report*. Bethesda, MD: National Heart, Lung, and Blood Unstitute; 1998. NIH publication 98-4083.



Pre-Operative Work-up

- Multi-disciplinary Team:
 - Bariatrician
 - Nutritionist
 - Psychologist/psychiatrist
 - Bariatric surgeon
- Goals:
 - Assessing indications & contra-indications
 - Comprehensive medical, dietary & psychological evals
 - Optimizing medical co-morbidities
 - Education on procedures, risks, and expectations

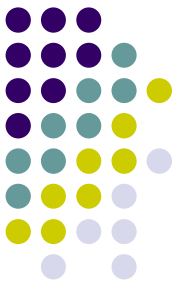


Pre-Operative Evaluation

- **Medical Evaluation**

- Comprehensive **History and Physical**
- **Assessment for comorbidities** associated with obesity (e.g. HTN, DM, CAD, NASH, OSA, etc)
- Routine blood work
- EKG and Chest X-ray
- **Cardiac Risk Assessment** based on American Heart Association guidelines
- Cardiac Echo if pulmonary artery HTN suspected
- Screening for **Obstructive Sleep Apnea**

- **Optimize Medical Co-Morbidities**



Pre-Operative Evaluation

- **Nutritional Evaluation:**

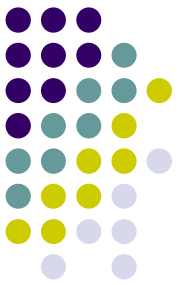
- Assess nutritional status
- Aid in patient education
- Determine compliance with post-op diet changes

- **Psychological Evaluation:**

- Patients with **Axis I or Axis II disorders (DSM IV)** lose **less** weight⁶
- ***Sub-optimal outcomes*** associated with⁷:
 - Disturbed eating habits (e.g. binge eating)
 - Substance abuse
 - Low socioeconomic status
 - Limited social support

6. Kalarchian MA, Marcus MD, Levine MD, et al. Psychiatric disorders among bariatric surgery candidates: relationship to obesity and functional health status. Am J Psychiatry 2007;164:328-34.

7. van Hout GCM, Verschure SKM, van Heck GL. Psychosocial predictors of success following bariatric surgery. Obes Surg 2005;15:552-60.



Bariatric Procedures

- **2 Categories:**

- Restrictive
- Malabsorptive

- **Combination procedures:**

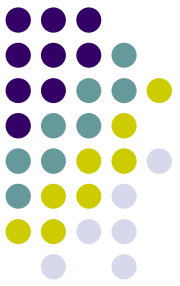
- **Roux-en-Y Gastric Bypass (RYGB)**

Restrictive >> Malabsorptive

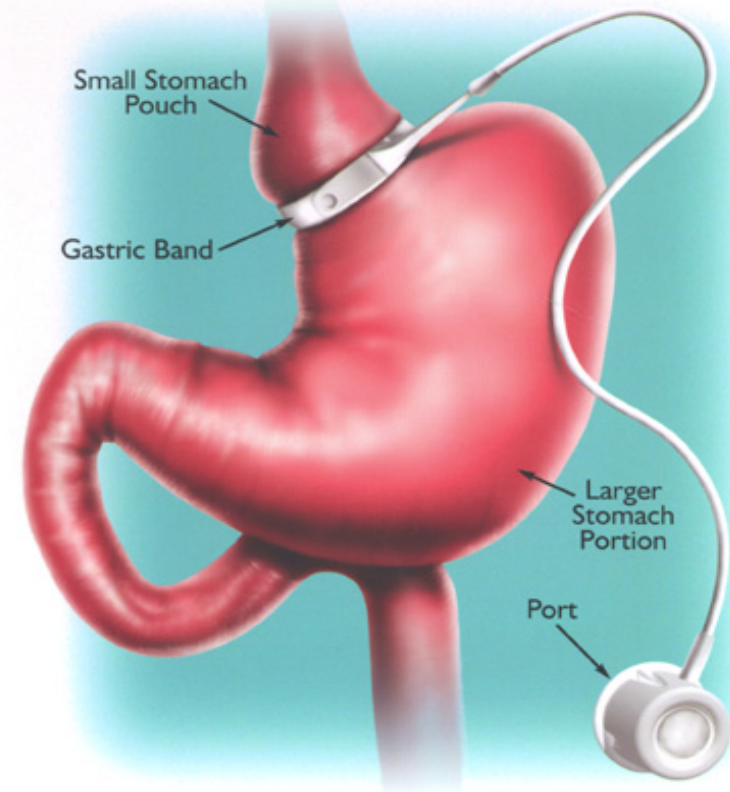
- **Biliopancreatic Diversion with Duodenal Switch (BPD/DS)**

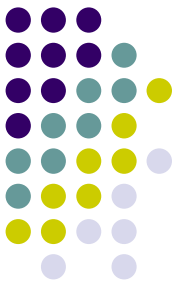
Malabsorptive >> Restrictive

Bariatric Procedures



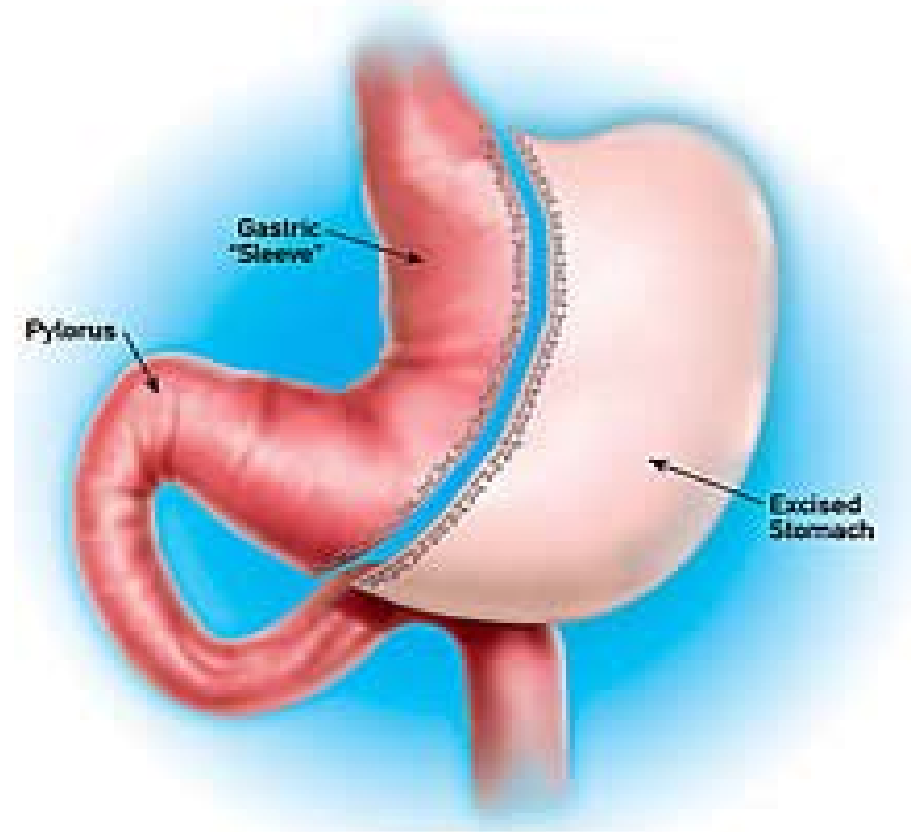
- **Restrictive:**
 - *Laparoscopic Adjustable Gastric Band (LAGB)*





Bariatric Procedures

- **Restrictive:**
 - *Sleeve Gastrectomy*

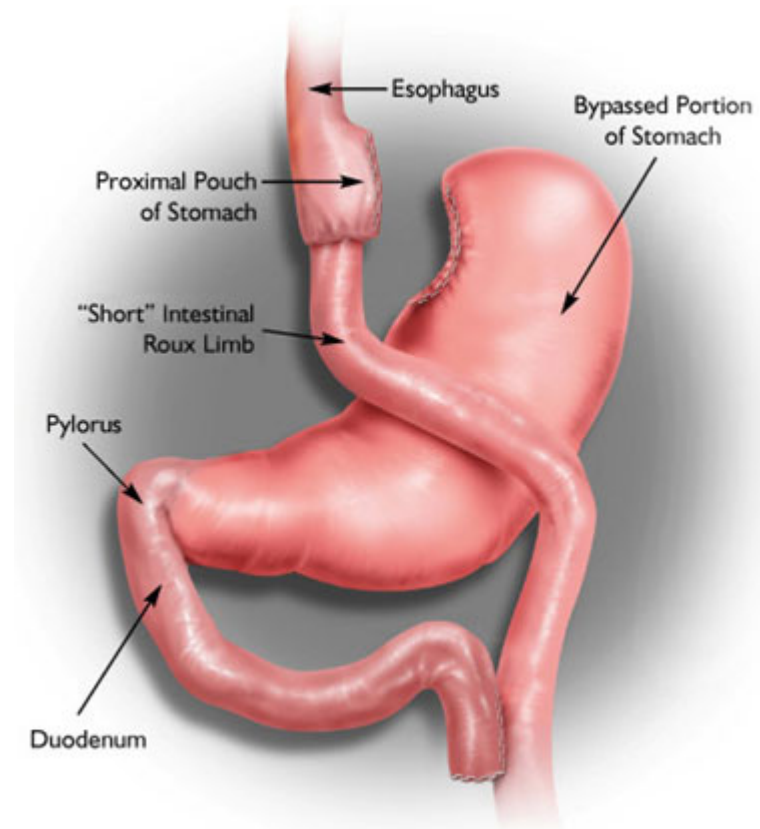


Bariatric Surgery

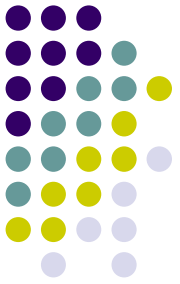


● Combination Procedure

- ***RYGB*** (*restrictive >> malabsorptive*)
 - Gastric pouch 15-50ml
 - Roux limb
 - Bilio-pancreatic limb
 - Common Channel



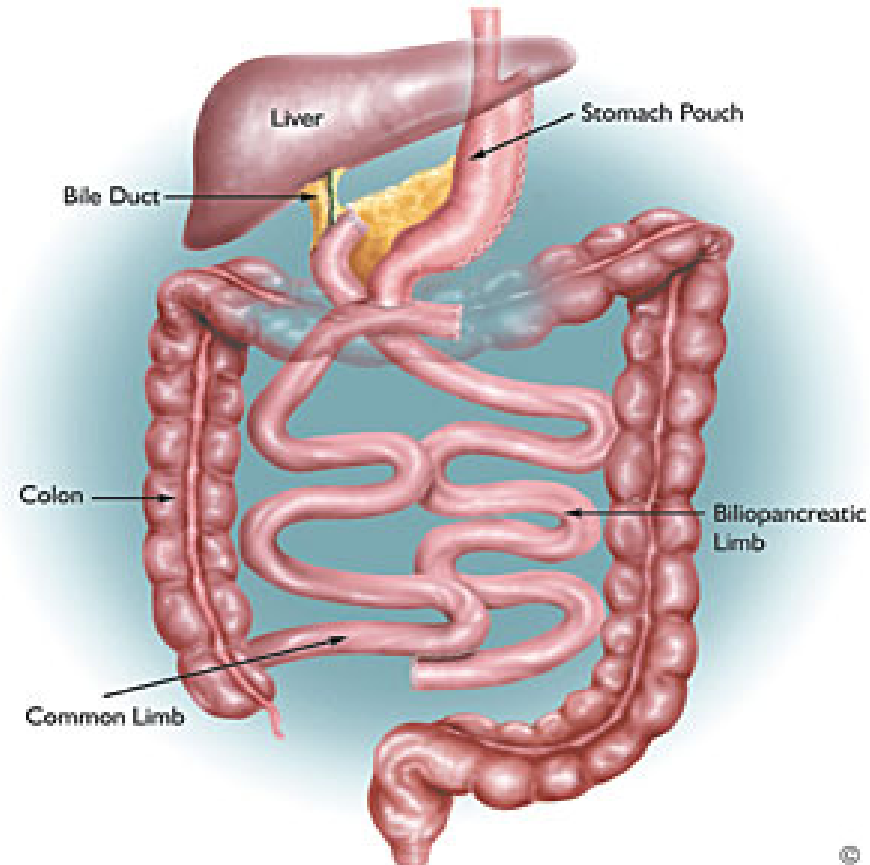
Bariatric Surgery

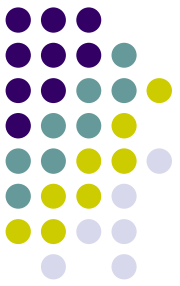


● Combination Procedure:

● ***BPD/DS (malabsorptive >> restrictive)***

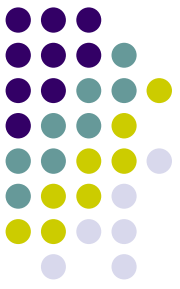
- Gastric Sleeve (200-500ml)
- Alimentary Limb
- Bilio-Pancreatic Limb
- Common Channel (100cm)





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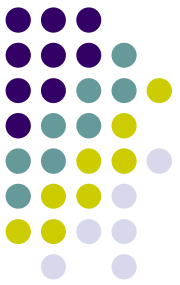


Surgical Complications

- ***Complication Rates of Laparoscopic vs. Open Procedures⁸:***

	Laparoscopic	Open
Surgical Complications	26.1%	31.1%
Respiratory Complications	1.9%	3%
Wound Infections	0.0%	13.1%
Incisional Hernias	0.0%	8.2%
Internal Hernia	1.3%	0.0%

8. Maggard MA, Shugarman LR, Suttorp M, et al. Meta-analysis: surgical treatment of obesity. Ann Intern Med 2005;142:547-559.

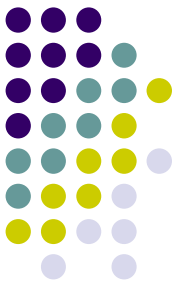


Surgical Complications

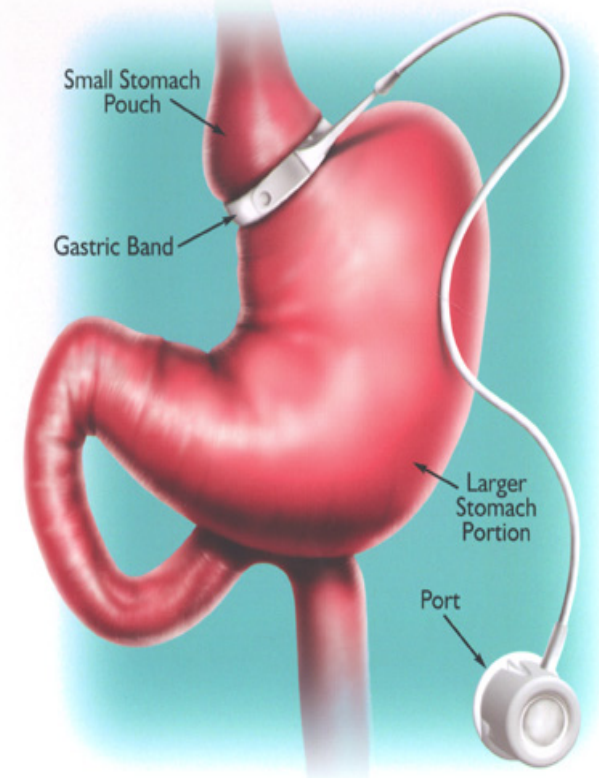
- **Venous Thrombo-Embolism: 0.2-3.5%**
 - Routine DVT prophylaxis
 - Vena Caval filter placement in high risk patients:
(e.g. venous stasis disease, BMI \geq 60, prior VTE, known hypercoaguable state)

- **Cholilithiasis: 30%**
 - Several approaches to gallbladder disease
 - Routine screening with ultrasound for gallstones
 - Routine cholecystectomy
 - Treatment with ursadiol 600mg Qday x 6 mos

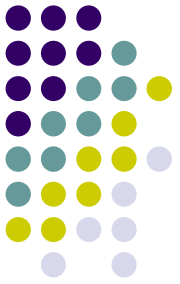
Surgical Complications



- **LAGB**: 13-15% will require *re-operation*
 - Acute Stomal Obstruction: 2%
 - Gastric band erosion: 3%
 - Band slippage or prolapse:
24% → 2-14%
 - Tubing/Port malfunction: 0.4-7%
 - Pouch/Esophageal dilatation: 10%
 - GERD or Esophagitis



Surgical Complications



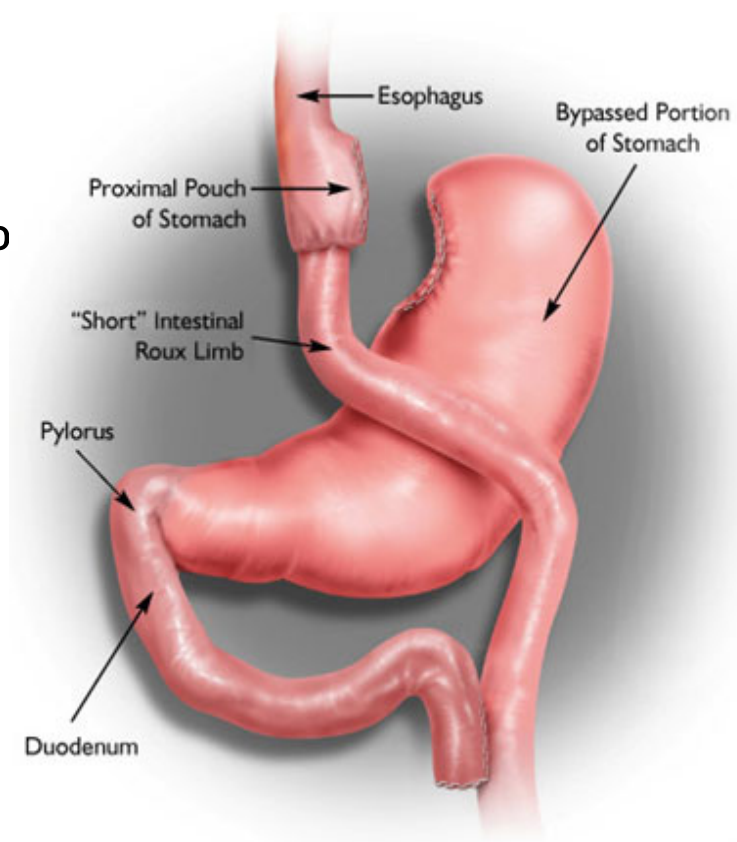
- **RYGB & BPD/DS**

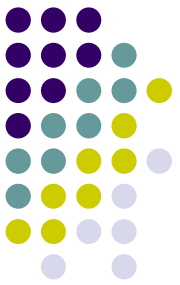
- Anastomotic leak: 1.2-3%
- Post-operative bleeding: 0.6-4%

Intra vs. Extra luminal

- **RYGB**

- Stomal Stenosis: 6-20%
- Gastric Distension: rare





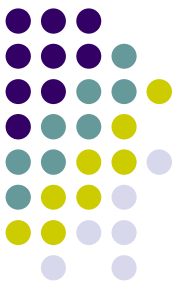
Nutritional Deficiencies

- **LAGB**

- *Low risk*
- Can occur with food intolerance, excessive vomiting
- Most common deficiency: *folate*

- **RYGB**

- High risk of *iron, folate, Vitamin B12, Calcium, Vitamin D* deficiency
- Increased risk secondary to:
 - Poor absorption (bypassed duodenum and prox jejunum)
 - Food intolerance
 - Achlorhydria
 - Decreased secretion of intrinsic factor

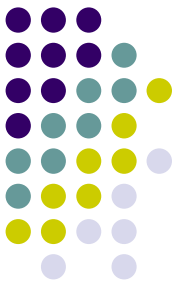


Nutritional Deficiencies

- **RYGB:**⁹

	% affected	Replacement	Comments
Iron	52%	320mg po BID	High doses may not prevent anemia in menstruating women
Vit B12	64%	1000-2000mcg po Qday	Small % will require IM B12
Folate	38%	800mcg po Qday	Increased neural tube defects in infants of mothers s/p RYGB
25-OH Vitamin D	50%	400 international units po Qday	Leads to metabolic bone disease
Calcium	10%	1200-1500mg po Qday	Replace with Ca ⁺⁺ citrate b/c Ca ⁺⁺ carbonate require acidification for absorption

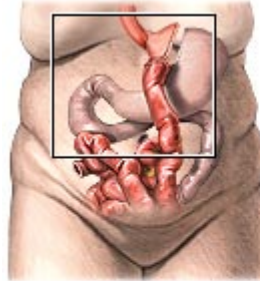
9. Shah M, Simha V, Garg A. Review: Long Term Impact of Bariatric Surgery on body weight, comorbidities, and nutritional status. J of Clin Endocrinology and Metab 2006;91(11):4223-4231.



Nutritional Deficiencies

- RYGB and Dumping Syndrome
 - Occurs in up to 76% of patients

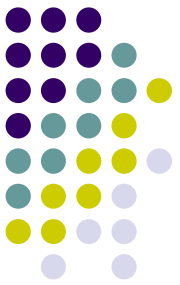
Post gastric bypass surgery



Other symptoms include:

- fast heart rate
- sweating
- nausea
- diarrhea or vomiting

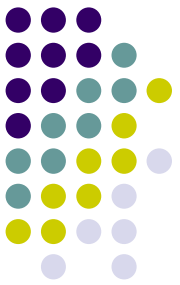




Nutritional Deficiencies

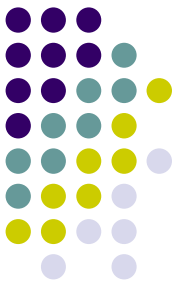
- **BPD/DS**

- **Protein Calorie Malnutrition: 11.9%**
 - *Hospitalization* for parenteral nutrition
 - *Reoperation* required for **4%**
- **Fat Soluble Vitamin Deficiency: **A, D, K****
- **Iron Deficiency Anemia**
- **Case reports of *Thiamine deficiency* → Wernicke's encephalopathy**



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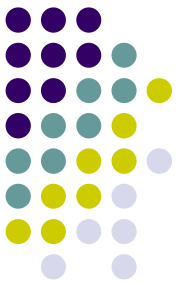
Mortality

- **Overall Mortality** of bariatric Surgery **<1%** (8,10)
- **30 day Mortality Rates:**
 - *LAGB: 0.02-0.1%*
 - *RYGB: 0.3-0.5%*
 - *PBD/DS: 0.9-1.1%*
- **Increased mortality** associated with:
 - Male gender
 - Age
 - Decreased surgical experience & hospital Volume
- **“Centers of Excellence”** accredited by the *ASBS*

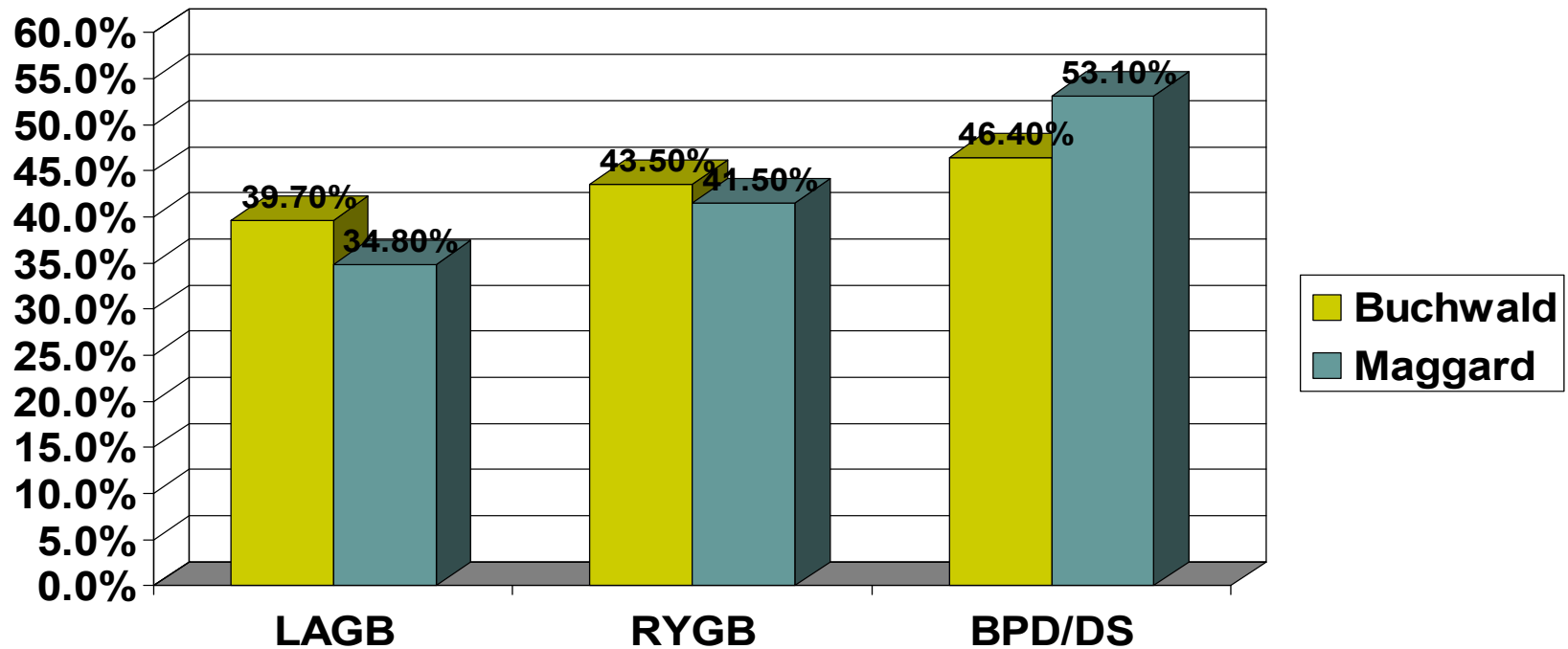
8. Maggard MA, Shugarman LR, Suttorp M, et al. Meta-analysis: surgical treatment of obesity. *Ann Intern Med* 2005;142:547-559.

10. Buchwald H, Avidor Y, Braunwald E, et al. Bariatric surgery: a systematic review and meta-analysis. *Jama* 2004;292:1724-37.

Outcomes



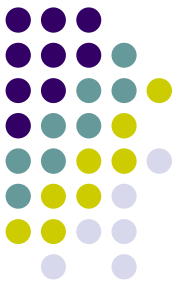
- **Average % of weight loss at 2 years^{8,10} :**



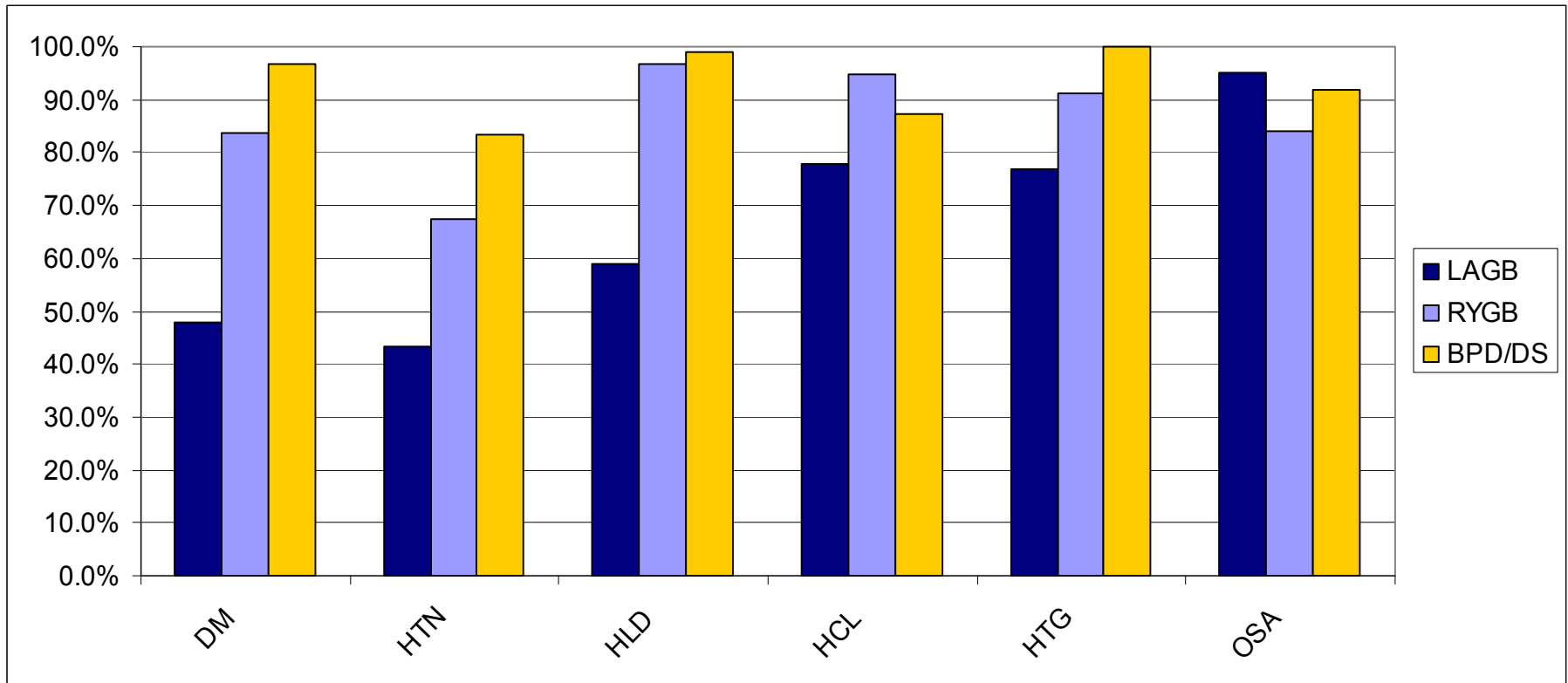
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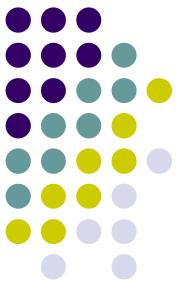
Outcomes



● Reduction in Co-Morbidities at 2 years¹⁰ :



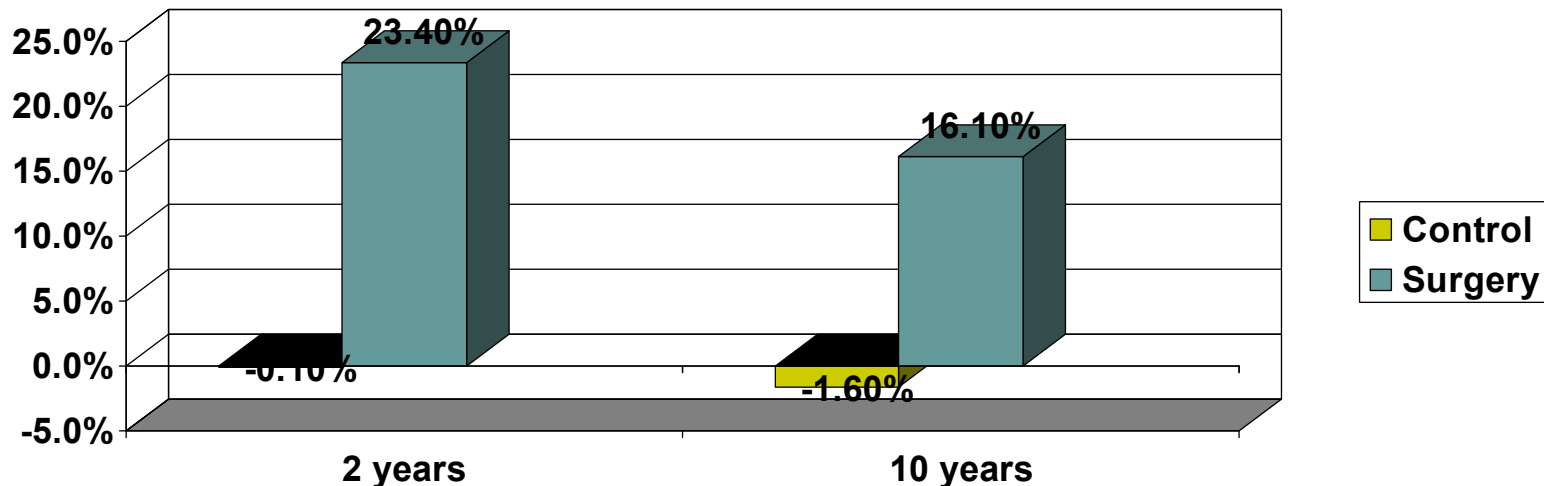
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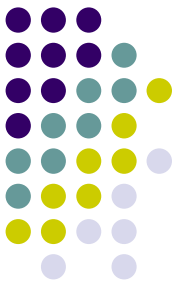
Outcomes

- **The SOS Trial**¹¹
 - *Non-Randomized, Matched Control Trial*
 - Outcomes of Bariatric Surgery at **2 & 10 years**

% Decrease in BMI (Control vs. Surgical Group)

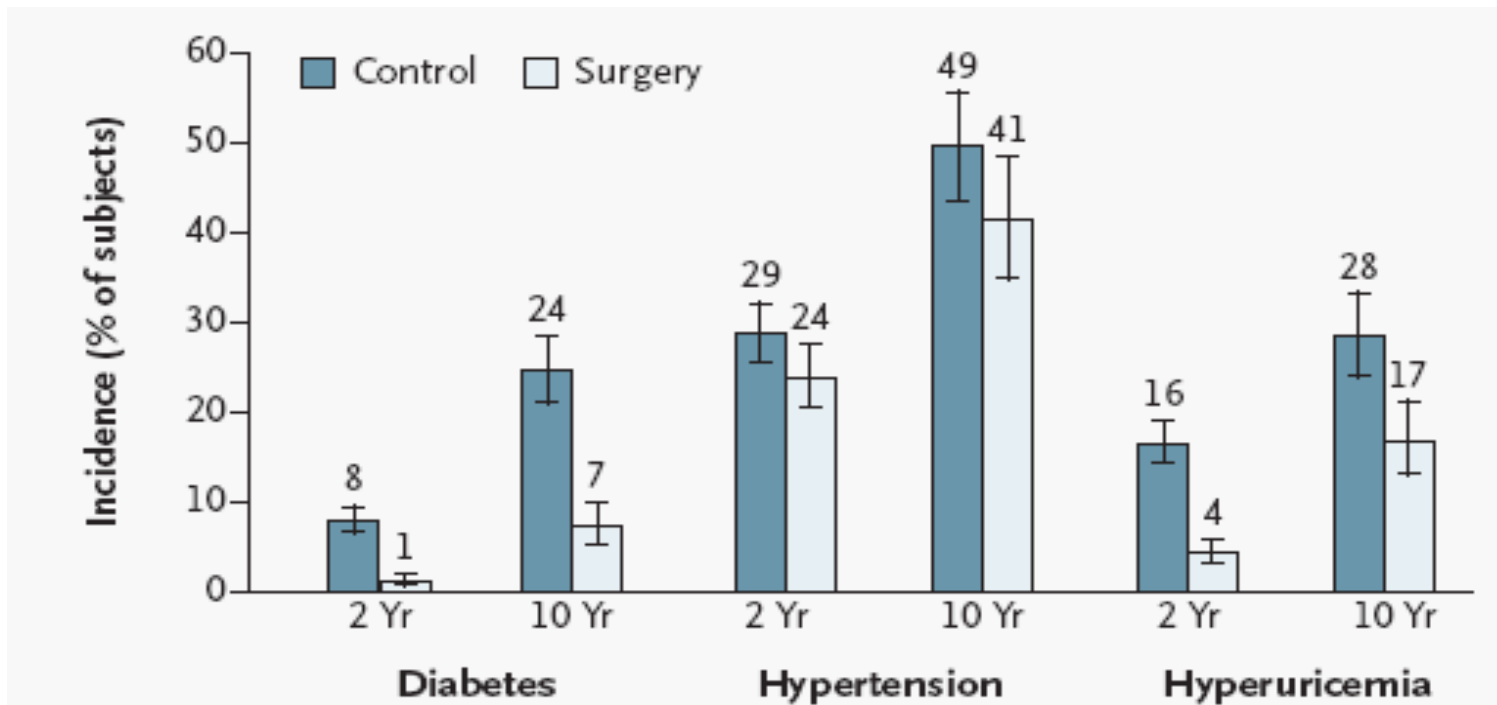


11. Sjostrom L, Lindroos AK, Peltonen M, et al. Lifestyle, Diabetes, and Cardiovascular Risk Factors 10 years after bariatric surgery. NEJM 2004; 351(26):2683-2693.

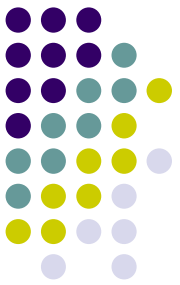


Outcomes

- **The SOS Trial**¹¹
 - *Reduction in Co-Morbidities at 2 & 10 years*

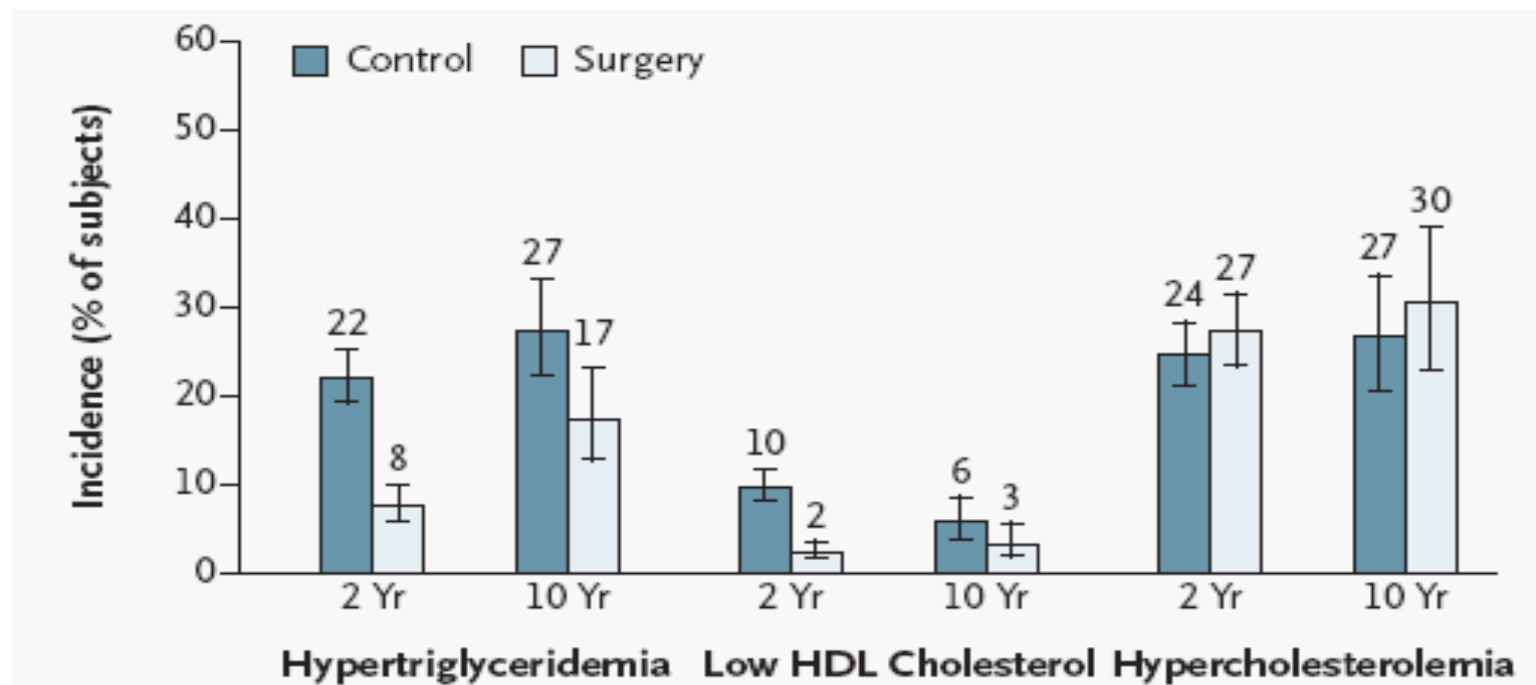


11. Sjostrom L, Lindroos AK, Peltonen M, et al. Lifestyle, Diabetes, and Cardiovascular Risk Factors 10 years after bariatric surgery. NEJM 2004; 351(26):2683-2693.



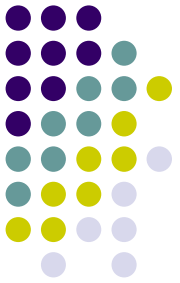
Outcomes

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Outcomes



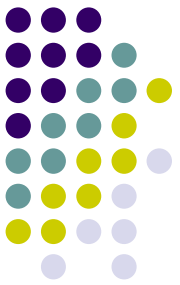
● Mortality Benefit?

- **SOS:**¹¹
 - Prospective, non-randomized, control trial (10 yrs)
 - 80% decrease in annual mortality for diabetics (9% mortality at 9 yrs vs. 28% in control group)
- **Christou and Colleagues:**¹²
 - Observational cohort study (5 yrs)
 - Relative risk reduction of 89% at 5 years
- **Flum and Dillenger:**¹³
 - Retrospective study (15 yrs)
 - Relative Risk reduction of 33% at 1 year post-op
 - Modest improvement in mortality at 15 years (16.3% vs. 11.8%)

11. Sjostrom L, Lindroos AK, Peltonen M, et al. Lifestyle, Diabetes, and Cardiovascular Risk Factors 10 years after bariatric surgery. *NEJM* 2004; 351(26):2683-2693.

12. Christou NV, Sampalis JS, Liberman M, et al: Surgery decreases long-term mortality, morbidity, and health care use in morbidly obese patients. *Ann Surg* 2004; 240:416-423.

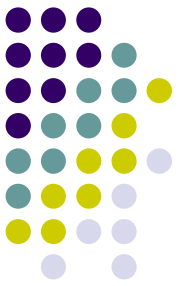
13. Flum DR, Dellinger EP. Impact of gastric bypass operation on survival: A population based analysis. *J Am Coll Surg* 2004; 199:543-551.



Overview

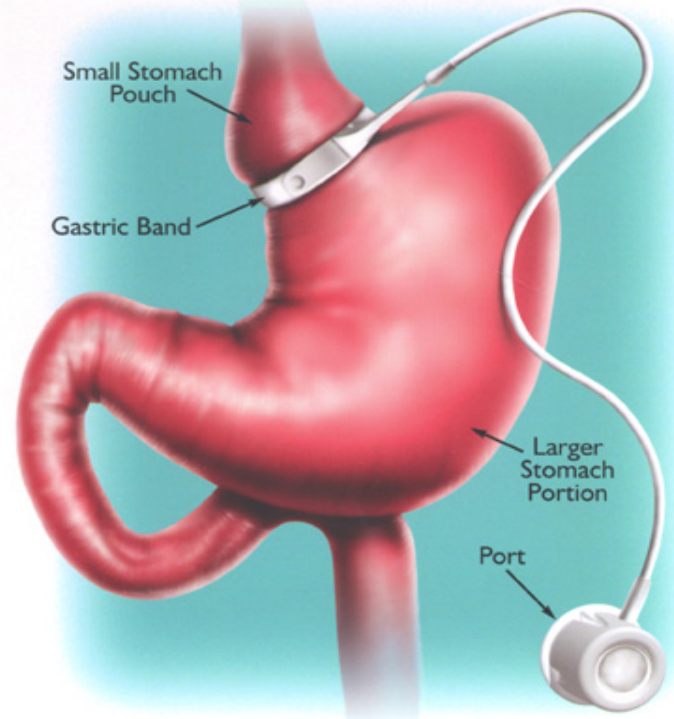
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Post-Operative Follow-up

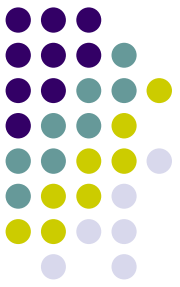


● LAGB

- Placed deflated
- Tightened Q4-6 wks
- Goal weight loss 1-2kg/wk
- If band tightened too aggressively:
 - Frequent vomiting
 - Maladaptive eating patterns

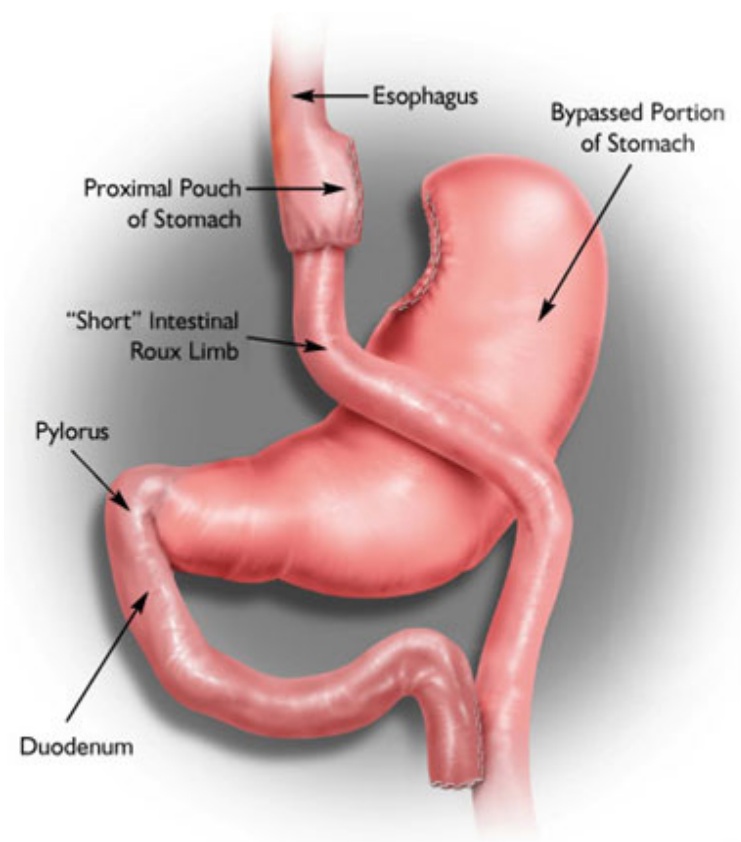


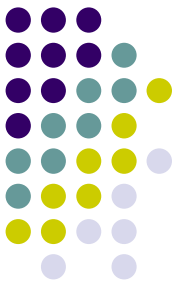
Post-Operative Follow-up



● **RYGB & BPD/DS**

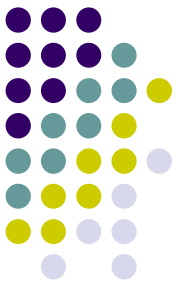
- Follow-up Q4-6 wks for weight & BP monitoring
- Adherence to dietary changes & nutritional supplementation
- Close monitoring of blood glucose in diabetics
- Titration of anti-HTN meds





Post-Operative Follow-Up

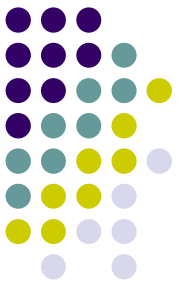
- **Nutritionist**
 - Education for post-operative dietary changes
 - Avoidance of unhealthy eating habits
 - Support and encouragement
- **Psychiatrist/Psychologist**
 - Patients with a history of eating disorders (e.g. binge eating) have difficulty adjusting
 - Continue pre-operative anti-depressants
 - Improved self-esteem & mood, however changes deteriorate over time



Overview

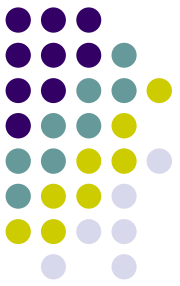
- Background Information
- Referral & Pre-Operative Evaluation
- Post-Operative Complications
- Mortality Rates and Outcomes
- Post-Operative Follow-up
- **Conclusions/Recommendations**

Case Presentation

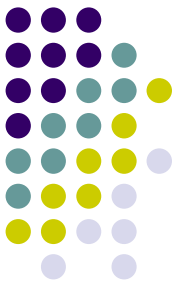


- **Summary:** A.C. 42 y/o s/p laparoscopic RYGB presenting with nausea/vomiting, dysphagia, GERD, decreased po intake and inability to tolerate solid foods x 1-2 days, with a benign exam.
- **DDX:**
 - Food Intolerance or Dietary Non-Compliance
 - Small Bowel Obstruction
 - Internal Hernia
 - Stomal Stenosis
- Patient sent for UGI
 - The diagnosis of Stomal Stenosis is confirmed
- Patient referred to GI for Endoscopic Dilatation

Conclusions/Recommendations



- **Bariatric surgery** is the *best treatment* for long-term weight loss and comorbidity reduction
- PCP's should *screen all individuals* for overweight/obesity, and *refer to bariatric surgery* when indicated
- Patients undergoing bariatric surgery should do so after a **complete evaluation**: medical, surgical, nutritional, psychological
- Patients should be *well informed* regarding risks of procedures, complications, and expectations
- *Post-operative monitoring for complications*, nutritional deficiencies and improvement in comorbidities
- *Continued follow-up* with **nutritionist** and **psychiatrist** post-op
- More studies needed to better understand *long-term implications* in bariatric surgery



Thanks!
Questions?