Bariatric Nursing Review Course
Session II

Choice of Procedures and Preoperative Care
Purpose/Objectives

• The purpose of this program is to educate nurses about the bariatric choice of procedures and preoperative care. After completion of this educational session, the nurse will be able to
  • Review normal anatomy of the digestive system
  • Describe the types of procedures used to treat morbid obesity
  • Identify the anatomical and physiological changes associated with specific bariatric procedures
  • Discuss the risks and benefits of specific bariatric procedures
  • Discuss some preoperative considerations for patients considering bariatric surgery
Food vs. Hunger

• Food intake is regulated by two sensations, hunger and appetite. What is the difference between hunger and appetite?

• Appetite is the (psychological) desire for food.

• Hunger is the physiologic craving for food, which can be mild to a stronger sensation of discomfort.
What are the five basic processes in which food is broken down for cellular consumption?

Ingestion - eating

Peristalsis - moving of food along the digestive tract

Digestion - mechanical and chemical break down of food

Absorption - movement of digested food from the digestive tract to the cardiovascular and lymphatic systems for delivery to the cells

Defecation - elimination of waste products from the digestion system
What is the difference in mechanical and chemical digestion?

Mechanical digestion is the movements that involve breaking food into smaller particles to aid chemical digestion- starts in the mouth with chewing and continues with the smooth muscles in the stomach and small intestine.

Chemical digestion is the catabolic process in which carbohydrate, lipid and protein molecules are made usable for the cells.
Digestive Tract

• List the organs of the digestive tract.
  • Mouth
  • Pharynx
  • Esophagus
  • Stomach
  • Small intestine
  • Large intestine

• List the accessory structures of the digestive tract.
  • Teeth
  • Tongue
  • Salivary glands
  • Liver
  • Gallbladder
  • Pancreas
Who Does What?

• Review primary role of the following organs in the digestive process.

• Salivary glands- secrete saliva which lubricate, dissolve, and begin chemical breakdown of food.

• Liver- makes and secretes bile salts, changes excess monosaccharides into glycogen or fat, stores glycogen, copper, iron and vitamins A, D, E & K, removes harmful compounds or byproducts.

• Gallbladder- stores and concentrates bile.

• Pancreas- secretes pancreatic juice (water, salts, sodium bicarbonate and enzymes) which aids in the chemical digestion of food. Also secretes hormones glucagon, insulin and somatostatin which help regulate appetite.
Digestive Enzymes

• Digestive enzymes are produced and secreted throughout the digestive process by the salivary glands, stomach (zymogenic cells), pancreas, and small intestine. What is the function of the enzymes?

• Digestive enzymes break down starches, proteins and fats into glucose, amino acids, and fatty acids which can be used on a cellular level.
Indications for Bariatric Surgery

- BMI > 40 or BMI > 35 with serious comorbid conditions
- Acceptable operative candidate
- Motivated to adhere to the postoperative lifestyle changes
- Well informed regarding risks of surgery
- Able to participate in long-term follow-up
- No substance abuse issues
- No significant (or under control) psychiatric conditions
How to Choose???

• Procedures may be classified by the effect on absorption of nutrients, limitation of intake, or a combination of both.
• The choice of the procedure depends on the surgeon and the patient.
• Factors that may affect the choice include body mass index, BMI, age, gender, race, body habitus and other comorbid conditions.
3 Main Classification of Procedures Used to Treat Morbid Obesity

• Malabsorptive procedures- jejunoileal bypass

• Restrictive procedures- jaw wiring, intragastric devices, gastroplasty & gastric banding

• Combined procedures- gastric bypass & biliopancreatic diversion and duodenal switch

• *Laparoscopic versions of weight-loss procedures are on the rise including Roux-en-Y gastric bypass, RYGB, vertical banded gastroplasty, VBG, & laparoscopic adjustable-gastric band, LAGB.
Restrictive Procedures

- **Vertical Banded Gastroplasty VBG**
  - A small pouch of 50 cc is made in the upper part of the stomach with a narrowing to restrict the flow of food into the distal stomach. The pouch is usually stapled, cut and divided from the remainder of the stomach fundus.

- **Laparoscopic Adjustable Gastric Banding LAGB**
  - A silicone band device with an inflatable balloon is placed around the upper part of the stomach. A port which is connected to the inflatable balloon is placed in the subcutaneous tissue which allows for adjustment after healing.
Vertical Banded Gastroplasty

Adjustable Gastric Banding
Combined Procedures

• Roux-en-Y Gastric Bypass RYGB

• Starts with a 15-30 cc pouch on the upper stomach. Then a separate limb extends (approximately 50 cm) from the ligament of Treitz for biliary and pancreatic enzymes to mix with chyme (partially digested food & enzymes) at the distal anastomosis. The GI tract is rearranged to bring 75-150 cm of the jejunum up to the gastric pouch to carry food from the gastric pouch to the distal anastomosis.
Combined Procedures

• Biliopancreatic Diversion with Duodenal Switch
  BPD or BPD/DS

• Starts with a gastric pouch 150-200 cc. The small intestine is bypassed to create a 50 cc common channel with an alimentary limb of approximately 250 cm. The biliopancreatic limb carries bile and pancreatic enzymes to the common channel.
Roux-en-Y gastric bypass

Biliopancreatic diversion with duodenal switch
Jejunoileal Bypass

• Malabsorptive procedure in which the a variable length of the small intestine is bypassed (decreases the absorption of calories and nutrients).

• This procedure causes nutritional and electrolyte disturbances which causes almost all cases to require reversal of the procedure.
Jejunoileal Bypass
Emerging Technologies

• Gastric Stimulation

• Experimental modality for weight loss

• Use of a device with a generator and bipolar lead. The lead is attached to the anterior wall of the stomach with the generator implanted under the skin of the abdominal wall.

• Electrical stimulus to the stomach induces gastroparesis and early satiety.
Short Term Risks of Bariatric Procedures?

- Bleeding
- Deep venous thrombosis & pulmonary embolism
- Wound-related risks
- Leaks
- Gastroesophageal reflux disease
- Pulmonary
- Cardiac
- Diabetes mellitus
- Dehydration and fluid imbalances
Long Term Risks for Bariatric Procedures

- Internal hernias, bowel obstruction
- Anastomotic problems
- Nutritional deficiencies (with malabsorptive procedures)
Vertical banded gastroplasty is a restrictive procedure that involves a band and cutting or stapling of the stomach. What specific risks should patients be educated about prior to the procedure?

Bleeding

Infection

Leak or perforation of suture line

Anastomotic stenosis

Internal hernia or small bowel obstruction

Ulceration or stenosis at the stoma

Dilation of the stoma (may lead to weight regain)

Reaction to surgical mesh
Laparoscopic adjustable gastric banding is also a restrictive procedure. What is one of benefits of this procedure over the VBG?

The adjustable band has no anastomoses reducing the risk of leaks.

Procedure is completely reversible.
Risks That Are Associated When An Adjustable Gastric Band is Used

- Bleeding
- Infection
- Leak or perforation
- “Slipped” band (distal portion of the stomach herniates through the band)
- Device failure- band or tube leak
- Device infection
- Erosion of the device
The RYGB procedure accounts for approximately 60 percent of bariatric procedures. What are the risk associated with this procedure?

- Bleeding
- Infection
- Incisional hernia (reduced if done laparoscopically)
- Leaks
- Anastomotic stenosis or ulceration
- Nutrient and calorie malnutrition
- Internal hernia or small bowel obstruction
The biliopancreatic diversion incorporates both restrictive and malabsorptive techniques. List some common patients outcomes with this procedure compared to the RYGB?

Patients can eat more both volume and variety.

Has a greater malabsorption component to maintain weight loss.

Patients report more frequent and foul-smelling stool and flatus.

More risk of hypocalcemia and hypovitaminosis D and potential for osteoporosis.
What is the most concerning immediate complication of bariatric surgery?

• **Gastrointestinal leak**
  
  – Symptoms include fever, tachycardia, low urine output, leukocytosis and shoulder pain.

  – Patients with postoperative leaks have surprisingly few signs in spite of significant sepsis.

  – Consequences of a leak can be devastating so high index of suspicion is necessary.
Checking for Gastrointestinal Leaks

- **Intraoperatively**
  - Insufflation with air
  - Instillation of methylene blue dye
  - Endoscopy

- **Postoperatively**
  - Water-soluble contrast upper-gastrointestinal study (UGI)
Thrombosis Prophylaxis Strategies

- Sequential compression devices

- Post operative activity- mobility as soon as possible

- Low-dose unfractionated heparin or low molecular-weight heparin

- Vena cava filters in high risk patients
Two most common wound related complications after bariatric surgery

• **Infection**
  - Reduced incidence when procedure is performed laparoscopically and when perioperative antibiotics are administered.

• **Hernia**
  - Reduced when laparoscopic procedures can be performed.
Pulmonary Complications After Surgery

Atelectasis and pneumonia prevention strategies in the postop bariatric patient.

- Deep breathing
- Incentive spirometry
- Early ambulation
- Monitor narcotic/sedation levels
- Continue continuous positive-airway-pressure (CPAP) devices as directed by surgeon
Bariatric patients have restrictive and/or malabsorptive procedures which may limit fluid intake. Dehydration is an ongoing concern or complication after the procedure. What are some signs or symptoms of dehydration?

Lightheadedness

Nausea

Malaise

Loss of consciousness

Diaphoresis

Low blood pressure

Rapid heart rate
Benefits of Bariatric Procedures

- Weight loss
- Resolution of comorbid conditions
- Sleep apnea
- Hypertension
- Diabetes mellitus
- Other comorbidities - GERD, dyslipidemia, venous stasis, arthritis, infertility, depression
• Selection of a bariatric procedure depends on the balance of risks and benefits.

• Some of the risks for bariatric surgery are the same as the indication to have the surgery.

• The preoperative evaluation is critical to determine the risk/benefit ratio.
What are the components of the metabolic assessment in obese patients

- Obesity
- Body-fat distribution
- Fasting lipid profile
- Insulin resistance
- Hypertension
Critical Value When Assessing Obesity

• BMI > 40 or > 35 with other comorbid conditions

• * Important to also note sequence of body-weight changes and weight cycling.
The pattern of body-fat distribution may be associated with cardiovascular and metabolic risks of obesity. How is body-fat distribution measured?

Waist circumference is the most common.

Critical values:

- males waist > 40 inches
- females waist > 35 inches

Waist/hip ratio is also used to describe body-fat distribution.
Fasting lipid profile is part of the metabolic assessment. What are the critical values for the high-density lipids (HDLs) and triglycerides?

HDLs

Males < 40

Females < 50

Triglycerides > 150
Insulin resistance often occurs with obesity. One means to measure insulin resistance is the homeostatic model assessment-insulin resistance (HOMA-IR). How is this calculated?

Fasting blood glucose (mg/dl)

Fasting insulin (uU/ml)

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\text{HOMA-IR} = \frac{\text{fasting insulin (uU/ml)} \times \text{fasting glucose (mg/dl)}}{22.5}
\]

*Critical value is a HOMA-IR ≥ 5 which corresponds with significant insulin resistance.*
Hypertension is a common comorbid condition with obesity. What would be considered a critical value?

Systolic > 130

Diastolic > 85
Some bariatric programs suggest a preoperative weight loss. List some reasons for this suggestion.

Modest weight loss (5% to 10% of initial weight) may produce significant improvements to glycemic and blood pressure control.

Demonstrates commitment to weight loss program.

May also improve other comorbid condition such as degenerative joint disease and nonalcoholic fatty-liver disease.
What additional testing may be warranted prior to bariatric surgery in patients with cardiovascular conditions (coronary artery disease and congestive heart failure)?

Physical examination

Echocardiogram

Chest x-ray

Cardiac echogram

Stress testing

Cardiology consultation
Coronary arteriography prior to noncardiac surgery is not always necessary unless clinically indicated. List some clinical indications for coronary arteriography testing prior to bariatric surgery.

Unstable angina

Recent myocardial infarction

Strongly positive noninvasive stress testing
Perioperative cardiac death or myocardial infarctions is a risk for any noncardiac surgery. Beta-blockers have been shown to reduce this risk. Which bariatric patients would most likely benefit from empiric preop treatment with beta-blockers?

Individuals with coronary artery disease and 2 or more risk factors

- BMI > 50
- Low forced expiratory volume
- Previous abdominal surgery
- Abnormal echocardiogram
- History of prior myocardial infarction
During the preoperative evaluation patients with gastrointestinal conditions may require additional testing. What are some common gastrointestinal conditions and testing necessary in this population?

Fatty liver- physical examination, liver function studies and abdominal ultrasound

Gallstones- physical examination, liver function studies and abdominal ultrasound

GERD- physical examination, H. pylori testing and endoscopy
Obesity increases a patient’s risk for nonalcoholic fatty-liver disease (as much as 30% to 100% of adults with obesity). Which liver conditions fall into the category of nonalcoholic liver disease?

- Steatosis
- Nonalcoholic steatohepatitis
- Fibrosis
- Cirrhosis
Nonalcoholic fatty-liver disease is associated with other factors. What are those factors?

Diabetes mellitus Type 2

Insulin resistance or hyperinsulinemia

Older age

Male gender

Elevated BMI
Pulmonary complications of obesity include obesity hypoventilation, sleep apnea, asthma and chronic obstructive pulmonary disease. List some appropriate preoperative tests for these conditions.

Physical examination

Chest x-ray

Pulmonary function testing

Sleep study
Additional risk factors for pulmonary emboli or deep venous thrombosis in bariatric patients.

- Obesity
- Prior history of venous thromboembolism
- Abdominal-fat distribution
- Smoking
- Advanced age
- Venous insufficiency
- Venous stasis due to immobilization
- Obesity hypoventilation syndrome or severe sleep apnea
- Congestive heart failure
- Use of oral contraceptives or hormone replacement (estrogen)
- Inborn or acquired hypercoagulable states
Contraindications for Bariatric Surgery

• Advanced or unstable cardiac disease

• Irreversible pulmonary conditions (unlikely to resolve with weight loss)

• Conditions that seriously complicate anesthesia, hemostasis or wound healing.

• Inflammatory bowel disease or intestinal motility disorders may require further evaluation prior to surgery selection.

• *Medical conditions that exclude patients from bariatric surgery are considered on a case by case basis.
Declining Obesity Surgery as a Treatment

• Patient lacks the understanding of the procedure.

• Patient is unable to comprehend the need for behavioral adaptation after surgery.

• Patient does not demonstrate commitment to follow postoperative instructions.

• *Behavioral contraindications for bariatric surgery should be identified through formal psychological and behavioral assessments.
Patients with extreme obesity carry with them the psychological consequences of years of obesity. Most common associated comorbid psychological condition is depression. List some other potential psychological concerns.

- Diminished quality of life
- Marked effects on self-esteem
- Binge eating behaviors
- Borderline personality disorder
- Impaired psychological or psychosocial functioning
Concerns From the Anesthesiology Point of View

• Cardiac concerns- hypertension, cardiac hypertrophy, congestive heart failure, coronary artery disease and risk of sudden death

• Respiratory function- changes in respiratory mechanics due to obesity

• Obstructive sleep apnea- obstructive sleep apnea, central and mixed apnea

• Gastrointestinal issues- GERD, hiatal hernia, prolonged gastric emptying

• Metabolic concerns- changes in total body metabolic rate, oxygen consumption and carbon-dioxide production
Which cardiac tests are of primary concern from an anesthesiology standpoint?

Ventricular function is critical due to higher cardiac output and larger blood volume in obese patients.

Echocardiogram and multigated acquisition scan are best to determine ventricular function prior to surgery.

EKG are also helpful to identify left ventricular hypertrophy, conduction abnormalities, arrhythmias or previous myocardial infarction.

Blood pressure monitoring sometimes is a challenge due to cuff fit. If cuff fit is an issue radial artery monitoring may be an option.
Respiratory Changes in Patients with Severe Obesity

- Decreased chest-wall compliance
- Impaired respiratory muscle function
- Decreased total lung capacity and vital capacity
- Decreased functional residual capacity
- Decreased expiratory reserve volume
- Airway closure during normal ventilation
Describe the changes in pulmonary function and how it may be affected by patient position.

Increased body mass puts additional weight on the rib cage, lower chest wall compliance,

Increased intraabdominal pressure pushes on the diaphragm which decreases total lung compliance.

Supine and Trendelenburg positions will reduce expiratory reserve volume, decrease functional residual capacity and may contribute to airway closure making the patient at risk for hypoxemia.
What are the two major factors that contribute to obstructive sleep apnea in obese patients?

Decrease in pharyngeal area from increase in fat tissue within the lateral pharyngeal walls.

Extraluminal pressures in the pharynx due to the fat deposition and external compression on the upper airway.
Pickwickian Syndrome vs. Obesity-Hypoventilation Syndrome

**Pickwickian Syndrome**
- Massive obesity
- Sleep deprivation
- Periodic respiration
- Hypoxemia
- Daytime somnolence
- Alveolarly
- Hypoventilation
- Secondary polycythemia
- Right-heart failure/hypertrophy

**Obesity-Hypoventilation Syndrome**
- Long-term consequence of obstructive sleep apnea
- Central apneic episodes
- Desensitization of respiratory center to nocturnal hypercarbia
- Treated with progestational agents
Increased Risk of Pulmonary Aspiration During Intubation

• Increase intraabdominal pressure, increased gastric volume (greater than 25 ml) and acidity (pH less than 2.5) all contribute.

• Comorbid conditions such as GERD, hiatal hernia and prolonged gastric-emptying time.

• Difficult intubation.
Pre-op Medication Considerations

• Respiratory status may be more sensitive to sedatives.

• $\text{H}_2$ receptors may reduce risk of pulmonary aspiration.

• Preop antibiotics are commonly given, timing and dosage should insure adequate tissue concentration prior to the incision.

• Thrombosis prophylaxis should also be administered per orders.
Factors Affecting Medication Dosages

- Increased fatty tissue
- Increased blood volume
- Elevated cardiac output
- Decrease total body water
- Altered protein binding
- Increase renal blood flow and glomerular filtration rate
References

