Financial Disclosures

- I do not have any financial or beneficial relationship to disclose that may pose a conflict of interest

Objectives

- Review pregnancy outcomes following bariatric surgery
- Review the mechanisms of weight loss after bariatric surgery
- Understand different approaches to surgical weight loss

Pregnancy After Bariatric Surgery

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Obesity

- Obesity is an epidemic in the United States
- 66% of adults are either overweight or obese
- Adult obesity increased from 16% to 26% in last 10 years
- 30 states report prevalences greater than 25%

Prevalence in reproductive-aged women was 29% in 2004, affecting a greater proportion of Mexican American and African American women
- 70% increase in prepregnancy obesity from 1994-2003
- 800% increase in bariatric surgery from 1998-2005

Obesity Classification

- BMI 25-29.9 - Overweight
- BMI 30-34.9 - Class I Obesity
- BMI 35-39.9 - Class II Obesity
- BMI >40 - Class III Obesity
- BMI >50 - Super Obesity

U.S. Obesity Trends
Obesity

- Obesity increases the risk of developing HTN, stroke, diabetes, CAD, HLD, sleep apnea, osteoarthritis, depression, gallbladder disease, liver disease, some forms of cancer, etc.

Obesity-Maternal Effects

- Reduced fertility as a result of oligo-ovulation and anovulation
- Obese women are less likely to respond to ovulation induction

Obesity-Maternal Effects

- Obese patients are at increased risk for complications in pregnancy such as preeclampsia, GDM, and Cesarean delivery.
- Operative morbidity is increased as a result of difficulty in establishing and recovering from regional and general anesthesia, increased blood loss, longer operating times, and thromboembolism.

Obesity-Maternal Effects

- Less likely to have successful VBAC
- Have higher incidence of preterm birth for maternal or fetal indications
- More likely to need labor induction, require more oxytocin, and have longer labor
Obesity-Fetal Effects

- Maternal obesity causes increased risk of congenital anomalies, growth abnormalities, miscarriage, and stillbirth.
- Most common obesity-associated birth defects are related to the neural tube, facial clefting, and cardiac systems (even after controlling for diabetes).

Obesity-Fetal Effects

- Increased BMI impairs visualization of ultrasound images and compromises prenatal diagnosis of fetal anomalies.
- Risk for stillbirth is 2-4x greater in obese compared to normal weight women.
- The pathophysiology behind the increased risk for birth defects and stillbirth in obese patients is not known.

Bariatric Surgery

- Nonsurgical approaches to weight loss include behavioral changes, exercise, diet, and pharmacotherapy.
- Bariatric surgery criteria include BMI > 40, or BMI > 35 and co-morbid illness.
- Surgery is the most effective therapy available for morbid obesity and results in improvement or complete resolution of comorbidities and improved quality of life.

Bariatric Surgery

- Two approaches—restrictive and a combination of restrictive and malabsorptive operations.
- Most commonly performed procedures—Roux-en-Y gastric bypass and adjustable gastric banding.
**Roux-En-Y**

- Considered the “gold standard” of modern obesity surgery
- In this operation, a thumb-sized stomach pouch is created from which the rest of the stomach is permanently divided and separated. The small intestine is cut 18 inches below the stomach and reattached to the small stomach. The lower stomach is bypassed and food enters the small bowel within 10 minutes of beginning a meal.

**Roux-En-Y**

- The operation works by reducing food intake, and reducing the feeling of hunger.
- Excellent for gaining long term control of weight without the hunger or craving associated with small portions or dieting.

**Gastric Banding**

- Fluid filled band is placed around the stomach near the fundus reducing functional stomach volume.
- A tube is connected from the band to an access port located under skin of the abdomen. Adjustments are made through the access port as needed to maintain optimal weight loss by adding or removing saline solution.
Vertical Banded Gastroplasty

- Also called “Stomach Stapling”
- A “window” is cut in the upper portion of the stomach a few inches below the esophagus, then a line of surgical staples is placed around the window and in the direction of the esophagus that creates a small pouch in the upper stomach—this pouch will hold about 1 oz. of solid food.

After forming the pouch, a vertical band is placed through the window around the outlet of the stomach pouch and stitched into place. Because the band does not stretch, it holds food in the stomach longer, which allows the patient to feel full on a very small amount of food.
Sleeve Gastrectomy

- Generates weight loss by restricting the amount of food that can be eaten without any bypass of the intestines. The surgeon removes 85% of the stomach laparoscopically so that the stomach takes on the shape of a tube or “sleeve.” The remaining stomach measures 35-60 cc, and this procedure is not reversible.

- The nerves to the stomach and outlet valve remain intact with the idea of preserving the functions of the stomach while reducing the volume. If weight loss is inadequate, the patient has the option to proceed with gastric bypass.

Effect of Surgery on Future Fertility

- Rapid weight loss follows bariatric surgery, resulting in improvement of conditions such as PCOS, anovulation, and irregular menses, thus leading to higher fertility rates.
- Bariatric surgery should not be considered as a treatment for infertility.
Effect of Surgery on Future Fertility

- Studies have demonstrated the potential for compromised absorption of OCPs after bariatric surgery given the large numbers of unintended pregnancies after the procedures.
- Because of the increased risk of OCP failure, nonoral administration of hormonal contraception should be considered.

Effect of Surgery on Future Fertility

- Contraception and preconception counseling should be a component of overall counseling for any reproductive-aged woman undergoing bariatric surgery.
- Recommend waiting 12-24 months after surgery before conceiving so that the fetus is not exposed to a rapid maternal weight loss environment and so the patient can achieve full weight loss goals.

Effect of Surgery on Future Fertility

- Should pregnancy occur before the recommended time frame, closer surveillance of maternal weight and nutritional status is beneficial.
- Recommend weight gain of 15 lbs. or less in these pregnancies.
- Use of ultrasound for serial monitoring of fetal growth should be considered.

Pregnancy Outcomes After Bariatric Surgery

- After conception, consultation with a nutritionist may facilitate adherence to dietary regimens and allow the patient to cope with the physiologic changes of pregnancy.
- After bariatric surgery, there is a reduced risk for hypertension, gestational diabetes, and preeclampsia, as well as of large-for-gestational-age infants and macrosomia.
Pregnancy Outcomes After Bariatric Surgery

- After bariatric surgery, the risk for premature rupture of membranes is increased, but the risk for preterm delivery, congenital anomalies, and perinatal death is not increased.

Pregnancy Outcomes After Bariatric Surgery

- Several case reports have identified significant late complications of previous bariatric surgery that have occurred during pregnancy, including maternal GI hemorrhage and intestinal obstruction. Exploratory surgery may be necessary to treat these complications.
- Maternal deaths have been reported.

Pregnancy Outcomes After Bariatric Surgery

- There should always be a high index of suspicion for GI surgical complications when pregnant women who have had these procedures present with significant abdominal symptoms.
- Other bariatric related complications include anastomotic leaks, internal hernias, ventral hernias, band erosion, and band migration.

Addressing Nutritional Deficiency

- A broad evaluation of micronutrient deficiencies is recommended at the beginning of pregnancy.
- Most common nutritional deficiencies after gastric bypass are of protein, iron, vitamin B12, folate, and calcium.
- If there is a proven deficit, then appropriate treatment should be instituted and monitored.
Addressing Nutritional Deficiency

- In the absence of a deficiency, iron, ferritin, calcium, and vitamin D levels should be monitored every trimester.
- It is not known if women require higher doses of folic acid after weight loss surgery to decrease the risk of birth defects.

Addressing Nutritional Deficiency

- The daily recommendation for 60g of protein intake is the same regardless of bariatric surgery status.
- A daily MVI is recommended in addition to PNV (be aware of excess vitamin A consumption).
- Close surveillance should continue postpartum especially if breastfeeding.

Addressing Nutritional Deficiency

- Nutrient deficiencies can also occur after restrictive surgical procedures.
- Patients may experience decreased food intake or intolerance to certain foods secondary to narrowed gastric opening.
- Removing fluid from gastric band has been used to relieve nausea and vomiting during 1st trimester.

Addressing Nutritional Deficiency

- There is no consensus on the management of patients during pregnancy who have had an adjustable gastric banding procedure, but early consultation with a bariatric surgeon is recommended.
Iron

- Most common deficiency seen after bariatric surgery
- Deficiency caused by decreased intake, less gastric acid, bypassed absorption site, food intolerance to iron rich foods
- Signs/symptoms of deficiency: Pica, koilonychia, weakness/fatigue

Iron

- Deficiency detected by low serum iron level, elevated TIBC, microcytosis
- Prevention: Iron containing MVI, IV/IM iron if necessary

Vitamin B12

- Deficiency causes megaloblastic anemia and irreversible neurological damage
- Deficiency caused by limited intake or failure to absorb B12
- Symptoms of deficiency include fatigue, GI distress, mental confusion, paranoia, headaches, depression

Vitamin B12

- Deficiency detected by low serum levels
- Prevention: 500 mcg/day or 1000 mcg IM/month
Folate
- Deficiency caused by decreased intake or limited absorption
- Symptoms of deficiency include irritability, weakness, sore tongue, palpitations, SOB
- Deficiency is detected by low serum levels
- Prevention: 800 mcg/day

Calcium and Vitamin D
- Deficiency caused by decreased intake and reduced absorption
- Symptoms of deficiency include insomnia, muscle cramps, reduced bone density, convulsions
- Deficiency detected by monitoring calcium, phosphorus, alkaline phosphatase, PTH
- Monitor with yearly DEXA scan
- Prevention: supplement with 1500-2000mg of calcium citrate with vitamin D in divided doses

Thiamine
- Thiamine deficiency, or “bariatric beriberi”, can occur very quickly
- Deficiency caused by food intolerance, vomiting, excessive alcohol intake
- Symptoms of “dry beriberi” include muscle weakness, vomiting, peripheral neuropathy, and paralysis
Thiamine

- Symptoms of "wet beriberi" include increased heart rate, swelling of lower extremities, SOB
- Cerebral beriberi, or Wernicke-Korsakoff Syndrome, is characterized by confusion, inability to learn, amnesia, and telling stories that bear no relation to reality

- Deficiency detected by low serum levels
- Prevention: MVI with B1
- If untreated, causes irreversible brain and nerve damage, coma, and death

Antepartum Care

- Early identification of pregnancy is important-screen for nutritional deficiencies/replacement, get early ultrasound for dating, and counsel on weight gain
- Consider TFTs-iodine deficiency is possible
- Monitor therapeutic drug levels (these can be altered due to decreased absorption times)

- GDM Screening-Patients may be unable to tolerate the 50g glucose load after gastric bypass due to dumping syndrome
- Dumping syndrome is related to the ingestion of refined sugars or high glycemic carbohydrates that the stomach rapidly empties into the small intestine. Fluid shifts from the intravascular compartment into the bowel lumen result in small bowel distention.
Antepartum Care

- Symptoms of dumping syndrome include abdominal cramps, nausea, vomiting, bloating, and diarrhea.
- An alternative GDM screen is home glucose monitoring (fasting and 2 hr. postprandials) for 1 week during the 24-28 weeks of gestation.

Labor and Delivery After Bariatric Surgery

- Bariatric surgery should not alter the course of labor and delivery, and should not significantly affect its management.
- Cesarean delivery rates are higher after bariatric surgery (as high as 62%).
- There is no known physiologic reason for performing more Cesarean deliveries in women who have had bariatric surgery.

Labor and Delivery After Bariatric Surgery

- If a patient has had extensive and complicated abdominal surgery from weight loss procedures, prelabor consultation with a bariatric surgeon should be considered.

Conclusions

- Pregnancy after bariatric surgery is generally associated with improved outcomes.
- Assessment of nutritional status is important in patients planning pregnancy.
- Bariatric surgery may represent an effective preconception intervention for patients with morbid obesity.
**ACOG Statement**

As the rate of obesity increases, it is becoming more common for providers of women's health care to encounter patients who are either contemplating or have had operative procedures for weight loss, also known as bariatric surgery. The counseling and management of patients who become pregnant after bariatric surgery can be complex. Although pregnancy outcomes generally have been favorable after bariatric surgery, nutritional and surgical complications can occur and some of these complications can result in adverse perinatal outcomes.*

**References**


**References**


References


