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## Committee on Obstetric Practice

*This document reflects emerging clinical and scientific advances as of the date issued and is subject to change. The information should not be construed as dictating an exclusive course of treatment or procedure to be followed.*

## Obesity in Pregnancy

**ABSTRACT:** In the United States, more than one third of women are obese, more than one half of pregnant women are overweight or obese, and 8% of reproductive-aged women are extremely obese, putting them at a greater risk of pregnancy complications. Therefore, preconception assessment and counseling are strongly encouraged for obese women and should include the provision of specific information concerning the maternal and fetal risks of obesity in pregnancy, as well as encouragement to undertake a weight-reduction program. At the initial prenatal visit, height and weight should be recorded for all women to allow calculation of body mass index (calculated as weight in kilograms divided by height in meters squared), and recommendations for appropriate weight gain should be reviewed at the initial visit and periodically throughout pregnancy. Nutrition consultation should be offered to all overweight or obese women, and they should be encouraged to follow an exercise program. Pregnant women who have undergone bariatric surgery should be evaluated for nutritional deficiencies and the need for vitamin supplementation when indicated. Obese patients undergoing cesarean delivery may require thromboprophylaxis with pneumatic compression devices and unfractionated heparin or low molecular weight heparin. For all obese patients, anesthesiology consultation early in labor should be considered, and consultation with weight-reduction specialists before attempting another pregnancy should be encouraged.

The prevalence of obesity in the United States has increased dramatically over the past 25 years. The recent National Health and Nutrition Examination Survey found that in the United States, more than one third of women are obese, more than one half of pregnant women are overweight or obese, and 8% of reproductive-aged women are extremely obese (1). The obesity problem is greatest among non-Hispanic black women (50%) compared with Mexican American women (45%) and non-Hispanic white women (33%) (1).

In 2009, the Institute of Medicine (IOM) published revised pregnancy weight gain guidelines that are based on prepregnancy body mass index (BMI) ranges recommended by the World Health Organization. These ranges are independent of age, parity, smoking history, race, and ethnic background (2, 3). The revised IOM recommendations define *normal weight* as a BMI of 18.5–24.9, *overweight* as a BMI of 25–29.9, and *obesity* as a BMI of 30 or greater. The IOM guidelines do not differentiate between Class I obesity (BMI=30–34.9), Class II obesity (BMI=35–39.9), and Class III obesity (BMI≥40) (2).

## Pregnancy Complications

Overweight and obese women are at increased risk of several pregnancy complications, including gestational diabetes mellitus, hypertension, preeclampsia, cesarean delivery, and postpartum weight retention (4–8). Similarly, fetuses of pregnant women who are overweight or obese are at increased risk of prematurity, stillbirth, congenital anomalies, macrosomia with possible birth injury, and childhood obesity (9, 10). Additional concerns include potential intrapartum, operative, and postoperative complications and difficulties related to anesthesia management. Obese women are also less likely to initiate and sustain breastfeeding (11).

## Maternal Complications

In a prospective multicenter study of more than 16,000 patients, a BMI of 30–39.9 was associated with an increased risk of gestational diabetes mellitus (odds ratio [OR], 2.6 and 4.0), gestational hypertension (OR, 2.5 and 3.2), preeclampsia (OR, 1.6 and 3.3), and fetal macrosomia (OR, 1.7 and 1.9), when compared with a BMI of

less than 30 (7). In this same study, the cesarean delivery rate was 20.7% for women with a BMI of 29.9 or less, 33.8% for women with a BMI of 30–34.9, and 47.4% for women with a BMI of 35–39.9. Other studies have consistently reported higher rates of preeclampsia, gestational diabetes mellitus, and cesarean delivery (particularly for arrest of labor) in obese women than in nonobese women (4–6).

At least three cohort studies suggest that obesity is an independent risk factor for spontaneous abortion among women who undergo infertility treatment (12–14). In recognition of this association, it is recommended that health care providers encourage obese women to lose weight before beginning infertility therapy. Data also link obesity with spontaneous abortion among women who conceive naturally (15).

### **Fetal Complications**

When counseling obese women about potential pregnancy complications, it is important to inform them of the associated fetal risks, including prematurity, stillbirth, congenital abnormalities (eg, neural tube defects), macrosomia, and childhood and adolescent obesity. Some studies have reported a higher rate of premature delivery for obese women than for women of normal weight (4, 16). However, in a study of more than 2,900 obese women, prepregnancy obesity was associated with a lower rate of spontaneous preterm birth (17). A large Swedish cohort study reported a greater risk of antepartum stillbirth among obese patients than among women who had a BMI of less than 20 (16).

Obese pregnant women are more likely to give birth to an infant with congenital anomalies (9), and obesity also lowers detection rates of fetal anomalies during prenatal ultrasonography (18). Data establish that the risk of neural tube defects among obese pregnant women is double that of pregnant women of normal weight after correcting for diabetes as a potential confounding factor (19–21). The benefit of the administration of folic acid doses higher than 400 micrograms per day has not been studied in obese pregnant women without diabetes.

Multiple studies have shown that maternal obesity and excessive weight gain during pregnancy are associated with large-for-gestational-age infants (5, 22–24). Furthermore, these large-for-gestational-age infants are at increased risk of childhood and adolescent obesity (6, 25, 26). Although the diagnosis of fetal macrosomia is imprecise, prophylactic cesarean delivery may be considered for suspected fetal macrosomia with estimated fetal weights greater than 5,000 g in women without diabetes and greater than 4,500 g in women with diabetes (27).

### **Intrapartum Complications**

It is important to discuss potential intrapartum complications with obese women, such as the challenges associated with anesthesia management and the increased risk of complicated and emergent cesarean delivery. Other

potential problems include difficulty estimating fetal weight (even with ultrasonography) and the inability to obtain interpretable external fetal heart rate and uterine contraction patterns.

### **Anesthesia Management**

If an anesthesiology consultation was not obtained antepartum, it should be conducted early in labor to allow adequate time for the development of an anesthetic plan. The use of epidural or spinal anesthesia is recommended in the obese pregnant patient when anesthesia is needed or elected; however it may be technically difficult or impossible to administer this type of anesthesia because of obscured landmarks, difficult positioning, and excessive layers of adipose tissue. Alternatively, the use of general anesthesia in obese pregnant women also poses several challenges, including difficult endotracheal intubation due to excessive tissue and edema (28) and intraoperative respiratory events from failed or difficult intubation (29).

### **Cesarean Delivery**

Operative and postoperative complications among obese pregnant women include increased rates of excessive blood loss, operative time greater than 2 hours, wound infection, and endometritis (30–32). Sleep apnea occurring in this group of women may further complicate anesthetic management and postoperative care (33).

Obese women who require cesarean delivery have an increased incidence of wound breakdown and infections (31, 34). Antimicrobial prophylaxis is recommended for all cesarean deliveries unless the patient is already receiving appropriate antibiotics (eg, for chorioamnionitis) (35). For obese women who require cesarean delivery, consideration should be given to using a higher dose of preoperative antibiotics for surgical prophylaxis (36). Attempts to decrease the incidence of wound breakdowns and infections that have been studied include closure of the subcutaneous layers and the placement of subcutaneous drains. Investigators have demonstrated that suture closure of the subcutaneous layer after cesarean delivery in obese patients may lead to a significant reduction in the incidence of postoperative wound disruption (37, 38). However, postoperative placement of subcutaneous draining systems has not consistently been shown to be of value in reducing postcesarean delivery morbidity (39, 40).

Because of an increased risk of venous thromboembolism, placement of pneumatic compression devices before cesarean delivery is recommended for all women not already receiving thromboprophylaxis (41). Obese patients, especially those who are hospitalized and immobile, may be at increased risk of thromboembolism. Individual risk assessment will lead some health care providers to plan thromboprophylaxis with pneumatic compression devices and unfractionated heparin or low molecular weight (LMW) heparin in such patients (42).

However, cesarean delivery in the emergency setting should not be delayed because of the timing necessary to implement thromboprophylaxis (41). Postpartum unfractionated heparin or LMW heparin prophylaxis has been recommended for patients thought to be at high risk of venous thromboembolism (43, 44); however, data are insufficient to determine whether the benefits of unfractionated heparin or LMW heparin prophylaxis in this group of patients outweigh the risks (45, 46).

Because of the increased likelihood of complicated and emergent cesarean delivery, extremely obese women may require specific resources, such as additional blood products, a large operating table, and extra personnel in the delivery room. Particular attention to the type and placement of the surgical incision is needed (ie, placing the incision above the panniculus adiposus) (34, 47). There are additional logistical challenges to monitoring labor and performing an emergent cesarean delivery in the extremely obese patient. Therefore, these patients should be counseled about these possible complications of an emergent cesarean delivery.

### **Bariatric Surgery Considerations**

The number of obese reproductive-aged women undergoing bariatric surgery is increasing (48). Although maternal gastrointestinal complications, including obstruction and hemorrhage, can occur as a result of this procedure, the incidence is infrequent (49, 50). Furthermore, pregnancies after bariatric surgery are less likely to be complicated by gestational diabetes mellitus, hypertension, preeclampsia, and macrosomia than are pregnancies of obese women who have not undergone such surgery (51, 52).

Pregnant women who have undergone bariatric surgery should be evaluated for nutritional deficiencies and the need for vitamin supplementation when indicated because they are at increased risk of deficiencies in iron, vitamin B<sub>12</sub>, folate, vitamin D, and calcium. Women with a gastric band should be monitored by their general surgeons during pregnancy because adjustment of the band may be necessary (53). Bariatric surgery is not an independent indication for cesarean delivery (54).

### **Counseling**

Obese women are at increased risk of several pregnancy complications; therefore, preconception assessment and counseling are strongly encouraged. Obstetricians should provide education about the possible complications and should encourage obese patients to undertake a weight-reduction program, including diet, exercise, and behavior modification, before attempting pregnancy. Specific medical clearance may be indicated for some patients.

At the initial prenatal visit, height and weight should be recorded for all women to allow calculation of BMI, and recommendations for appropriate weight gain should be reviewed both at the initial visit and periodically throughout pregnancy (3). The 2009 IOM guidelines

recommend a total weight gain of 15–25 lb (6.8–11.3 kg) for overweight women (BMI=25–29.9) and 11–20 lb (5.0–9.1 kg) for all obese women (BMI ≥30). (For an online BMI calculator, see <http://www.nhlbisupport.com/bmi>). Nutrition consultation should be offered to all overweight or obese women, and they should be encouraged to follow an exercise program. Nutrition and exercise counseling should continue postpartum and before attempting another pregnancy. Because these patients are at increased risk of emergent cesarean delivery and anesthetic complications, anesthesiology consultation early in labor should be considered (22).

### **Recommendations**

Recommendations for obese women who are pregnant or planning a pregnancy include the following:

- Preconception assessment and counseling are strongly encouraged and should include the provision of specific information concerning the maternal and fetal risks of obesity in pregnancy and encouragement to undertake a weight-reduction program.
- At the initial prenatal visit, height and weight should be recorded for all women to allow calculation of BMI, and recommendations for appropriate weight gain, guided by IOM recommendations, should be reviewed both at the initial visit and periodically throughout pregnancy.
- Nutrition consultation should be offered to all overweight or obese women, and they should be encouraged to follow an exercise program. Nutrition and exercise counseling should continue postpartum and before attempting another pregnancy.
- Women who have undergone bariatric surgery should be evaluated for nutritional deficiencies and the need for vitamin supplementation, when indicated, because they are at increased risk of deficiencies in iron, vitamin B<sub>12</sub>, folate, vitamin D, and calcium.
- For patients undergoing cesarean delivery who have additional risk factors for thromboembolism such as obesity, individual risk assessment may require thromboprophylaxis with pneumatic compression devices and unfractionated heparin or LMW heparin.
- Consideration should be given to using a higher dose of preoperative antibiotics for cesarean delivery prophylaxis.
- The use of suture closure of the subcutaneous layer after cesarean delivery in obese patients may lead to a significant reduction in the incidence of postoperative wound disruption.
- Anesthesiology consultation early in labor should be considered.
- Consultation with a weight-reduction specialist before attempting another pregnancy should be encouraged.

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