



# Special Considerations in Pregnancy After Bariatric Surgery

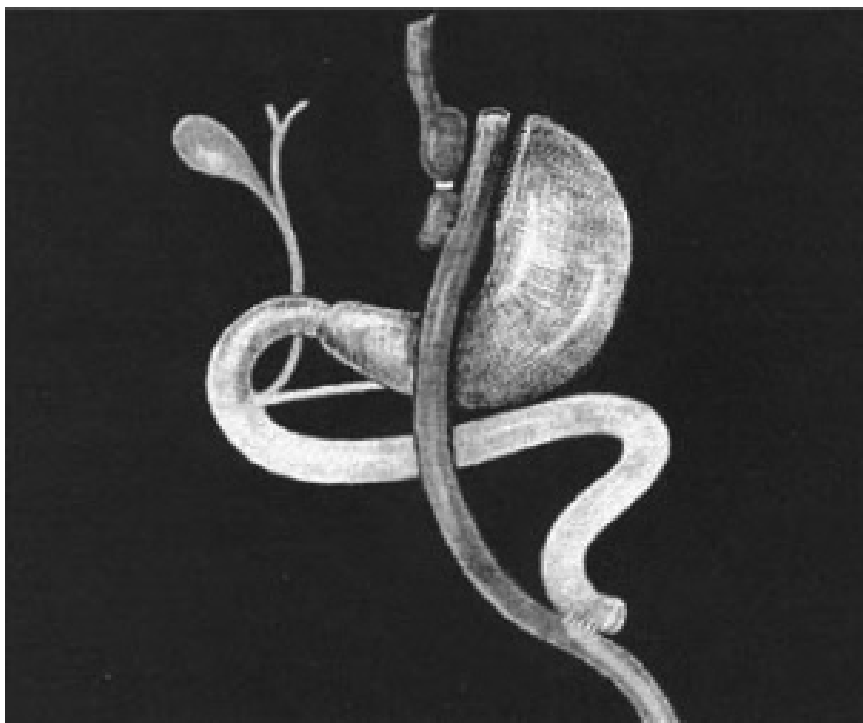
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Women who have undergone bariatric surgery can experience improved fertility and resolution of comorbid conditions. There are, however, potential complications associated with bariatric surgery that require special consideration in patients who are pregnant. Joseph R. Wax, MD, Tufts University School of Medicine, Portland, Maine, USA, discussed the management of pregnant women who have previously undergone bariatric procedures.

Almost two-thirds of women in the United States are considered overweight or obese, with a majority of women having a body mass index (BMI) of 25 to 30 kg/m<sup>2</sup> [Flegal KM et al. *JAMA* 2010]. About 7% of U.S. women are morbidly obese (ie, with a BMI of 40 kg/m<sup>2</sup>) and are candidates for bariatric surgery. In the United States, about 125,000 bariatric surgeries are performed yearly, with more than 80% of the procedures in women, and more than half of those are in women of childbearing age [Nguyen NT et al. *J Am Coll Surg* 2011].

The most common technique in bariatric surgery is the Roux-en-Y gastric bypass, which causes weight reduction by restricting caloric intake and inducing malabsorption [Nguyen NT et al. *J Am Coll Surg* 2012; Buchwald H et al. *H Obes Surg* 2002]. This technique typically results in a weight loss of about 100 pounds. The procedure entails making a staple line across the upper portion of the stomach to form a 15 to 20 mL gastric pouch, which will become the functional stomach (Figure 1). The duodenum is resected, and the distal portion of the jejunum is anastomosed to the

Figure 1. The Roux-en-Y Gastric Bypass Procedure



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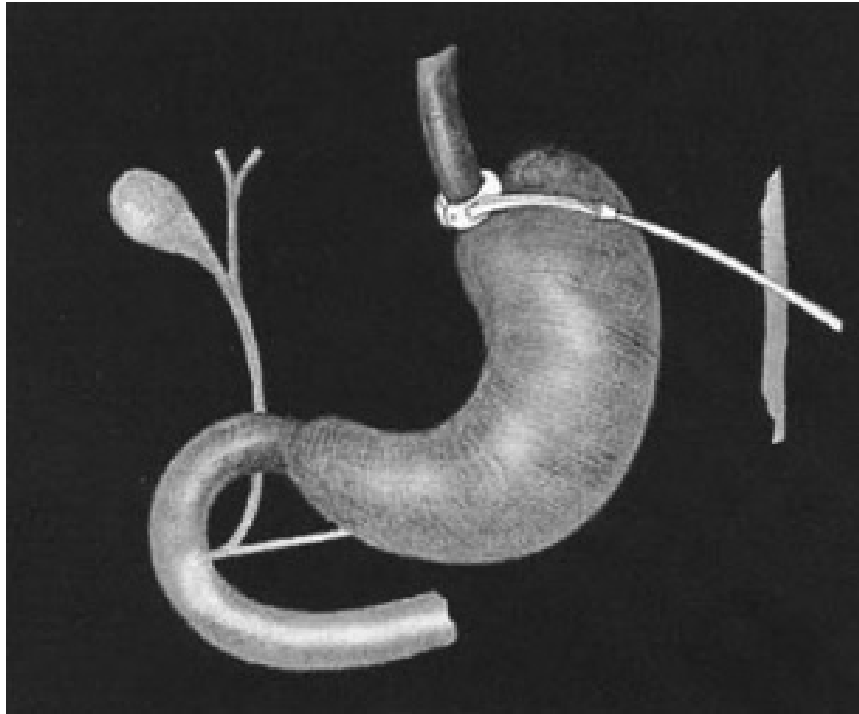
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Figure 2. Laparoscopic Adjustable Gastric Banding



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newly formed gastric pouch. The surgery is performed either laparoscopically—which results in shorter hospital stays, less patient discomfort, and fewer wound and cardiopulmonary complications—or in an open fashion [Simpfendorfer CH et al. *Surg Clin North Am* 2005]. Open procedures allow the surgeon more tactile control and easier adhesiolysis, and they result in fewer long-term complications [Simpfendorfer CH et al. *Surg Clin North Am* 2005].

About 36% of bariatric procedures are sleeve gastrectomies, which result in weight loss due to caloric restriction and can cause up to a 61% reduction in excess body weight [ASMBS. *Surg Obes Rel Dis* 2012]. The procedure entails resecting the entire greater curvature of the stomach, resulting in a sleeve shape that forms the functional stomach.

Laparoscopic implantation of an adjustable gastric band is performed in about 4% of gastric procedures, and it induces weight loss through caloric restriction [Nguyen NT et al. *J Am Coll Surg* 2012; Buchwald H et al. *H Obes Surg* 2002]. In this procedure, a band is placed at the base of the esophagus and upper stomach, and it is connected to a subcutaneous injection to inflate the band to a variable

degree, thus resulting in caloric restriction (Figure 2). Although this method has the potential to result in up to a 50% reduction in excess body weight, the band is often deflated as a result of complaints of nausea and vomiting.

During the course of 12 to 24 months, patients typically experience rapid weight loss. With the weight loss, there is frequently resolution of obesity-related comorbidities such as hypertension, diabetes, and reproductive disorders such as polycystic ovarian syndrome, anovulation, and irregular menses [Teitelman M et al. *Obes Surg* 2006; Eid GM et al. *Surg Obes Rel Dis* 2005]. As a result, women often experience an improvement in fertility and fecundity.

Prof. Wax highlighted that many experts warn against conception during the period of maximal weight loss, the initial 12 to 24 months, so that comorbidities may resolve and to prevent suboptimal weight loss [NCCDPH. *MMWR* 2010]. In addition, there is some evidence of a greater rate of miscarriage and a potential for fetal growth restriction. Prof. Wax pointed out that these theoretical concerns have not been consistently demonstrated by research. He recommended, however, that women who wish to conceive should meet with their

obstetrician to receive preoperative preconception care that includes counseling, contraception, and nutritional supplementation. Importantly, oral contraceptives are contraindicated in women who have undergone bariatric surgery because they are poorly absorbed and therefore have decreased efficacy.

Bariatric surgery provides multiple reproductive benefits to women who do conceive after weight loss. Women who have undergone bariatric surgery are at lower risk of developing hypertension and pregnancy-related hypertensive disorders, diabetes and gestational diabetes, weight gain, and macrosomia, and they are at lower risk of undergoing cesarean delivery. There is, however, an increased risk of delivering a fetus that is small for gestational age.

There is the potential for late surgical complications that occur during pregnancy, which is the result of malabsorption or mechanical issues due to anatomic changes. Malabsorption frequently leads to micronutrient deficiencies, such as of iron, calcium, and folic acid. This is not a surprising occurrence in women who have undergone bariatric surgery because the digestive system is isolated from regions that secrete acid and cofactors that allow for the absorption of iron and vitamin B<sub>12</sub>. Portions of the gastrointestinal system that absorb folic acid, iron, calcium, and, potentially, vitamin D are also isolated. Therefore, these patients should receive lifelong supplementation with folic acid (400 µg) and calcium citrate (1500 to 2000 mg), as well as ferrous sulfate or fumarate, vitamin B<sup>12</sup> (500 to 1000 µg), and vitamin D based on needs as established by laboratory findings [ACOG. *Obstet Gynecol* 2009; Aills L et al. *Surg Obes Rel Dis* 2008]. Understandably, micronutrient deficiency of folate raises the concern of open neural tube defects (ONTDs). There have been reported cases of ONTDs in children born to women who were not taking vitamin supplements; however, later studies have not found an association between gastric procedures and ONTDs [Sheiner E et al. *Am J Obstet Gynecol* 2004; Haddow JE et al. *Lancet* 1986; Knudsen LB et al. *Lancet* 1986].

Another malabsorption-related condition that is of concern is hyperinsulinemic hypoglycemia. Prof. Wax recommended that women who have undergone gastric surgery should avoid refined and simple sugars and increase their intake of protein and complex carbohydrates, as well as consuming liquid before and after meals [Wax JR et al. *Obes Surg* 2007]. In addition, a bariatric nutritionist can be consulted.

Dumping syndrome is also a concern in pregnant women who have undergone gastric procedures. This is a result of a rapid transit of nutrients to the small intestine that causes an osmotic fluid shift into the lumen of the intestines, resulting in vasomotor symptoms, such as

flushing, and abdominal symptoms, such as bloating, cramping, and diarrhea. Prof. Wax recommended that patients avoid the glucose challenge test, which can induce dumping syndrome. Instead, at about 26 to 28 weeks of gestation, patients can do home glucose monitoring for 1 to 2 weeks; if glucose levels are consistently elevated, then the patient should be treated for gestational diabetes.

Mechanical complications can become life threatening to post-gastric bypass pregnant patients, although they may initially present in a subtle fashion. Bowel obstruction occurs with a consistent presentation that includes left-upper-quadrant or epigastric pain that is often progressive and persistent, cramping, and nausea with emesis, but with normal bowel sounds, vital signs, and laboratory tests [Wax JR et al. *Am J Obstet Gynecol* 2013]. Patients who present with abdominal complaints should receive a bariatric surgical evaluation [Wax JR et al. *Obes Surg* 2007]. Importantly, small bowel obstruction (SBO) can mimic obstetric disorders, induce obstetric disorders, or occur simultaneously with obstetric disorders, making diagnosis difficult.

Prof. Wax highlighted that misdiagnosis can result in serious complications, including necrosis and gangrenous regions of the gastrointestinal tract. Any patient who does not respond to treatment of a suspected diagnosis, or has progressive or recurrent symptoms, should be evaluated for SBO, including those women who require a cesarean delivery. In addition, mismanagement can also result in serious complications. Prof. Wax pointed out that medical management cannot correct issues such as adhesions, hernias, or stenosis. In addition, if cesarean delivery is performed due to a bowel obstruction, the entire bowel must be evaluated.

Pregnant women who have undergone bariatric surgery require special consideration in terms of late surgical complications, which can lead to serious consequences and death if misdiagnosed or mistreated. Prof. Wax concluded that it is important that physicians managing pregnant women who have undergone gastric procedures are familiar with postsurgical complications, particularly the potential of SBO.

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