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Pregnancy and neonatal outcome after bariatric surgery

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The global obesity epidemic is changing the face of maternal–fetal medicine. One in five women is obese at time of conception, and increasing numbers of parturients have undergone bariatric surgery. Recent publication of large, population-based studies and comparison studies of preoperative and post-operative pregnancies have highlighted new risks and benefits to the mother and child. Pregnancy after bariatric surgery appears to effectively reduce the risk of complications such as fetal macrosomia, gestational diabetes mellitus, and hypertensive disorders of pregnancy; however, women who become pregnant after bariatric surgery may constitute a unique obstetric population with an increased risk for preterm and small-for-gestational-age infants. In this article, we provide an overview of the current knowledge of the impact of maternal bariatric surgery on neonatal and pregnancy outcomes.

Introduction

Rising rates of obesity have created a worldwide epidemic [1]. As obesity rates in pregnant women rise, the importance of obesity-related complications also increases. Pregravid obesity has been shown

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to triple the risk of infertility and increase rates of miscarriage, gestational diabetes mellitus (GDM), gestational hypertension, pre-eclampsia and caesarean delivery (CD) [2–8].

Women of reproductive age are turning to bariatric surgery in increasing numbers. Currently, women aged 18-45 years undergo >50,000 inpatient bariatric surgical procedures a year in the United States [9], accounting for approximately half of all bariatric procedures [10]. This has created a new obstetric population with unique outcomes and risks for mother and child.

Recent publication of large, population-based trials [11–13] and studies comparing preoperative and post-operative pregnancies [14,15] have highlighted new risks and benefits of pregnancy after surgery and confirmed prior research in this new and important field of maternal–fetal and neonatal medicine.

Bariatric procedures

Three main classes of bariatric surgeries have been developed to date. These include restrictive, malabsorptive and combined restrictive–malabsorptive procedures. Restrictive procedures, such as sleeve gastrectomy, vertical banded gastroplasty (VBG) and adjustable gastric banding (ABG), promote weight loss by physically decreasing gastric volume and thereby total food intake. They are generally considered safer and less complicated to perform, but they do have the disadvantage that sugary, high-energy foods may bypass the restriction. Malabsorptive procedures, such as biliopancreatic diversion (BPD), cause weight loss primarily by bypassing a significant portion of the small bowel and inducing malabsorption. Most purely malabsorptive procedures have been linked to significant safety concerns and are now rarely performed [16,17]. In the United States, most procedures are currently of the combined type, with the Roux-en-Y gastric bypass (RYGB) accounting for 93% of all procedures performed in 2000 [17]. Despite its classification, malabsorption is actually not significant in RYGB [18]. Instead, neuroendocrine changes are increasingly recognized as an important component of the weight loss effect [16]. A recent 10-year follow-up of a randomized study of laparoscopic Roux-en-Y gastric bypass (LYRGB) and laparoscopic adjustable gastric banding (LAGB) found LYRGB was superior to LAGB in terms of excess weight lost (76.2% vs. 46.2%), but exposed the patient to higher complication rates and more potentially lethal long-term surgical complications [19].

Restrictive procedures also promote a shorter mean time of rapid weight loss than combined procedures (9–12 vs. 12–18 months). The shape of the weight loss curve, in addition to overall amount of weight lost, is different between the two types of procedures [20,21]. Arguably the best long-term study of bariatric surgery is the Swedish obese subjects (SOS) study, a prospective, non-randomized study of 4047 obese persons, of which 2010 underwent a form of bariatric surgery. As reported by Sjöström et al. [22], the average maximum weight loss after 1–2 years was a reduction of 32% for gastric bypass, 25% for VBG, and 20% for AGB as compared to a 1–2% change in body weight resulting from traditional weight loss techniques. A 10-year follow-up found weight loss had stabilized at 25%, 16%, and 14%, respectively, for the three procedures.

Complications related to bariatric surgery have been reported in subsequent pregnancies. Reported complications include internal hernias, bowel obstructions, hyperemesis, cholelithiasis and problems with position and function of the gastric band that may require revision [20,23]. A systematic review of bariatric surgery during pregnancy [24] identified 20 complications requiring surgical intervention, including multiple bowel obstructions, a gastric ulcer, a staple line stricture and several band-related complications. After RYGB, the risk of intestinal obstruction is particularly high [25]. Santulli et al. [26] observed surgery-related complications in about a one-fourth of parturients after RYGB. This is in agreement with an earlier study [27].

In light of the serious potential side effects of bariatric procedures that may arise during pregnancy, it is recommended that a high index of suspicion for gastrointestinal surgical complications be maintained when a post-operative woman presents with abdominal pain during pregnancy [28]. Wax et al. [29] further recommend that any woman with a history of RYGB should ideally have a preconception visit with an obstetrician to discuss the warning signs of small bowel obstruction and the associated risks with pregnancy post-operatively. The early involvement of a bariatric surgeon in cases of suspected bowel obstruction is also strongly encouraged [28].