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Intrauterine growth retardation after laparoscopic Roux-en-Y gastric bypass — clinical presentation and literature review

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ABSTRACT

Bariatric surgery is associated with a higher risk of intrauterine growth retardation (IUGR) and small for gestational age neonates. We present two examples of IUGR after laparoscopic Roux-en-Y gastric bypass, both associated with excessive restriction in patients caloric intake, one due to obstetrician's indications and the other resulting from patient's anxiety of weight gain in pregnancy. IUGR was observed accordingly in the 35th and 28th week of pregnancy. The first patient had an urgent cesarean section due to pathological cardiotocography tracings in the 35th week of pregnancy, with the newborn's weight of 1690g (< 1st percentile). The second patient, admitted in the 28th week with suspected IUGR, had an elective cesarean section in the 36th week, with the newborn's weight of 2095g (5th percentile). Although malabsorptive mechanisms are known to be involved in the impaired fetal growth after bariatric surgery, patients' and obstetricians' adherence to nutrition and supplementation regimen are of utmost importance. The problem of optimum daily caloric intake, vitamin and micronutrients supplementation in pregnancies after bariatric surgery is presently discussed in the literature. Optimum care and advice for bariatric patients have to be diversified as malabsorptive and restrictive operations lead to changes in metabolism, nutrition and hormonal balance.

Key words: bariatric surgery; fetal growth retardation; avitaminosis

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INTRODUCTION

As the prevalence of obesity in women of reproductive age is rising every year and bariatric surgery is proven to be the mainstay of treatment, the number of women after bariatric surgical procedures experiencing pregnancy is constantly growing. In 2013 over 450,000 bariatric procedures were performed worldwide [1]. As stated by Walędziak et al. [2] observe a similar trend in Poland, with over 2000 bariatric procedures performed in 2016. The influence of bariatric surgery on the pregnancy course and perinatal outcomes has become one of the major concerns of obstetricians taking care of these patients. Nutritional deficiencies, intrauterine growth retardation (IUGR) and the risk of prematurity are only a few problems to be considered [3]. Although international recommendations about adequate nutrition and vitamin intake in pregnancy after bariatric surgery are officially accepted and widely available, there still exists an important problem of patients' and their obstetricians' adherence to the recommendations. Therefore a pregnancy in a patient who underwent a bariatric procedure should be considered high risk pregnancy.

CLINICAL PRESENTATION

Case 1

The first patient, a 32-year-old primigravida underwent laparoscopic Roux-en-Y gastric bypass (LRYGB) in November 2014. Her preoperative weight was 125 kg, with a body mass index (BMI) of 42.75 kg/m^2. The patient had a weight loss of 37kg and her BMI was 30.09 kg/m^2 before the pregnancy, reaching %EWL (excess weight loss) of 71.29%. The time-to-conception interval was two years. She had a history of chronic hypertension, treated during pregnancy

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with methyldopa 250 mg taken 3 times daily, with optimal control. Her gestational weight gain (GWG) was 13kg with a maximum weight of 101 kg and BMI of 34.54 kg/m^2 at the end of pregnancy. Because of elevated fasting glucose levels she was diagnosed with gestational diabetes mellitus (GDM) in the 6th week of pregnancy. She was treated only via diet, achieving normal blood glucose levels. The patient received supplementation with prenatal vitamins with additional iron sulfate 80 mg daily (orally) and folic acid 5 mg daily during the first trimester. She had a history of anemia before the pregnancy with normal levels of hemoglobin and blood count throughout pregnancy. The patient stated having been advised by her obstetrician to restrict her caloric intake throughout the pregnancy to 1200 kcal daily and having strictly followed those indications. In the 35th week of pregnancy she was admitted to hospital due to non-reassuring cardiotocography (CTG) tracings and suspected IUGR. On the day of admission the estimated fetal weight (EFW) was 1911 g. The growth retardation was of more than three weeks for the EFW. In detail: two weeks for the head circumference (HC) 299 mm — 33w1d, three weeks for the biparietal diameter (BPD 88 mm — 32w2d), four weeks for the abdominal circumference (AC) 274 mm — 31w3d. The medial cerebral artery flow peak index (MCA PI) was 0.99 (1st percentile) and umbilical artery flow peak index (UA PI) was 1.44 (96th percentile), giving the cerebral-placental ratio (CPR) of 0.69 — circular centralization.

The patient was submitted to constant fetal CTG monitoring and received one dose of 12 mg betamethasone intramuscularly. The blood glucose and blood pressure were monitored, basic blood exams were taken. Because of reduced variability and repetitive decelerations in the CTG tracings during hospitalization, the tracings were classified to be pathological and urgent cesarean section after 11 hours of hospitalization was performed. The male newborn weighed 1690g (< 1st percentile) and received 9 Apgar points on the 1st and 10 points on the 3rd, 5th and 10th minute of life.

Case 2

The second patient was a 34-year-old female in her second pregnancy, with a history of one spontaneous abortion. She underwent LRYGB in July 2009. Her weight before the operation was 137.5 kg, with a BMI of 49.3 kg/m^2. The patient had a maximum weight loss of 67.6 kg and reached a BMI of 25.06 kg/m^2, achieving %EWL 99.7%. The time-to-conception interval was seven years. Before the pregnancy her body weight was 83.7 kg, with a BMI 30.01 kg/m^2. Her weight gain during pregnancy was 4.3 kg with the maximum weight of 88 kg and BMI of 31.55 kg/m^2 at the end of pregnancy. The patient had a history of depression and a suicide attempt before pregnancy, with no medications taken during pregnancy and under care of a psychologist. She was treated for severe anemia before pregnancy with iron given parenterally. The treatment was continued during pregnancy, having resulted in normal parameters of hemoglobin and blood count. The patient also monitored her own blood pressure, with generally normal readings, without need of introducing medications. The patient had been advised about her optimum daily caloric intake in pregnancy, but she admitted having restricted herself to a maximum of 1500 calories daily due to her fear of regaining weight during pregnancy, without having informed her obstetrician about this decision. She received supplementation with prenatal vitamins. In an ultrasound examination performed in the 28th week of pregnancy IUGR was diagnosed — EFW was 862 g (26w1d). In detail: biparietal diameter for 27 weeks 4 days (69 mm), HC for 26 weeks (248 mm) and AC lower than 2nd percentile (198 mm — 24w3d). Blood flow in MCA, UA and in the left uterine artery was normal as well as placental-cerebral ratio. The left uterine artery flow was normal, whereas in the right uterine artery (RUt) flow notch was present and the peak volume index (PI) was augmented.

The patient was admitted to hospital in the 28th week of pregnancy due to suspected IUGR and abnormal flow in the right uterine artery. After admission, constant CTG was introduced and after two days of normal tracings changed to CTG six times daily, with normal tracings throughout the stay. The patient received two doses of betamethasone 12 mg intramuscularly. In repeated ultrasound examinations, the RUt PI continued to be augmented, whereas MCA PI and UA PI were normal. In the ultrasound examination performed in the 33rd week of the pregnancy, the retardation growth in EFW and AC was of three weeks. In the 34th week the patient left the hospital against medical advice. In the 36th week of pregnancy she had a cesarean section (for psychiatric indications — she was diagnosed with tocophobia) performed in another hospital. The newborn weighed 2095g (5th percentile) and had an Apgar score of 10.

SUMMARY

The problem of optimum daily caloric intake, vitamin and micronutrients supplementation in pregnancies after bariatric surgery is presently discussed in the literature. Optimum care and advice for bariatric patients have to be diversified, as malabsorptive and restrictive operations lead to different changes in metabolism, nutrition and hormonal balance. Changes in gastric pH, dumping syndrome and problems with absorption may lead to vitamin and micronutrient deficiencies. These aspects are widely presented in the literature on the subject. Although there are international recommendations considering vitamin and micronutrients in pregnancy after bariatric surgery, they are not adequately implemented and followed [3]. The novelty of

our study is presentation of two important problems considering bariatric patients' nutrition in pregnancy, up-to-date knowledge in the group of obstetricians managing these patients and patients' adherence to their doctors' indications. International recommendations are clear and univocal about adequate caloric and protein intake, micronutrient and vitamin supplementation in pregnancies after bariatric surgery and easy to be followed. However, due to symbolic presence of problem of pregnancy after bariatric surgery in our national recommendations, unfortunately the international recommendations are not generally followed. Specific recommendations should be created and introduced in our country as soon as possible to avoid situations where patients are advised by their obstetricians to keep their caloric intake in pregnancy at the level of 1200kcal daily. Additionally, we have to remember that some of the patients keep restricted diet in a fear of gaining weight. Most patients after bariatric surgery have gone through a period of hard work, diet and exercises in order to lose weight and many of them are afraid of regaining weight during pregnancy. Therefore, they restrict caloric intake in pregnancy, often against indications of their obstetricians or not informing them about their nutritional doubts, sometimes to a level which could be harmful to the fetus. The problem of direct and sincere communication between a patient after bariatric surgery and their obstetrician cannot be overemphasized. The role of a dietician nutritionist and psychologist is very important in planning the nutrition of a pregnant bariatric patient. Insufficient maternal caloric and vitamin intake may lead to retardation of the intrauterine growth of the fetus. The problem of malnutrition in pregnancy may influence the level of IUGR, bariatric surgery itself already being a risk factor.

The vast majority of studies analyzing the impact of bariatric surgery on the fetal growth retardation show an increased risk of IUGR and small for gestational age (SGA) infants [4–6]. The important question is whether there are differences in the incidence of IUGR and SGA after different types of bariatric surgery.

Chevrot et al. [7] analyzed 139 cases of women who had undergone bariatric surgery and they found a 2-fold increase in number of SGA infants. RYGB was stated to be an independent risk factor for fetal growth retardation. Unlike patients after RYGB, patients with purely restrictive surgery (mainly gastric banding) included in the study had no increase in the SGA rate. The differences in the incidence of IUGR between malabsorptive and purely restrictive surgery are also shown in other studies. Facchiano et al. [8] analyzed 42 cases of pregnancy in 36 women after bariatric surgery, 19 after laparoscopic adjustable gastric banding (LAGB) and 17 after RYGB. The mean birth weight was found to be lower in the RYGB group (2984 g) than in the LAGB group (3225 g). Sheiner et al. compared the results of 298 pregnancies after bariatric surgery with a control group and found the risk of IUGR to be 2.5 times higher after bariatric surgery than in the general population [9].

Johansson et al. [10] presented an analysis of 670 pregnancies after bariatric surgery, 98% of operations were gastric bypass. The study demonstrated that bariatric patients had a higher risk of SGA infants than obese population without a history of bariatric surgery – 15.6% vs 7.6%. Kjaer et al. [11] reviewed 339 cases of singleton deliveries in Denmark from January 2004 to December 2010 in women with prior bariatric surgery, 84.4% of whom had undergone RYGB. Mean birthweight of the children was lower (3312 g) in patients after bariatric surgery than the control group (3585 g). The risk of SGA was 2.3 higher in women after bariatric surgery than in a matched group of women with no history of bariatric surgery. An increased risk of IUGR after RYGB was also observed by Belcastro et al., who reviewed pregnancy outcomes of 44 patients who had undergone RYGB 18 to 48 months before pregnancy. They found 9 cases (20.5%) of IUGR, which was significantly higher than in the general population [12].

Contrary to those presented above, there are also studies that do not show any impact of bariatric surgery on the incidence of IUGR and SGA. Aricha-Tamir et al. [13] analyzed 144 cases of women who had paired pregnancies before and after bariatric surgery from 1988 to 2008 and found no significant differences in the SGA rate.

One of the most important questions is the influence of laparoscopic sleeve gastrectomy (LSG) on the fetal intrauterine growth. Amounting 64.6% of all bariatric procedures, LSG remains the most popular bariatric procedure both in our country and worldwide, but there are few studies analyzing its impact on the pregnancy course and neonatal outcomes. A study by Coupaye et al. [14] included 123 pregnancies after bariatric surgery, 77 after RYGB and 46 after sleeve gastrectomy (SG). They observed a comparable rate of IUGR and SGA after RYGB and SG, positively associated with protein supply and negatively with the pregnant woman's iron status. Rottenstreich et al. [15] conducted a retrospective case-control study, comparing 119 patients after LSG with obese controls. The study group had an increased risk of SGA neonates — 14.3% vs 4.2% in the control group.

To conclude, the influence of bariatric surgery on the pregnancy course and neonatal outcomes is widely discussed in the literature. Bariatric procedures reduce the incidence of obesity-related pregnancy complications, such as GDM, pregnancy-induced hypertension or large for gestational age neonates, but also have negative impact on the absorption of vitamins and micronutrients, leading to their deficiencies in pregnancy that may influence the fetal growth. Most common bariatric procedures, such as

SG and RYGB are associated with an increased risk of IUGR and SGA. Analysis of the factors influencing the fetal growth after bariatric surgery remains subject of current and future studies. Optimum supplementation and diet are crucial for a pregnant bariatric patient and such care should be provided by a specialist in nutrition. Valid knowledge of obstetricians taking care of bariatric patients, sincere contact with their patients and helping them with adherence to dietary recommendations is extremely important for the optimum pregnancy and fetal outcomes. Nevertheless, there is a strong need of implementing international recommendations about pregnancy nutrition care after bariatric surgery in our country, so that they are easily available both for pregnant patients and their obstetricians.

Conflict of interest

None.

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