Thieme

Fertility, Pregnancy and Lactation After Bariatric Surgery – a Consensus Statement from the OEGGG

Fertilität, Schwangerschaft und Stillzeit nach bariatrischen Operationen – eine OEGGG-Stellungnahme

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ABSTRACT

Bariatric surgery is recommended when other weight loss interventions, such as lifestyle modification or medications, have failed. A considerable number of women undergoing bariatric surgery are of childbearing age; hence, it is necessary to be aware of the effects of bariatric surgery on pregnancy for managing these patients. Although bariatric surgery is associated with positive effects on cardiovascular and metabolic parameters, side effects such as anaemia, the risk of developing internal hernia, altered glucose metabolism and the risk of small for gestational age offspring have to be considered. Pregnant women with a history of gastric bypass should not undergo the oral glucose tolerance test (OGTT) due to the high risk of hypoglycaemia. There are no contraindications for vaginal delivery and breastfeeding. This paper has been published as a consensus statement by the Austrian Society of Gynaecology and Obstetrics (OEGGG).

ZUSAMMENFASSUNG

Bariatrisch-chirurgische Maßnahmen werden zunehmend eingesetzt, wenn andere Interventionen wie die Lebensstilmodifikation oder eine Pharmakotherapie versagt haben. Vor allem ist auch eine steigende Anwendung dieser Eingriffe an Frauen im gebärfähigen Alter zu beobachten. Daher ist es notwendig, sich mit den Auswirkungen der bariatrischen Chirurgie auf Schwangerschaft und Geburt auseinanderzusetzen. Neben den positiven Effekten auf kardiovaskuläre und metabolische Parameter, müssen mögliche Nebenwirkungen wie mütterliche Anämie, ein erhöhtes Risiko für intraabdominelle Hernien, ein veränderter Glukosestoffwechsel sowie ein erhöhtes Risiko für eine fetale Wachstumsrestriktion beachtet werden. Der oGTT (oraler Glukosetoleranztest) ist bei Patientinnen nach einer bariatrisch-chirurgischen Intervention kontraindiziert, da dieser ein erhöhtes Risiko für hypoglykäme Episoden birgt. Für die vaginale Geburt und für das Stillen besteht keine Kontraindikation. Dieser Artikel wurde als Stellungnahme durch die Österreichische Gesellschaft für Gynäkologie und Geburtshilfe (OEGGG) veröffentlicht.

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Summary of Recommendations

1. Preconceptional counselling: The patient should be informed by an experienced obstetrician about the possible complications of pregnancy following gastric bypass (increased risk of foetal growth restriction, malnutrition, dumping syndrome, unreliability of the OGTT in diagnosing gestational diabetes, internal hernia, premature delivery). Patients who do not wish to have a child must be apprised of the reduced efficacy of oral contraceptives.
2. First presentation: Measurement of HbA_{1c} and fasting blood glucose, iron status, vitamin status, calcium and parathyroid hormone, nutritional supplementation, if necessary endocrinological assessment, repeating once per trimester (close monitoring as needed)
3. Explanation of the development of dumping symptoms, recommendation of a carbohydrate-modified diet, involvement if necessary of a dietologist
4. Monthly ultrasound checks with biometrics
5. Determination of diurnal blood glucose profile between week 24 and 28 of pregnancy for at least one week, or as of week 14–16 of pregnancy until delivery, depending on patient compliance
6. No contraindication for vaginal delivery
7. No contraindication for breastfeeding (breastfeeding should be recommended)
8. Appropriate nutritional supplementation during lactation

Background

Up to 21.1% of women in Austria aged 30 to 45 years are overweight (BMI 25–29.9 kg/m^2) and 9.1% obese (BMI ≥ 30 kg/m^2) [1]. Decreased fertility and complications of pregnancy such as diabetes, hypertension, pre-eclampsia and neonatal macrosomia are frequently reported in this population [2, 3].

Weight loss achieved by a change in lifestyle, drug therapy or bariatric surgery is associated with improved fertility and reduced rates of complications during pregnancy [4, 5].

Bariatric surgery is the most effective method for achieving weight loss [6]. Bariatric surgery is indicated above a BMI of ≥ 40 kg/m^2 or at a BMI of 35–40 kg/m^2 with associated comorbidities (possibly even at a BMI of > 30 to < 35 kg/m^2 in case of type 2 diabetes). The procedure may entail a restrictive or malabsorptive technique, or a combination of the two [7, 8].

Bariatric surgery is being offered increasingly to patients of childbearing age. It is therefore necessary to be aware of its effects on pregnancy and childbirth. In addition to the potential positive effects on cardiovascular [9] and metabolic parameters [10], potential adverse effects such as maternal anaemia [11], an increased risk of intra-abdominal hernias [12], impaired glucose metabolism [13] and a higher risk of foetal growth restriction [14] must be afforded closer attention.

Methods

The references for this consensus statement were extracted from the PubMed and MEDLINE databases using the following MeSH keywords: “obesity”, “bariatric surgery”, “pregnancy and bariatric surgery”, “obesity and fertility”, “obesity and pharmacology”, “obesity and bariatric surgery”, “obesity and diabetes”, “diabetes and pregnancy”, “gestational diabetes and hypertension”, “obesity and hypertension”, “bariatric surgery and hypertension”, “obesity and heart disease”, “bariatric surgery and heart disease”, “gastric bypass and anemia”, “gastric bypass and hyperparathyroidism”, “bariatric surgery and vitamin D”, “dietary supplements and gastric bypass”, “gastric bypass and abdominal hernia”, “fetal macrosomia”, “infant, small for gestational age”, “breastfeeding and bariatric surgery”. Longitudinal studies such as cohort studies and systematic reviews (including meta-analyses) were given preference in the compilation of this consensus statement. In addition, the guidelines of the American College of Obstetricians and Gynaecologists (ACOG) on the care of patients during pregnancy and delivery after bariatric surgery were taken as a reference.

Preconceptional Aspects

Obesity is often associated with hyperandrogenaemia and polycystic ovary syndrome (PCOS). Follicle growth and oocyte maturation are impaired by the compensatory hyperinsulinaemia and often increased insulin resistance secondary to PCOS, resulting in reduced fertility [15, 16]. Hence, even young women who are overweight must often rely on assisted reproductive technologies (ART) to fulfil their desire for a child. Obesity is thus considered a risk factor for a lower number of eggs and embryos of poorer quality, accompanied by decreased rates of pregnancy and live birth [17]. Weight loss surgery appears to have a positive effect on hyperandrogenaemia in most female patients [18], and spontaneous conception has been achieved in up to 58% of infertile women following surgery [19]. Patients having undergone ART before and after bariatric surgery were found to have an increased number of eggs, better egg quality, and higher live birth rates during postoperative treatment cycles [20].

Patients who do not wish to have children must be informed that the efficacy of oral contraceptives could be reduced as a result of the operation (especially in the case of malabsorptive procedures) and that parenteral dosage forms or non-hormonal methods should be considered in the choice of a suitable contraceptive method [21].

Pregnancy after Bariatric Surgery

Glucose metabolism and gestational diabetes

Bariatric surgery reduces the risk of gestational diabetes [11, 22], but malabsorptive procedures in particular can cause fluctuations in blood glucose. In the 2 h OGTT, for instance, lower fasting glucose concentrations and an excessive increase in blood glucose were noted 60 min after glucose delivery followed by hyperinsulinaemic hypoglycaemia after 120 min. Consequently, it can be difficult to diagnose gestational diabetes as the OGTT does not deliver reliable results [13]. Alternatively, subcutaneous glucose could be measured continuously or capillary glucose measured repeatedly in the context of a diurnal blood glucose profile [23, 24]. A diurnal blood glucose profile is recommended as of week 24 to

28 of pregnancy (also earlier, if necessary) [23]. The target values are < 95 mg/dl (fasting) and < 140 mg/dl (1 h postprandial). No screening test is available as yet for gestational diabetes in pregnancy after weight-loss surgery. To rule out any pre-existing diabetes mellitus, the HbA_{1c} value (and fasting glucose in addition) should be determined at the first gynaecological examination [23].

Attention should also be paid in this patient population to the issue of a dumping syndrome (especially hypoglycaemia after carbohydrate intake). Early dumping syndrome occurs 15 min to 1 h after a carbohydrate-rich meal and is characterised by transient arterial hypotension, reflex tachycardia, flush, hyperhidrosis and even syncope [25, 26]. Late dumping syndrome develops two to three hours after a meal and is caused by excessive insulin secretion with reactive hypoglycaemia and corresponding symptoms [25, 26]. Standard treatment consists of a modified diet, mainly the avoidance of rapidly absorbed carbohydrates. Pharmacological interventions are not indicated in pregnancy, as insufficient data are available [25]. If a dumping syndrome is suspected, dietary advice from a dietologist or specialist with an additional qualification in nutritional medicine is recommended with a view to introducing a carbohydrate-modified diet.

Nutrient uptake

Bariatric surgery, especially when malabsorptive procedure is used, influences the uptake of micronutrients and macronutrients.

Several studies suggest a higher rate of iron deficiency anaemia following bariatric surgery [5, 27 – 29]. Therefore, the iron status should be checked even before conception, if possible, and closely monitored during pregnancy. The current recommendations for iron replacement in pregnant women having undergone bariatric surgery range from 40 mg to 600 mg per day [30 – 32]. The iron status should be checked during each trimester of pregnancy as a minimum [33].

Vitamin B_{12} deficiency has also been observed in pregnant women who have had bariatric surgery (5,34). A sublingual dose of 350 µg/day or intramuscular administration of 1000 µg every 4–12 weeks is currently recommended with respect to supplementation [30, 32]. The vitamin B_{12} status should likewise be monitored in each trimester [33].

Very obese patients are frequently found to have vitamin D_3 deficiency; of patients in whom bariatric surgery is planned, up to 84% are affected [35]. Elevated parathyroid hormone concentrations may also be noted in preoperative patients due to decreased levels of vitamin D and calcium [35 – 37]. Bariatric surgery using a malabsorptive procedure, in particular, appears to intensify this problem. It has been reported that up to 73.6% of patients develop secondary hyperparathyroidism five years after surgery despite vitamin D supplementation [36], with long-term effects on bone health [32, 38]. As an adequate maternal calcitriol concentration and the resulting increase in calcium absorption are important to foetal bone mineralisation, a sufficient supply of vitamin D_3 and calcium is essential in patients who have had bariatric surgery [30]. There is no global consensus on supplementation; current literature describes doses of 1000–2000 mg calcium citrate [30 – 32] and 50–150 µg or 1000 IU vitamin D_3 per day [30, 32], including regular laboratory tests and ultrasound checks for assessing foetal growth [30, 33, 39].

At present there is no evidence of an increased risk of folic acid deficiency in pregnant women following bariatric surgery [34, 40], provided this patient population likewise receives supplementation at the standard recommendation of 400 µg folic acid per day [31, 32, 39]. The folic acid concentrations should still be monitored in each trimester [33, 39].

Other deficiencies observed in pregnant women post bariatric surgery involve vitamins A and K. There is no general consensus with respect to supplementation of either vitamin, but several authors suggest that regular checks and, if necessary, supplementation is necessary, whereby in the case of vitamin A in particular attention must be paid to its potential teratogenicity, and daily dose of 5000 IU/day (ideally in the form of β-carotene) should not be exceeded [30, 32]. Furthermore, a dose of 15 mg zinc per day and daily supply of at least 60 g of protein are recommended [30, 31, 33].

Pre-eclampsia

The growing incidence of pre-eclampsia worldwide is associated, among others, with the rise in pathological obesity [41 – 43]. Whereas approximately 2–8% of all pregnant women suffer pre-eclampsia [44], it can affect up to 13% of patients with grade 3 obesity [41]. Numerous studies have confirmed that bariatric surgery prior to conception can reduce the risk by up to 75% compared with an obese control group [45] in whom surgery was not performed [5, 46 – 50]. The effect appears to be more pronounced during the first two years postoperatively [51].

Foetal development

Several studies suggest that the risk of a foetus being small for gestational age (SGA) is increased in pregnancy after gastric bypass [14, 51, 52]. This complication could be related to the amount of weight lost by the mother and the surgical technique, as the risk of SGA appears to be less pronounced after a purely restrictive intervention [14]. The direct consequence of foetal adaptations in an undernourished mother [53] are metabolic effects reported in SGA children lasting through to adulthood [54]. At present, long-term data on the children of mothers having undergone bariatric surgery are still sparse; hence, so far only a limited assessment can be made regarding the extent to which the postoperative intrauterine conditions could influence the child's later development.

The increased risk of premature delivery (spontaneous or medically induced) must be noted, moreover, especially if the woman becomes pregnant during the first year after bariatric surgery. This could be attributable to increased weight loss during pregnancy, which may result in foetal malnutrition and premature delivery [55]. The data in this respect are not conclusive. In several studies, no significant correlation could be found between the increased risk of premature birth and prior bariatric surgery [51, 52]. The American College of Obstetricians and Gynecologists (ACOG) [33] and other authors [32] recommend delaying pregnancy until at least 12–18 months after bariatric surgery, but this is not supported by all current studies [56]. Obstetricians must bear in mind

that the optimal timing for pregnancy following gastric bypass has not yet been ascertained.

The literature reports that, compared with normal pregnancies, there is a slight but not statistically significant increase in the rates of intrauterine foetal death (IUFT) and perinatal mortality after bariatric surgery [52].

Growth checks at intervals of several weeks and registration with a perinatal centre are advisable with a view to preventing or minimising long-term consequences.

Surgical complications

The incidence of herniation after gastric bypass can reach 5%. Pregnant women have an even higher risk after bariatric surgery, possibly due to increased intra-abdominal pressure exerted by the pregnant uterus on the intestine [57]. In the event of acute abdomen, the obstetrician must also consider internal hernia and refer the patient with a view to surgery. If internal hernia is suspected, the patient should fast and be admitted for pain management and monitoring. If the pain recurs after building up the diet, subacute surgery should be performed. If the pain symptoms persist despite treatment and fasting, acute surgery will be necessary to prevent intestinal necrosis and foetal complications [58]. Timely diagnosis and treatment of an intra-abdominal hernia are crucial to maternal and foetal health, as deaths of both mother and child have been reported in the literature [59].

Lactation

Malabsorption and subsequent malnutrition are widespread consequences following bariatric surgery. Current studies are examining whether this nutrient deficiency affects the composition of breast milk; the data available so far provide no indication that the composition of the breast milk is inadequate after bariatric surgery [60]. In the light of current data, breastfeeding is certainly to be recommended [32, 60].

Conclusion

Bariatric surgery is associated with maternal and foetal effects on pregnancy [5]. Preconceptional counselling from the obstetrician is urgently recommended to ensure that the woman is aware of the potential risks of pregnancy following bariatric surgery. At first presentation during pregnancy, blood should be taken to determine the iron and vitamin status and intervene, where necessary. The patient should be informed about the symptoms and the avoidance of a dumping syndrome, and a diurnal blood glucose profile should be taken between week 24 and 28 of pregnancy [23]. The OGTT is contraindicated in pregnancy after bariatric surgery due to the increased risk of hypoglycaemia [13]. Regular ultrasound checks are recommended for monitoring foetal growth. Vaginal delivery and breastfeeding are not contraindicated.

Conflict of Interest

The authors declare that they have no conflict of interest.

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