



Nutritional Requirement Post Bariatric Surgery Pregnancy

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Abstract

Obese woman encounter problems with fertility and higher incidence of complications like still birth, gestational diabetes, pre-eclampsia, thromboembolism and maternal accrete. Bariatric surgery is now available as an option for morbidly obese patients where life style or medications to control obesity have become ineffective. Mild nutritional deficiencies are frequent after bariatric surgery. Pregnant woman requires additional Vitamin B12, folate, iron, calcium, protein and fat soluble vitamins to meet up the increasing demand. We present a brief review of the current recommendations for nutritional supplementation in post bariatric surgery pregnancies.

Keywords: Post bariatric surgery pregnancy; BMI; Pre-eclampsia

Introduction

Obesity is one of the major public health concerns in 21st century. It is defined as defined as a BMI ≥ 30 kg/m². As per WHO estimates that 39% of adults worldwide are overweight (BMI ≥ 25 kg/m²) and 13% are obese (BMI ≥ 30 kg/m²) [1]. Obesity is associated with an increased risk of developing various medical conditions including Type 2 Diabetes Mellitus (T2DM), coronary artery disease, fatty liver disease, obstructive sleep apnea and osteoarthritis [2].

Obese woman encounter problems with fertility [3,4] and higher incidence of complications like stillbirth, gestational diabetes, pre-eclampsia, thromboembolism and maternal death [5]. They have higher likelihood of caesarean sections, post-partum hemorrhage and poor wound healing [6]. Bariatric surgery has evolved as an effective cost effective treatment of obesity in recent years [7]. More and more woman go for bariatric surgery [8,9] which results in improved fertility outcome but complications due to surgery are also noted during pregnancy [10].

Bariatric surgery [11] can be: restrictive or malabsorptive procedures or a combination of both. Roux-en-Y Gastric Bypass (RYGB), the sleeve gastrectomy and the adjustable gastric band are most commonly employed surgical techniques. RYGB is a combined malabsorptive and restrictive procedure which consists of a horizontal partitioning of the upper part of the stomach to create a gastric pouch. 75 cm to 150 cm of the small intestine are used to create the alimentary limb which carries ingested food to the bowel without the addition of biliopancreatic secretions which are carried directly into the bowel through the biliopancreatic limb, typically 30 cm to 60 cm in length. Sleeve gastrectomy a restrictive procedure creates a small gastric pouch whereas in adjustable gastric banding a band is placed 1 cm to 2 cm below the gastroesophageal junction. Both the procedures can be done as laparoscopic procedures.

There is no international consensus about management of pregnancy after BS. Even though BS seems to reduce obesity-related fertility issues and adverse pregnancy outcomes [12,13] obstetricians have to consider pregnancy related complications possibly caused by BS [14]. The standard recommendation of the ACOG for women wishing to conceive after BS is to delay pregnancy for at least 1 to 1.5 years after surgery [14], which is also supported by the obesity management task force of the European Association for the Study of Obesity [15].

Antenatal Care

Nutrient deficiencies following bariatric surgery can be exacerbated by pregnancy symptoms such as morning sickness or hyperemesis, gastro-esophageal reflux, abdominal bloating and pressure symptoms [16]. Women who become pregnant following bariatric surgery should have nutritional surveillance and laboratory screening for deficiencies every trimester [17].

Following bariatric surgery, patients are advised to adopt a regular eating pattern, aiming to include three small, balanced meals per day that include protein, vegetables/salad and a small amount of carbohydrate. In woman with higher complaints of nausea the advice to eat little and

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often is of greater importance.

Pregnant women should avoid any further weight loss during pregnancy, instead focusing on a balanced, varied dietary intake. Weight gain during pregnancy of 6 kg in those with a BMI > 25 kg/m² should be expected, and no more than 12 kg in women of a healthy BMI [18]. Energy intakes during pregnancy increase by 200 kcal/day, but only in three final three months of pregnancy [19].

Protein

A reference nutrient intake of 0.75 g of protein per kg of body weight plus an additional 6 g/day in pregnancy is recommended [19]. The causes of protein insufficiency include reduced intake, intolerance of protein-rich foods or procedures that lead to malabsorption such as biliopancreatic diversion or a Roux-en-Y gastric bypass with longer roux limb length [20]. Childhood protein deficiency is risk factor for cardiovascular disease in later life [21]. Protein deficiencies are also associated with poor wound healing, which may be of particular concern as caesarean section rates are higher amongst obese women. The edema as a consequence of bariatric surgery could be misinterpreted as a normal symptom of pregnancy or as a sign of pre-eclampsia by those unaware of bariatric surgery complication.

Iron

The most common nutritional deficiency post bariatric surgery is Iron deficiency anemia [22]. It occurs due to reduced gastric PH that hinders with iron absorption, use of proton pump inhibitor, dietary restrictions and removal of absorption sites like ileum and duodenum. WHO defines anemia in pregnant woman as hemoglobin less than 11 mg/dl with iron deficiency anemia been the most common anemia accounting for 50% of cases [23]. Iron deficiency anemia has detrimental effect on pregnancy causing preterm delivery, low birth weight of fetus [24] and on maternal side it leads to higher propensity for cesarean section and post partum hemorrhage [25]. American college of obstetrics and gynecology {ACOG} recommends 27 mg/day of elemental ferrous iron supplementation and 40 mg/day elemental iron in post bariatric surgery pregnancies [26]. The WHO recommends 30 to 60 mg/day elemental iron supplementation in pregnancy [27]. Iron supplementation in post bariatric surgery pregnancy should not be done without monitoring of routine CBC, iron, ferritin levels at every trimester [14].

There is interplay of pathophysiology of iron, obesity and pregnancy. Obesity being a state of chronic inflammation with increasing evidence of increased acute phase reactants like Hepcidin which inhibit enterocyte iron absorption leading to decreased Iron levels and stores in the body. Pregnancy on the other hand is characterized by expansion of blood volume and hence increased demand of iron in pregnant state. Interestingly, bariatric surgery results in weight loss which causes lowering of Hepcidin levels that eventually improve iron status [28].

Vitamin B12 and folate

Vitamin B12 deficiency is attributed to decreased intrinsic factor and malabsorption post bariatric surgery. B12 deficiency manifests as nausea, weakness, pancytopenia, sensory neural disturbances and megaloblastic anemia. In a study by Bebbler et al. [29] 50% pregnant woman had B12 deficiency after bariatric surgery. The other studies from literature suggest B12 deficiency after RYGB procedure between 4% to 62% [30,31]. The supplementation dose of vitamin B12 for post bariatric pregnant woman is 1 mg intramuscular hydroxyl-cobalamin

at every three months [32]. A preoperative and annual screening for vitamin B12 followed by supplementation of 1000 microgram/day orally or 500 microgram/week intranasal route or 1000 microgram/week intramuscularly is recommended [33].

Folic acid deficiency results due to low gastric PH and decreased absorption capacity although it is rare after all bariatric procedures [34]. Megaloblastic anemia, neural tube defects and rare fetal myelomeningocele have been reported in literature [35]. The American association of clinical endocrinology recommends pre and post screening after malabsorption and combine bariatric surgery. Wang et al. [36] in their studies did not encounter folic acid deficiency in their study on post bariatric surgery pregnant woman. However general screening at each trimester and supplementation is recommended at usual doses for folic acid [33]. The dose of folic acid is 400 micrograms/day from preconception period till 12 weeks of pregnancy [36]. Post bariatric surgery an additional 5 mg/day of folic acid is recommended.

Other vitamins

Vitamin A is a fat soluble vitamin having anti oxidant properties and helps in cell signaling modulation in various metabolic pathways in body but there are weak indications in literature to suggest that vitamin A reduces maternal infections [37]. For post bariatric surgery pregnancies it's supplementation in beta carotene form in daily dose not exceeding 5000 IU is recommended [38-40].

Hyper emesis gravidum is seen in 0.3% to 3.6% of pregnant woman after bariatric surgery leading to dehydration, electrolyte imbalance and gastric band slippage [41,42]. Wernickes encephalopathy is a serious disorder following thiamine deficiency [43] and it is therefore prudent approach to supplement thiamine before dextrose or parenteral nutrition and in all those cases where thiamine deficiency is suspected [44].

Vitamin C, B9 and trace elements like Selenium have an important role in enzymatic reactions but no adverse effect on pregnancy have been observed in literature studies [45] but supplementation of vitamins is recommended following bariatric surgery in pregnant woman [38,39,46].

Vitamin D and Calcium

Vitamin D and Calcium homeostasis is vital for fetal skeletal mineralization. Vitamin D decreases urinary excretion of calcium and causes increased resorption from bone. The propensity of post bariatric surgery vitamin D deficiency is not well elucidated in literature [47]. Increased calcium requirements during last trimester of pregnancy are well documented. Calcium supplementation in pregnancy and lactation are recommended in doses 700 mg/day [48] and post bariatric surgery 1500 mg/day [49] respectively in calcium citrate form as it has better absorption at reduced gastric PH [50] Vitamin D levels post RYGB have been found to be <29 ng/ml in spite of supplementation however minimal adverse effects have been seen in literature studies [51] Vitamin D deficiency poses risk of IUGR and Preeclampsia [52], its supplementation in dose of 800 IU/day [53] is suggested as well as screening once in every trimester [54].

Dumping obstacle to nutrition

Dumping is a noted side effect following gastric bypass surgeries and sleeve gastrectomy. Early dumping occurs due to rapid transit of ingested food due to vasoactive amines causing abdominal pain, diarrhea, palpitations and hypotension [55]. It is always advisable to

take small meals in divided daily intake say 6 meals to prevent dumping episodes. Liquid intake following meals should be postponed for 30 min and lying down for 30 min to reduce vasomotor symptoms [56].

Late dumping occurs after 1 h to 3 h of carbohydrate intake which is primarily mediated by in cretin. It causes reactive hypoglycemia causing diaphoresis, tremors and palpitations [55]. Limited pharmacotherapy interventions are available for pregnant woman. Pectin and guar gum have been tried in some patients with some success in studies from literature [56].

Oral glucose tolerance test is done in pregnant woman but for those with history of bariatric surgery the interpretation of the test may be difficult and therefore capillary blood monitoring is recommended before and after meals at 24 to 28 weeks of pregnancy [57].

Conclusion

The pregnancy should be delayed minimally for a year post bariatric surgery [58] due to rapid weight loss in the post operative year. It is based on the theory that a pregnancy occurring during a period of malnutrition could lead to adverse outcome like low birth weight and malformation. A comprehensive preconception and antenatal care of nutrition is recommended for pregnant woman post bariatric surgery with specialist monitoring and management by multidisciplinary approach.

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