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Nutritional Management of Bariatric Surgical Patients in the Peri-operative Setting

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Abstract

Bariatric surgical treatments have increased in recent history, largely due to the growing rates of obesity. In light of this, correct nutritional management of these patients peri-operatively is as crucial as ever. This article describes the evidenced-based approach to the nutritional management of patients in the setting of bariatric surgery in order to achieve the best possible outcome post-operatively.

Keywords: Nutrition; Low calorie diet; Bariatric surgery; Obesity

Introduction

Bariatric treatments have sharply increased due to the rise in severe obesity that has been ineffective against diet, exercise, and medical therapy [1]. This, in addition to the introduction of laparoscopic procedures, is proposed to be the reason behind the number of bariatric procedures doubling in number over the past decade [2,3]. Furthermore, bariatric surgery is justifiable given its documented impact on comorbidities associated with obesity, with a decrease in post-operative weight known to improve features of metabolic syndrome [4,5]. However, it is also important to maintain this post-operative weight loss with appropriate nutrition. Furthermore, an equally important part of post-operative diet is pre-operative nutrition in order to maximise the successful outcome of surgery. This review focuses on the perioperative and post-operative long-term nutrition of patients in the setting of bariatric surgery.

Pre-operative nutrition

In the 2-4 weeks leading up to bariatric surgery, surgeons tend to place their patient patients on a very-low calorie diet (VLCD) [6]. VLCD aims to provide patients with low energy intake, whilst also maintaining a high protein formula, the combination of which results in rapid weight loss, adequate satiety for a few days, and minimises loss of fat-free mass [7,8]. VLCD has been clinically proven to induce weight loss [9]. With the intention of optimising safety of the procedure, pre-operative weight loss is ideal. The primary reason for this is that it reduces liver volume, provides greater surgical access, and reduces peri-operative complications [10,11]. The role of VLCD in having these effects can be appreciated when considering the fact that excessive intrahepatic deposition of fat has complicates the technical aspects of surgery and increase operating time [12,13]. Furthermore, an enlarged liver has been reported to be the most common cause for conversion to an open procedure during laparoscopic gastric bypass and gastric banding [14,15].

It is significant to note that while some VLCD programs may extend for over 12 weeks, research has demonstrated that 80% of the decrease in liver volume in response to VLCD is achieved after the initial 2 weeks [16]. Furthermore, there is concern that an aggressive or prolonged form of this diet may be associated with adverse outcomes such as impaired immunity and poor wound healing [13,17]. For this reason, in order to reach a balance between maximising weight loss, and minimising complications, the preference is to adhere to only 2 weeks of VLCD as is practiced in most Australian centres, with a product such as OptiFast.

This evidence strongly suggests that in the pre-operative setting, the patient should be commenced on a 2 week very-low calorie diet pre-operatively, such as Optifast, and to then be fasted from the day prior to the procedure.

To specifically define Optifast, it is a Nestle product that replaces the typical three meals per day, and patients instead consume five shakes per day, which provides 1906 kJ, including 70 g of protein, 15 g of fat, and 100 g of carbohydrates, as well as the recommended daily allowance of essential vitamins, minerals, and trace elements [10].

Post-operative nutrition: Short-term setting

In the early post-operative period, the patient is to return from theatre to the recovery, ward or high-dependency unit in a fasting state. It is important to note that the priorities in this time period are assessing for leak, minimising nausea and vomiting, as well as maintaining fluid balance [18]. It is also

important to note that the post-operative diet plans are generally surgeon or institution-specific, as well as the bariatric procedure-type specific. Typically, on post-operative day one, if there is a negative gastrografin leak test, patients are commenced on a clear fluid diet [18]. After this initial period in which the absence of a potential leak is confirmed, and nausea is minimal, it would be appropriate to upgrade the patient's current intake, and this is based on the texture and volume of food that the patient can tolerate. The patient's diet transitions from liquids to puree or blended foods, and then to solids [19]. Over the initial week, it is expected that most patients will be on fluids, and the transition in upgrading to solids is a slow process. Solid foods are commenced at approximately 10 to 14 days after surgery, once the gastrointestinal tract has healed and patients are able to tolerate more solid-textured foods. As described above, this is done whilst transition from a soft diet to a normal diet.

The goals of nutritional management in the early period following bariatric surgery patients is to promote intake of sufficient energy and nutrients to allow healing and preservation of lean tissue during the period of rapid weight loss after surgery and to consume foods that do not cause dumping syndrome, reflux or early satiety, while also limiting calorie intake [20]. To improve nutrition, it is also important to acknowledge the barriers to oral intake. Prophylactically charting pharmacologic treatment before the development of post-operative nausea and vomiting significantly reduces its incidence [21,22].

Based on this evidence, nutrition in the early post-operative period would be based on excluding a leak on radiology, and then slowly commencing fluids over the first two weeks, before upgrading to a soft diet and then eventually a full diet if the patient is able to tolerate doing so.

Post-operative nutrition: Long-term setting

A number of adverse effects or deficiencies have been noted following bariatric surgery, and because of this, the patient's diet needs to be adjusted to prevent against these. Guidelines from the American Society for Metabolic and Bariatric Surgery recommend nutrient assessments every three to six months in the first year after bariatric surgery, and annually thereafter with laboratory testing [19,23]. In order to account for the malabsorptive component of bariatric surgery, and prevent against these nutrient deficiencies, it is important for patients to comply with nutrition and lifestyle modifications, as recommended by the American Association of Clinical Endocrinologists [19]. It is significant to note that these malabsorptive effects following bariatric surgery are more frequent in procedures such as roux-en-Y gastric bypass and biliary pancreatic diversion [24].

Protein is the most significant component of the macronutrients that needs to be considered in long-term management of bariatric nutrition. 18-25% of patients suffer protein deficiencies after malabsorptive bariatric procedures, compared with only 2% of patients after restrictive bariatric surgery [25,26]. Protein malnutrition has potential to occur in bariatric surgery due to malabsorption from bypassing a segment of small bowel, or less frequently, from dietary restriction [24]. It is recommended that 1.1-1.5 g/kg ideal body weight/day of protein supply is needed for patients after bariatric surgery [19]. The recommended daily intake of protein is 56 grams/day for men and 46 grams/day for women. When considering how this is adjusted after a bariatric procedure, protein requirement during the post-operative weight loss phase should be calculated as 1.2 grams/kg body weight for preservation of fat-free mass [27]. The only exception to this rule is for patients who have undergone biliopancreatic diversion with duodenal switch, as this results in significant malabsorption, and therefore a higher protein intake of 1.5 to 2.0 g of protein/kg body weight per day [28].

Various vitamin deficiencies are also common after bariatric surgery. Fat soluble vitamins (A, D, E, K) are also a common deficiency following bariatric surgery, particularly in malabsorptive-type procedures such as roux-en-Y gastric bypass and biliopancreatic diversion [24,29,30]. Following any type of bariatric procedure, it is crucial that patients continue to meet the recommended daily allowance for fat-soluble vitamins in the general population. With regards to those following significant malabsorptive surgery, if there are no other complications, these patients should be commenced on supplements for all four of the fat-soluble vitamins as there is a high incidence of their associated deficiencies occurring [31]. When considering water-soluble vitamins of clinical significance, note that vitamin B12 deficiency is uncommon in the initial 12 months post-operatively due to existing reserves within the liver [32]. However, it is known to occur as time progresses, and therefore, should be monitored at regular intervals, and treated with supplements if necessary [29,31].

The most critical mineral deficiency occurring post-operatively with bariatric patients is that of iron [33]. Its pathogenesis is underpinned by the impaired ability of the intestinal tract to secrete adequate acid to reduce ferrous to ferric iron, as well as the reduced absorption of iron in the setting of a bypass [24]. The literature surrounding this is somewhat controversial despite several studies supporting the long-standing notion that bariatric surgery, particularly malabsorptive bariatric surgery, is linked with depletion of iron stores [34-37]. Another school of thought, based on recent cohort studies, is that the role of surgery has been over-estimated, or that bariatric procedures may exacerbate an already pre-existing iron deficiency, but do not serve as an initiating factor [29,32]. Regardless, there is an obvious need to monitor serum ferritin and iron levels in the body, and consider further iron supplementation if necessary.

Also part of nutritional management in these patients is avoiding the potential complication of dumping syndrome. Dumping syndrome refers to the rapid gastric emptying that occurs after bariatric surgery. Its underlying pathogenesis is related to the delivery of energy-concentrated food to the small intestine, which exerts local osmotic effects and delayed hypoglycaemic events [38,39]. The resulting clinical symptoms are uncomfortable, of which include vomiting, nausea, abdominal pain, diarrhoea, lethargy, and manifestations of post-prandial hypoglycaemia [40]. This is more prevalent with malabsorptive surgery, as with most complications, however, it is also treatable or preventable with appropriate nutritional

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modifications. These include consuming smaller and more frequent meals, as well as avoiding carbohydrate–dense foods, and separating solids from liquid intake by 30 min [24]. A second line therapy to consider when symptoms are refractory to lifestyle changes are administration of somatostatin analogues, such as octreotide 50 mg subcutaneously given 30 min prior to the meal [41].

The long-term management of nutrition following bariatric surgery is clearly quite complex, and best results are achieved with the assistance of a dietician. In terms of vitamin and mineral supplementation in the long-term, guidelines are available for prescribers [19,42]. These supplemental recommendations are very much procedure-specific depending on whether a malasborptive or restrictive operation was performed.

Conclusion

Bariatric surgery is an effective method of weight loss in obese patients, but is not the end of treatment. On-going careful nutrition is also of significance in ensuring patients both keep their weight low, whilst also consuming the necessary nutrients. The pre-operative diet is also important, but more so from an operative approach perspective. The nutritional management of malabsorptive procedures, such as roux-en-Y gastric bypass is much more complex due to the decreased bioavailability, and these patients are likely to benefit from stricter monitoring of deficiencies and on-going dietetics input.

Conflict of Interest

None of the authors have any competing interests.

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