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SURGERY FOR OBESITY AND RELATED DISEASES

Controversies in Bariatric Surgery

Effects of very low calorie diets on liver size and weight loss in the preoperative period of bariatric surgery: A systematic review

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Abstract Restrictive diet implementation in bariatric surgery (BS) preoperative period is common, although its benefits are not well established. This study aimed to assess the effects of very low calorie diets (VLCD) on liver size and weight loss during BS preoperative period. Surgery-related complications were also assessed. A systematic review of the literature was performed. Terms such as "bariatric surgery" and "very low energy diet" were included in the search strategy. Inclusion criteria were adult patients (aged >18 yr); VLCD treatment in BS preoperative period (10 d to 12 wk); and assessment of 1 the following outcomes: weight loss, liver volume reduction, and surgical complications. There were 9 studies included (849 patients including 250 controls, 196 controls without VLCD). Of the studies, 3 were randomized clinical trials and 6 were observational studies. VLCD treatment led to weight loss (−2.8 to −14.8 kg) and to liver size reduction by 5% to 20% of the initial volume. VLCD treatment did not significantly reduce perioperative complications. However, 1 study (n = 273) reported a protective effect 30 days after surgery. This systematic review found VLCD treatment led to significant weight loss and liver volume reduction when applied to patients with obesity in BS preoperative period. The effect of VLCD on surgical risks is not clear. Standardization of dietary characteristics is needed, because weight loss and decrease in liver size were not connected to higher caloric restriction. This is an important matter in clinical practice as to avoid unnecessary prolonged and/or excessive dietary restriction. (Surg Obes Relat Dis 2017;▮:00–00.) © 2017 American Society for Metabolic and Bariatric Surgery. All rights reserved.

Keywords: Very low calorie diet; Bariatric surgery; Liver volume; Surgical outcomes; Preoperative weight loss

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Obesity prevalence is increasing worldwide. It has become the most prevalent public health problem, above malnutrition and infectious diseases. Given the unsatisfactory results of conservative treatments for severe obesity, bariatric surgery (BS) has been considered the most effective treatment to promote long-term weight loss. It has also been shown to reduce and control co-morbidities [1]. In this scenario, the number of BS performed has increased significantly. It reached 140,000 surgeries in 2013 in the United States, which has the highest number of BS in the world, followed by Brazil at approximately 72,000 BS in the same year [2].

Nonalcoholic fatty liver disease may be present in up to 90% of the candidates for bariatric surgery [3]. Under these conditions, the liver left lobe is usually increased, which reduces access to the gastroesophageal area [4]. The liver

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may become more friable and susceptible to injury and bleeding [5]. Hepatomegaly has been cited as a common cause of conversion of laparotomy to open surgery in the Roux-en-Y gastric bypass [6].

Diets with different nutritional compositions and duration have been employed and studied in BS preoperative period with the objectives of weight loss [7–9], liver size reduction [10–15], visceral fat reduction [16–18], surgical risks reduction [8], decrease in blood loss in the transoperative period [19], and decrease in surgical time [8,19]. On the other hand, there is no consensus on the ideal characteristics and duration of the nutritional intervention to be applied to these patients.

Despite the fact BS is the most efficient method for weight loss and decrease of associated co-morbidities, $<1\%$ of patients with surgical indication undergo surgery. Some lack access to this health resource, and others who would have the resources to undergo the surgery choose not to do so [26]. Submitting patients to extremely restrictive diets in the preoperative period may discourage and limit even more the number of surgeries. Therefore, the aim of this study was to conduct a systematic review to evaluate the effects of very low calorie diets (VLCD; 400–800 kcal/d) [20] in individuals with obesity in BS preoperative period. Outcomes of interest were weight loss, reduction in liver volume, and decrease in surgical complications.

Methods

This study was registered in PROSPERO platform (CRD42016038022), which is the International Prospective Register of Systematic Reviews. This manuscript was elaborated after the norms and recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines [21].

Data sources

A review of the literature was conducted on January 11, 2016, to identify relevant studies on the subject. The data sources used were the following databases: MEDLINE (via Pubmed), Cochrane Database of Systematic Reviews, Embase, Scielo, and Lilacs. A manual search was performed on lists of references of published and unpublished studies. A second search for data update was performed on August 28, 2016. Searches were performed by 1 of the authors (M.H.) and were not restricted by date or country of origin. The selection of articles was performed independently by 2 reviewers (M.H. and S.S.). Any disagreement was resolved by consensus involving a third researcher (C.B.).

Key words used in the search strategy included [bariatric surgery] and [very low calorie diet] and their synonyms. The search strategy used for PubMed was: "Bariatric Surgery"[Mesh] OR "Bariatric Surgery" OR "Bariatric Surgical Procedures" OR "Bariatric Surgical Procedure" OR "Bariatric Surgeries" OR "Metabolic Surgery" OR "Metabolic Surgeries" OR "Stomach Stapling" OR "obesity surgery" OR "gastric bypass" OR *"Gastroplasty" OR "Roux-en-Y Gastric Bypass" OR "Gastroileal Bypass" OR "Gastrojejunostomy" OR "Roux en Y" OR "Gastric Band" OR "Sleeve Gastrectomy" OR "Gastric Sleeve"* AND "Ketogenic Diet" [Mesh] OR "Ketogenic Diet" OR "Ketogenic Diets" OR "Caloric Restriction" [Mesh] OR "Caloric Restriction" OR "Low-Calorie Diet" OR "Low Calorie Diet" OR "Low-Calorie Diets" OR "Low Calorie Diets" OR "Low-Energy Diet" OR "Low Energy Diet" OR "Low-Energy Diets" OR "Low Energy Diets."

Eligibility criteria

The criteria for including studies were patients >18 years of age in the preoperative period of any BS technique for the treatment of obesity, who underwent VLCDs (up to 800 kcal/d) for a minimum of 10 days and a maximum of 12 weeks; analyses of 1 or more of the following outcomes after treatment: change in weight, change in liver size, and number of complications in the perioperative period. Randomized clinical trials (RCT) and prospective and retrospective studies with or without control groups were included. Exclusion criteria were reviews, letters to the editor, and conference abstracts.

Assessment of methodologic quality

Each of the studies was analyzed in relation to the methodologic quality by 2 independent evaluators (M.H. and S.S.) using the Effective Public Health Practice Project quality assessment tool [22]. This tool can be applied to evaluate the methodologic quality of RCT as well as observational studies.

Data collection

Data extraction was performed by 2 researchers (M.H. and C.B.). Data were extracted for the main outcomes weight, body mass index (BMI), liver size, and surgical complications. Data were also collected on secondary outcomes, such as surgical time, changes in visceral fat, and perception of surgical difficulty according to the assessment by the surgeon.

Statistical analysis

Given the heterogeneity of interventions and study designs, no meta-analysis was possible. Associations between the outcomes were assessed, when possible, using Pearson's correlation test, with a significance level of $P < 0.05$. The analyses performed were mostly descriptive.

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