



Basic nutritional investigation

Shrinking preoperative fast time with maltodextrin and protein hydrolysate in gastrointestinal resections due to cancer

Paula Alves Peixe-Machado R.D., M.Sc.^a, Benedito Dario de Oliveira R.N.^a,
Diana Borges Dock-Nascimento R.D., Ph.D.^b, Jose Eduardo de Aguiar-Nascimento M.D., Ph.D.^{a,*}

^a Department of Surgery, Julio Muller University Hospital, Federal University of Mato Grosso, Cuiabá, Brazil

^b Department of Food and Nutrition, Federal University of Mato Grosso, Cuiabá, Brazil

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ABSTRACT

Objective: Prolonged preoperative fasting increases postoperative hospital length of stay and current evidence recommends patients drink a carbohydrate-based liquid drink 2 h before surgery. The aim of this study was to investigate whether the addition of hydrolyzed protein to a carbohydrate-based drink would reduce both the inflammatory response and hospital length of stay.

Methods: We evaluated 22 patients of both sexes, undergoing gastrointestinal resection due to cancer. Patients were randomized into two groups: control group (n = 12; 6–8 h fast) and the intervention group (n = 10; fasted to solids for 6 h; and given a beverage containing 11% pea protein hydrolysate and 89% carbohydrates (79% maltodextrin and 21% sucrose), 400 mL the night before and 200 mL 3 h before surgery. Blood samples were collected the morning before surgery and on postoperative day 2.

Results: Overall mortality was 4.5% (one case, control group). The duration of postoperative hospital stay was twofold longer in the control group (P = 0.04). A significant increase of serum C-reactive protein/albumin ratio was observed in controls compared with the intervention group (P = 0.04).
Conclusion: The abbreviation of preoperative fasting time to 3 h using a solution containing carbohydrates and hydrolyzed pea proteins reduces the acute-phase inflammatory response and decreases the postoperative length of stay in patients undergoing major surgery for a malignancy.

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Introduction

Perioperative care has been the subject of a number of studies in the past decade. The benefits of 6 to 8 h of preoperative fasting in order to reduce the risk for pulmonary aspiration of gastric content recently has been questioned in various studies [1,2]. Despite this, the “nothing by mouth after midnight” routine is still prescribed by many surgeons and anesthesiologists due to outdated concepts and paradigms [3]. Additionally, conventional fasting often is prolonged when surgery is delayed. Hence, the

actual duration of the preoperative fast can be excessively long, lasting from 10 to 16 h [2,3]. This may impair patients’ recovery because the systemic response to surgical trauma is increased by the prolonged period of fasting.

The acute-phase inflammatory response to major abdominal surgeries is mediated by acute-phase proteins released by the liver. These proteins increase or decrease within hours after the trauma and may help to predict postoperative complications [4, 5]. In this context, the Prognostic Inflammatory and Nutritional Index (PINI) proposed by Ingenbleek and Carpentier has been used to predict the risk for morbidity and mortality [6]. The PINI integrates two positive (C-reactive protein [CRP] and α -1-acid glycoprotein [α -1-GA]) and two negative (albumin and pre-albumin) acute-phase proteins. Studies have shown that formulas using acute-phase proteins, such as the CRP/albumin ratio, also may predict risks for hospitalized patients [7,8].

Beverages containing carbohydrates were evaluated and recommended to abbreviate preoperative fasting [9,10]. Recently, formulas containing either protein or amino acid

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* Corresponding author. Tel.: +556536237065; fax: +556536234020.

E-mail address: aguilar@terra.com.br (J. E. de Aguiar-Nascimento).

additions to a carbohydrate-enriched drink have been proposed. These new formulas may improve postoperative muscle strength [11] and reduce fatigue, anxiety, and discomfort [12] as well as lower the endocrine-metabolic response to trauma [13,14]. The addition of glutamine to these drinks improved the inflammatory response and nitrogen balance after laparoscopic cholecystectomy in one study [15] and the hepatic and mitochondrial metabolic response in two other recent studies [16,17].

However, the aforementioned studies were restricted to patients who underwent laparoscopic cholecystectomy. We questioned whether the abbreviation of preoperative fasting would improve the inflammatory response and other clinical outcomes after major surgery. Therefore, the aim of this study was to investigate whether shortening the preoperative fast using a solution containing carbohydrates and hydrolyzed proteins alters the acute-phase response and clinical outcomes of elective major operations of the digestive tract.

Material and methods

This was a randomized, single-blinded, clinical study carried out at the Julio Muller University Hospital (Mato Grosso State, Brazil). This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving human subjects/patients were approved by the hospital Research Ethics Committee registered under number 723/CEP-HUJM/09. Written informed consent was obtained from all patients. The study was registered in

ClinicalTrials.gov under the number NCT01563965. External monitoring of the study was carried out by the Research Ethics Committee of the Julio Muller Hospital.

Inclusion criteria included adults ages 18 to 65 y old, both sexes, and candidates for an elective laparotomy for gastrointestinal (GI) malignancies such as subtotal gastrectomy, left or right colectomy, and anterior resection of the rectum. Exclusion criteria were having diabetes mellitus, chronic kidney failure, chronic liver disease, serum bilirubin >2 mg/dL, body mass index (BMI) >35 kg/m², American Anesthesiologists Association score >3, gastroesophageal reflux, gastroparesis, or intestinal obstruction. Patients with any non-compliance with the study protocol, who had associated operations, who experienced severe intraoperative complications (any type of shock, cardiac arrest, or coagulations problems), or those who experienced prolonged (>6 h) operative time also were excluded.

On admission to the hospital, patients were randomized into two groups, an intervention group and a control group, using random numbers issued by a computer program (www.graphpad.com). For the randomization, the precepts of the CONSORT flow diagram were followed [18]. The intervention group received 400 mL (on the evening before surgery) and 200 mL (3 h before surgery) of a solution containing 11% protein (hydrolyzed pea protein) and 89% carbohydrates (79% maltodextrin and 21% sucrose) and 0% lipids (Providextra, Fresenius Kabi, Sao Paulo, Brazil). The control group received a conventional 6- to 8-h preoperative fast. All the patients were fasted for solids for at least 6 h before surgery.

On the day before the surgery and on postoperative day (POD) 2 blood samples were collected for glucose, insulin, triglycerides, albumin, prealbumin, CRP, and α -1-GA assays. The Homeostasis Model Assessment-Insulin Resistance (HOMA-IR) equation was used as proposed by Matthews et al [19] to assess insulin resistance according to the formula: $HOMA-IR = \text{insulin } (\mu\text{U/mL}) \times \text{glucose (mg/dL)}/405$. Inflammatory activity was assessed with the PINI = CRP

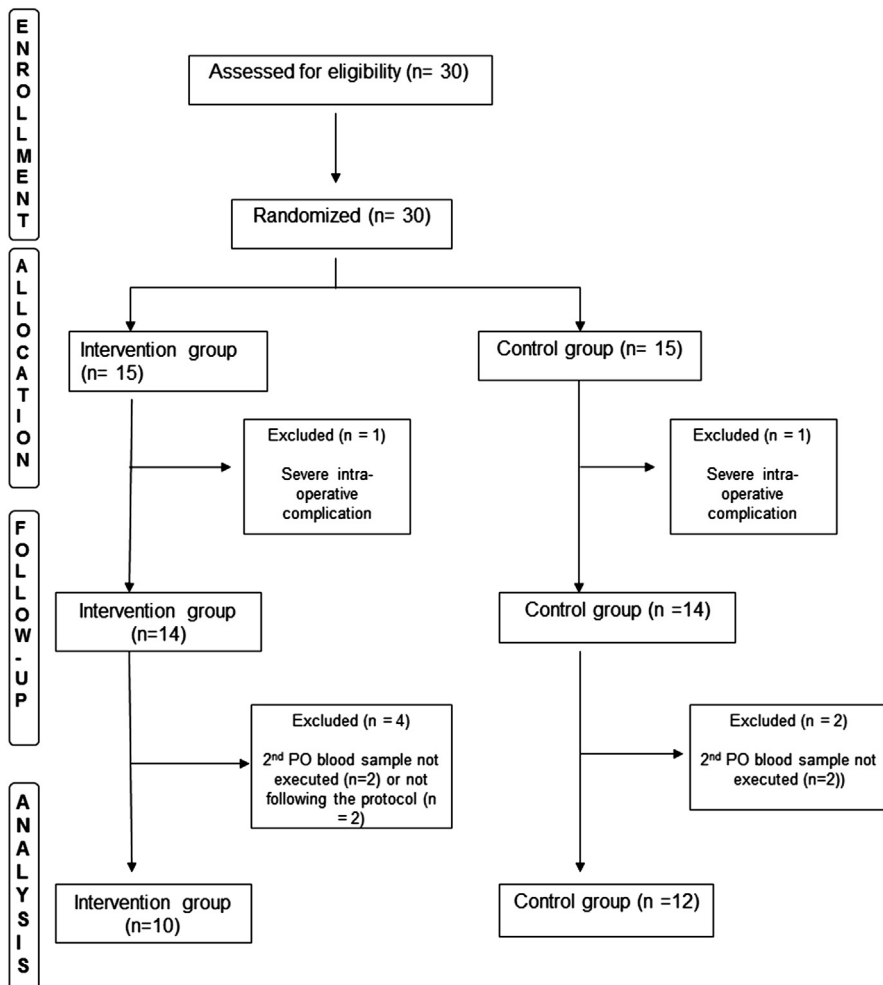


Fig. 1. CONSORT flowchart of the randomization.

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