

Reducing preoperative fasting time: A trend based on evidence

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Abstract

Preoperative fasting is mandatory before anesthesia to reduce the risk of aspiration. However, the prescribed 6-8 h of fasting is usually prolonged to 12-16 h for various reasons. Prolonged fasting triggers a metabolic response that precipitates gluconeogenesis and increases the organic response to trauma. Various randomized trials and meta-analyses have consistently shown that is safe to reduce the preoperative fasting time with a carbohydrate-rich drink up to 2 h before surgery. Benefits related to this shorter preoperative fasting include the reduction of postoperative gastrointestinal discomfort and insulin resistance. New formulas containing amino acids such as glutamine and other peptides are being studied and are promising candidates to be used to reduce preoperative fasting time.

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INTRODUCTION

Preoperative fasting is mandatory before general anesthesia. The main reason for preoperative midnight fasting is to reduce the volume and acidity of stomach contents, thus decreasing the risk of regurgitation/aspiration recognize as Mendelson syndrome^[1]. This policy, instituted after world war II, changed the simple practical fasting guidelines published by Lister in 1883 who quoted: "While it is desirable that there should be no solid matter in the stomach when chloroform is administered, it will be found very salutary to give a cup of tea or beef-tea about 2 h previously"^[2].

In the era of evidence based medicine however, there are no scientific reasons to keep a patient in prolonged preoperative fasting. This routine was questioned and shown to be unnecessary for most patients. As a result, many anesthesia societies have changed their guidelines and currently recommend intake of clear fluids up until 2 h before surgery and anesthesia^[3]. Accordingly, the European Society for Clinical Nutrition and Metabolism (ESPEN) recommended, with grade A of evidence, a carbohydrate-rich drink 2 h before anesthesia^[4,5].

Practice, however, is usually slow to change. Both clinicians and patients believe that fasting from midnight is safer. However the fasted state at the time of operation has recently been shown to represent an additional stress^[6]. Prolonged preoperative fasting in abdominal surgery results in a marked increase of insulin resistance^[7,8]. This modification of normal metabolism rapidly takes

place after trauma in 1-2 d and lasts for 2-4 wk in uncomplicated abdominal surgery. A pronounced insulin resistance has been demonstrated immediately after completion of surgery^[9,10]. Both the metabolic response and the degree of insulin resistance following abdominal surgery are related to the magnitude of the surgery performed^[11] and usually last until the recovery of the patient^[12]. Indeed, a positive correlation exists between postoperative insulin resistance and length of hospital stay^[12,13].

METABOLIC RESPONSE TO FASTING

Metabolic response to surgery and other trauma involves an increased metabolic rate and a state of hyper metabolism^[14]. Thus, substrate oxidation is markedly increased, resulting in an accelerated catabolic situation characterized by a net breakdown of glycogen, fat and protein. Although insulin levels are often increased, blood glucose levels also increase due to the developed insulin resistance. The insulin/glucagon ratio is reduced, resulting in an increased gluconeogenesis^[11]. Conventional preoperative fasting time may aggravate insulin resistance and influence the elevation of glycemia^[15], especially because it is frequently longer than the expected 6-8 h and may be as long as 10-16 h^[16]. Additionally, overnight fasting may cause variable degrees of dehydration depending on the ultimate duration of the fasting period.

SAFETY IN SHORTER PREOPERATIVE FASTING

Several randomized controlled studies^[17-21] and meta-analyses^[22,23] in otherwise healthy adults scheduled for elective surgery have documented that oral intake of water and other clear fluids (tea, coffee, soda water, apple and pulp-free orange juice) up to 2 h before induction of anesthesia does not increase gastric fluid volume or acidity. A carbohydrate rich beverage was found to be useful for this purpose 2 h before surgery. This seems to be the case not only in major operations. Faria *et al*^[24] (2009) studied adult women scheduled to undergo elective laparoscopic cholecystectomy and randomized them to either conventional preoperative fasting of 8 h or to receive 200 mL of a carbohydrate beverage containing 12.5% of maltodextrin 2 h before operation. They concluded that the abbreviation of the period of preoperative fasting diminishes insulin resistance and the organic response to trauma.

Scintigraphic studies showed that gastric emptying was complete within 2 h after intake of this drink^[25]. The amount of energy in this beverage was enough to increase insulin to levels seen after a mixed meal and insulin action enhanced by about 50% was shown 2-3 h after intake^[15]. Furthermore, randomized studies involving either preoperative glucose intravenous infusion or the carbohydrate-rich beverage showed that postoperative insulin resistance may be reduced by about 50% when preoperative fasting is avoided^[9,10,26,27]. A recent meta-analysis included 38 randomized controlled trials involving

"healthy" adult participants who were not considered to be at increased risk of regurgitation or aspiration during anesthesia. There was no evidence to suggest a shortened fluid fast results in an increased risk of aspiration, regurgitation or related morbidity compared with the standard "nil by mouth from midnight" fasting policy^[28].

However, it is important to clarify that fasting from solids 6-8 h before an elective operation is mandatory. Moreover, a carbohydrate drink 2 h before operation has important limits. Patients with any gastrointestinal motility disorder such as gastroparesis, mechanical obstruction of the gastrointestinal tract, gastro-esophageal reflux, and morbid obesity are examples of contra-indications of this protocol^[16,17,23].

NEW FORMULAS FOR PREOPERATIVE BEVERAGES

New formulas of preoperative drinks containing either amino acids (glutamine) or peptides (soy peptides) have been studied^[29,30]. Glutamine (15 g) plus carbohydrate in 300 mL or 400 mL of water seems to be safe to give 3 h preoperatively in healthy volunteers based on stomach emptying time. A drink containing soy peptide given to patients admitted for elective bowel resections has been shown to be safe. There was no difference in gastric emptying time between the carbohydrate group (12.5 g/100 mL carbohydrate drink) and carbohydrate/peptide group (12.5 g/100mL carbohydrate and 3.5 g/100 mL of hydrolyzed soy protein)^[30]. More research is necessary to determine the effects of clear liquids with amino acid or hydrolyzed protein in metabolic response and insulin sensitivity after surgery.

POSTOPERATIVE DISCOMFORT

The best performance of insulin sensitivity after surgery with the protocol of abbreviation of preoperative fasting has been shown to be due to reduced peripheral glucose uptake and oxidation in the early postoperative phase. This decrease in insulin resistance is likely to be important for the outcome of the patient because this helps control glucose levels during the postoperative phase. In postoperative patients in need of a high dependency unit or intensive care, studies have shown that, when glucose is controlled by intensive insulin therapy, mortality and morbidity are markedly decreased^[31].

In addition, data suggests that postoperative discomfort can be reduced in patients given a carbohydrate-rich beverage preoperatively. de Aguilar-Nascimento *et al*^[32] (2007) conducted a trial with 60 women having a cholecystectomy who were randomized to receive preoperative oral carbohydrates and concluded that the carbohydrate drink diminished gastrointestinal discomfort (vomiting and abdominal distensions) and reduced the length of stay. Abbreviation of preoperative fasting seems to have a beneficial effect with regard to perioperative thirst, hunger, anxiety^[33] and muscle strength^[29]. Patients undergoing elective cardiac surgery treated with the same preoperative fasting protocol

were less thirsty compared with controls and required less intraoperative inotropic support after initiation of cardiopulmonary bypass weaning in one study^[34].

Optimizing postoperative with fast-track or multimodal recovery programs have led to reduced patient morbidity and mortality after major surgery^[35,36]. Such patient care protocols include elements such as no bowel preparation, no preoperative fasting and use of epidural anesthesia; measures aimed at reducing surgical stress, optimizing postoperative analgesia and adjusting postoperative care to reduce complication rates and costs^[37]. Prospective randomized trials in colorectal operations showed that fast-track programs are superior compared to traditional care^[38,39].

In summary, avoiding fasting before surgery markedly reduces postoperative insulin resistance which has beneficial effects on postoperative glucose and protein metabolism. It seems that the overnight fasting routine is about to come to an end in most modern medical societies, at least with regard to the recommendation of clear fluids with carbohydrate. However the dogma of *npo* after midnight may last for more years or decades to come, despite the overwhelming evidence of safety and benefits in reducing preoperative fasting time.

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