

Role of Enteral Nutrition in Pre-operative Patients

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Abstract

Preoperative fasting had been the standard of care for years. In the light of newest recommendations this practice has been changing. In 1999, The Canadian Anesthetist's Society (CAS) (1) and American Society of Anesthesiologists (ASA) (2) had published guidelines, which recommends that patients be allowed to drink clear fluid two hours prior to induction of anesthesia. However, still the traditional preoperative approach of fasting for several hours is being carried out in several institutions.

We present a case of burn patient who had undergone skin-graft surgically on four occasions. The patient received two different nutritional regimens in the preoperative period; enteral nutrition and fasting. The preoperative nutrition management of patient with enteral nutrition resulted in more satisfaction, less hunger, thirst and reduced postoperative nausea and vomiting (PONV) as compared to when the patient was receiving no enteral nutrition in preoperative period.

Key words: Preoperative fasting, enteral nutrition, nutrition in burn patients.

Introduction

Prolong fasting in the preoperative phase have deleterious effect on the body. (3-9) It depletes liver glycogen in preoperative period and impairs mobilization of muscle glycogen in the post operative period leading to reduce muscle strength. It also results in impaired immune system, increase insulin resistance, and reduce preoperative thirst, hunger and anxiety. (1-5) It also increases the post operative nausea-vomiting (PONV), and increases postoperative loss of lean body mass. In 1999, The Canadian Anesthetist's Society (CAS) and American Society of Anesthesiologists

(ASA) published the guidelines, which allows patients to drink clear fluid up to two prior to induction of anesthesia. However, there are still many patients undergoing surgery without any nutrition and oral hydration for several hours prior to surgery.

Case report

We report a case of a 26-year-old male who was admitted to our Intensive Care Unit (ICU) after suffering a thermal (fire) burn with involvement of 67% total body surface area (TBSA) comprising of 2nd-3rd degree burns. The nutritional status was assessed using anthropometric methods, weight 45 kg, height 163 cm, body mass index 16.9. He was categorized as underweight.

The patient was in the ICU for 22 days prior to moving to the ward with 20% TBSA with 2nd-3rd degree burns. The patient underwent skin graft via four different preoperative nutrition management as illustrated in **Table 1**.

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The enteral nutrition is an oral nutritional supplements (ONS), nutritionally complete (contains carbohydrate, protein, lipid, vitamins and minerals), in a standard formulae, with a composition, which reflects the reference values for macronutrients and micronutrients for a healthy population. However, the management of preoperative nutrition with fasting regimen involved nothing orally/enterally for more than 14 hours.

The different nutritional regimens are shown in **Table 1**. The preoperative management with enteral nutrition was associated with increase patient satisfaction, less hunger, thirst, and less postoperative nausea and vomiting (PONV). The data was collected by patient interview as illustrated in **Table 2**.

In the preoperative management with enteral nutrition, our patient received adequate caloric intake as close to 100% of the patient caloric need (1500 calories) on one day after surgery as compared to 600 calories when fasting without enteral nutrition.

There was no difference in the blood glucose level in either form of nutritional management. Our patient did not have any evidence of aspiration with any regimens listed in **Table 1**.

Discussion

Traditionally, patients who undergo elective surgeries are still kept nothing per orally/enterally for approximately 12-14 hours prior to surgery despite the recommendations by CAS and ASA. (1,2) This not only leads to nutritional and caloric deficiency, but also impairs the recovery in post operative period and wound healing.

Prolong fasting depletes liver glycogen storage, which in turn affects the function of mononuclear phagocytic system (MPS). Mononuclear phagocytic system plays an important role in preventing endotoxin and bacterial translocation from the gut. (3) Some researches showed the beneficial of giving carbohydrate before operation. (4-9) Nygren et al. (8) studied two matched groups of patients undergoing elective colorectal surgery. The study group received 800 ml of an isoosmolar carbohydrate rich beverage the evening

prior to surgery (100 g carbohydrates), and again received 400 ml (50 g carbohydrates) two hours prior to induction of anesthesia. The control group (n=7) was operated after an overnight fast. In their study, the study group displayed less reduced insulin sensitivity after surgery as compared to control group. Soop et al. (9) in their paper also concluded that preoperative oral carbohydrate treatment attenuated the development of immediate postoperative insulin resistance. Melis et al. (7) in their randomized, controlled trial studied the effect of surgery on the postoperative immune response in 10 preoperatively fasted patients (control) and 2 groups of 10 patients receiving 2 different carbohydrate rich beverages preoperatively by measuring human leucocytes antigen (HLA-DR) expression on monocytes. They concluded that carbohydrate rich beverages can prevent surgery induced immunodepression and reduce the risk of infectious complications.

Arnault et al. (10) gave parenteral amino acid to the rats. They demonstrated that addition of alanine at reperfusion lowers the release of aspartate aminotransferase (AST), alanine aminotransferase (ALT), and lactate dehydrogenase (LDH). The effect was more obvious when the fasting duration was increased. (10)

In a study by Mayes, they concluded that three hours after meal, tissues can no longer derive their energy directly from ingested glucose and other macronutrients but instead must rely on other sources of fuel. The body will utilize energy sources from glycogen, visceral protein and fat storage. (11) Without protein intake for a few hours, plasma amino acid will decrease until basal value. (12) The body degrades muscles for maintaining the normal level of amino acid circulation (alanine, glutamine and branch chain amino acid). (13)

The result of this case shows that the preoperative management with enteral nutrition is better than fasting for several hours. The preoperative management without fasting gives more satisfaction to the patient including less hunger and thirst, reduces postoperative nausea and vomiting (PONV), makes patient receive nutrition earlier and achieve nutrition requirements sooner.

The aspiration which is a possible risk during anesthesia induction, surgery, extubation and immediate post operative

period in non fasting patients was not seen in our patient. Warner et al. (14) showed that the incidence of aspiration was 1:10,000 patients and no mortality in more than 200,000 patients. Olson et al. (14) in their study had aspiration in 1:12,131 and the mortality rate was 1:46,340. Fasting has become standard in elective surgery to avoid aspiration. Evidence based practice shows stomach is never empty even in fasting as it keeps secreting gastric juice up to 2500 ml daily. (15,16) Substituting clear water with enteral nutrition in the preoperative setting is possible, based on the theory that the small particle of enteral nutrition (<2 mm) leaves stomach immediately; therefore the risk of aspiration could be low.

Conclusion

The CAS and ASA guidelines proposed patients to drink clear liquids 2 hours and light meal 6 hours before surgery. Enteral nutrition could be an alternative way to be given short time prior to surgery. Compared to clear water, enteral nutrition provides more nutrients (protein and fat), more satisfaction, less hunger and thirst, and less post operative nausea and vomiting. Unfortunately, there is neither randomized controlled trial, nor any good study on gastric emptying time after drinking enteral nutrition. We suggest further studies in this arena to shed light on this important issue.

Table 1. Nutritional Managements.

Nutritional managements	I	II	III	IV
Last meal	Enteral nutrition	Enteral nutrition	Enteral nutrition	Oral diet
Time before surgery	1 hour 30 min	3 hours 45 min	1 hour 35 min*	14 hours 45 min
Operation type	Debridement & split thickness skin graft (STSG)	Debridement & wound dressing	Debridement & wound dressing	Debridement & wound dressing
Length of operation	3 hours (17.30-20.30)	1 hour 15 min (19.35-20.50)	3 hours 25 min (20.35-24.00)	2 hours 55 min (08.45-11.40)

* Patient was fasted for 20 hours before receiving enteral nutrition.

Note: Patient received metoclopramide 4 mg prior to surgery.

Table 2. Perioperative Signs and Symptom.

Nutritional managements	I	II	III	IV
Preoperation				
- Nausea	+ *	-	-	-
- Vomiting	+ *	-	-	-
- Hunger	-	-	-	+
- Thirst	-	-	-	+
Postoperation (the next day)				
- Nausea	+	+	+	+
- Vomiting	-	+	+	+
- Malaise	-	-	+	+
- Fatigue	-	-	+	+
First intake after surgery	15 min	6 hours	7½ hours	9 hours
First meal/drink	Water	Water	Water	Water

* 30 minutes after taking metoclopramide orally.

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