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Original Article

Evaluation of effects of a preoperative 2-hour fast with glutamine and carbohydrate rich drink on insulin resistance in maxillofacial surgery

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ABSTRACT

Introduction: The aim of this prospective, randomized, single-blinded study was to compare the effects of preoperative fast for clear fluids on insulin resistance and hemodynamic stability on patient undergoing maxillofacial surgery.

Method: In this study 20 patients undergoing maxillofacial surgery were randomized into four groups i.e. – group I patients with standard 08 h fasting before anesthesia, group-II patients were given 400 ml and 200 ml of water 08 h and 2 h respectively before anesthesia, group III patients were given 400 ml water with 50 gms of glucose and 40 gm of glutamine 08 h before anesthesia and 200 ml water with 25 gms of glucose and 10 gm of glutamine 2 h before anesthesia, group IV patients were given 400 ml water with 50 gms of glucose 08 h before anesthesia and 200 ml water with 25 gms of glucose 2 h before anesthesia. Blood samples were collected pre-operatively and post-operatively.

Results: Overall results suggest that Post-operative insulin resistance was greater in control patients (2.0 [0.3]) compared with the other 3 groups (placebo = 1.8 [0.9]); glutamine = (1.8 [0.6]); carbohydrate = (1.9 [0.6]).

Discussion: This study shows that shortening of pre-operative fasting time for clear fluids until 2- h prior to anesthesia may induce a favorable environment for the post-operative course. In conclusion, Glutamine with carbohydrate drink can be used safely in surgical patients.

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1. Introduction

''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 two hours previously''

Lord Lister, 1882.[1]

Retaining of food and fluids prior to surgery is a common practice due to concern regarding aspiration of acidic gastric contents during anesthesia. The traditional concept of 'fast from midnight' is a widespread accepted policy that is easy to apply, and is rarely challenged by staff and patients.[2] Standard fasting times are frequently longer than the expected 6–8 h, and may be as long as 10–16 h.[3] Fasting of prolonged duration is deleterious for the patient because the post-operative period is characterized by increased metabolic rate, hyper catabolism, gluconeogenesis and insulin resistance,[4] and is a key determinant of post-operative outcome and an independent predictor of the length of hospital stay after surgery.[5]

Enhanced Recovery after Surgery (ERAS) protocol has recently gained attention as an evidence-based method for peri-operative care used in hospitals worldwide to improve patient prognosis and this protocol recommends carbohydrate loading via oral administration before surgery, which reduces thirst, hunger, anxiety, and nausea, while preventing muscle wasting and loss of nitrogen and protein. Furthermore, the ERAS protocol has been shown to prevent the aggravation of insulin resistance that occurs as a result of surgery.[6]

Recently, several national anesthesia societies have revised their guidelines on preoperative fasting, recommending access to clear, non-particulate fluids up to 2 h prior to induction of anesthesia. These guidelines are supported by a Cochrane Collaboration review,[2] the British Consensus Guidelines on Intravenous Fluid Therapy for Adult Surgical Patients (GIFTASUP)[7] and American society of Anesthesiologist task force on preoperative fasting.[8] The summary of fasting recommendations is as under:

Ingested material	Minimum fasting period (h)
Clear liquids	2
Breast milk	4
Infant formula	6
Non-human milk	6
Light meal	6

Glutamine is most abundant free amino acid and essential amino acid in extra-cellular and intra-cellular compartments with important role in carbohydrate metabolism. In humans, supplementation enriched with glutamine, increases serum insulin levels and patients treated with glutamine showed less decrease in glucose levels and decreased insulin requirements.[9]

2. Material and methods

Total 20 patients' undergoing Oral & Maxillofacial surgical procedure (eg.– mandibular fracture, ZMC fracture, mid-facial fracture, Oral Oncology etc.) with physical status ASA-I and ASA-II, under general anesthesia were included in the study. The study was conducted after obtaining the approval of the ethical committee of college and informed written consent from the participants. The patients were equally and randomly allocated to one of the below mentioned groups without any bias for the purpose of this study.

Group I (control group) – This group constituted patients who were kept fasting for 08 h before anesthesia.

Group II (placebo group) – patients in this were given 400 ml and 200 ml of water 08 h and 2 h respectively before anesthesia.

Group III (Glutamine group) – patients in this group were given 400 ml water with 50 gms of glucose and 40 gm of glutamine 08 h before and 200 ml water with 25 gms of glucose and 10 gm of glutamine 2 h before anesthesia.

[Glutamine ingestion: The Glutamine group received a total of 0.77g per kilogram of body weight (range, 0.61–0.97 g/kg).]

Group IV (carbohydrate group) – patients in this group were given 400 ml water with 50 gms of glucose 08 h before and 200 ml water with 25 gms of glucose 2 h before anesthesia.

2.1. *Exclusion criteria*

Patients with known cardiac disease, pulmonary disease, metabolic disease, disease affecting fluid and electrolyte balance of the body and patients who were not willing to be a part of study, were excluded from the study.

2.2. *Peri-operative protocol*

All surgeries were scheduled to begin at 9:00 am; the evening before the surgery, patients were allowed to eat solid foods until 12:00 am. Patients in group II, II, and IV were given beverages as described above before induction of anesthesia.

All patients underwent surgical procedures under general anesthesia. Peri-operative hydration was accomplished with appropriate intravenous fluid. Post-operative fasting was maintained for 12 h after second beverage. After that, all patients received liquid diet. Blood samples were collected both at induction of anesthesia and after surgery, before the first liquid meal. Blood sugar level below 50 mg/dl was the hypoglycemic limit for the purpose of our study. The focus of the study were insulin resistance assessed by HOMA-IR equation (homeostasis model assessment- Insulin resistance) proposed by Matthews et al, and haemodynamic response during peri-operative period. HOMA-IR was calculated as Insulin (ulU/ml by chemiluminescence micro-particle immunoassay) x blood glucose (mg/dl by enzymatic assay)/405.

3. Statistical analysis

Data was analyzed using Statistical Package for Social Sciences, Version 15.0. As the sample size was small, hence the