A Comparative Study between Incidence of Occurrence of Electrolytes Disturbance in Post-operative Patients Receiving Total parentral nutrition versus Entral Nutrition

Thesis

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List of Abbreviations

CHO	Carbohydrates
CVCs	Compare conventional central venous catheters
DHA	Docosahexaenoic acid
DKA	Diabetic ketoacidosis
EN	Enteral nutrition
EPA	Eicosapentanoic acid
GIT	Gastrointestinal tract
ICU	Intensive care unit
LCT	Long chain triglycerides
MCT	Medium chain triglycerides
MUFAs	Mono-saturated fatty acids
PICCs	Peripherally inserted central catheters
PN	Parentral nutrition

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INTRODUCTION

Food is essential for all human beings in order to live. Sometimes it is hard for a person to eat enough food or any food at all as a result of a disease or an illness. There may be a problem with the stomach or bowel working well, or due to undergoing surgery. Under any of these conditions, nutritional support is needed **(Wiley, 1997).**

Underfeeding in the ICU patients is proven to be associated with increasing rates of morbidity and mortality. The chance of survival of the ICU patient without nutritional support is not well known, and malnutrition is more likely to develop due to increased metabolic needs and stress **(Alberda et al., 2009).**

Giner et al. in a study including 129 ICU patients, 43% of which were malnourished, found that the incidence of complications and the rate of failure of discharge were more in the malnourished patients than in the well-nourished even if the malnourished patients had less severe disease than the well-nourished **(Giner et al., 1996).**

Entral nutrition is that delivered through a feeding tube, and parentral nutrition (PN) is that delivered through an intravenous catheter inserted directly into the veins when the digestive tract cannot be used. Nutritional support including its amount, type, and

route of administration should be tailored specifically to each patient with the purpose of improving the patient outcomes, decrease the risk of infections and allowing patients to live normal lives as much as possible **(Wilmer, 2010).**

Currently, enteral nutrition is considered the preferred feeding way of the critically ill patient, as it counteracts the catabolic state caused by severe diseases. Early delivery of enteral feeding was proved to be beneficial. In case of failure of enteral feeding or if it is not working well, as in case of a patient who do not reach his target nutrient intake on EN alone, parenteral nutrition is considered an alternative or an additional approach or a reserve tool. The principal goal of PN is to provide a nutrient mixture in close relation to patient requirements without causing harm to the patient and to avoid complications **(Heyland et al., 1995).**

AIM OF THE WORK

The aim of this work is to determine the incidence of potassium, magnesium, sodium, calcium and phosphorus disturbance in adult postoperative ICU patients receiving parentral nutrition and compare them with postoperative patient receiving entral feeding.

ENTERAL NUTRITION

Indications and timing

All patients who are not expected to be on a full oral diet within 3 days should receive EN **(Kreymanna et al., 2006).**

There are no available studies investigating the maximum amount of time that ICU patients can survive with no nutritional support as these studies would be unethical **(Kreymanna et al., 2006).**

One study conducted in 1993, showed that in patients who received glucose treatment alone (250–300 g) over a period of 14 days, the mortality rate was higher by 10 times than in patients who received continuous total parenteral nutrition. From these data we can suggest that undernutrition mostly develops within 8-12 days following surgery in case of inadequate oral intake **(Sandstrom et al., 1993).**

Early versus delayed enteral nutrition in the critically ill

One meta-analysis of 15 randomized controlled trials studied the effects of introducing early EN in adult patients following surgery, burns, head injury, trauma, and acute medical conditions. Infectious complications and length of stay were found to be reduced significantly with early EN. However, the result of this

meta-analysis should be taken with caution due to the heterogeneity between the studies **(Marik and Zaloga, 2001).**

Zaloga (1999), conducted a systematic review of 19 studies on early EN. One study found a positive effect of early EN on survival rate. Other 15 trials found a positive effect on treatment duration, the rate of complications like sepsis and on other secondary parameters **(Zaloga, 1999).**

Moore and Jones7 in 1986 conducted the first published trail on the concept of early enteral versus inadequate oral or versus oral and parenteral nutrition in polytrauma patients. The study included randomised 75 patients with abdominal trauma. The control group were given approximately 100 g carbohydrates for 5 days following surgery. If the patients could not consume an oral diet, PN was provided. In the study group a needle catheter jejunostomy placed during emergency laparotomy was used to deliver early EN (12–24 h after trauma).On day four, in the study group, patients were found to have a caloric intake 1.5 times higher than the energy expenditure, and the control group were found to receive only 1/3 of their energy expenditure. The incidence of infections and the mortality rate were comparable between the two groups. There were no data available on length of stay. It is important to mention that total parenteral nutrition had to be introduced in 30% of the control group because oral intake

was insufficient. The better outcome in the jejunostomy group can be explained by total parenteral nutrition complications in the control group more than the EN advantages in the study group **(Moore et al., 1986).**

In another study, Graham and co-workers8 included 32 randomised polytrauma patients with head injury, they received either early jejunal feeding or delayed gastric feeding. The daily caloric intake improved with the early jejunal feedings (2102 versus 1100 kcal/day), and there was a decrease in bacterial infections incidence and length of ICU stay. No data on mortality rates were available **(Grahm et al., 1989).**

Another study conducted by Chiarelli et al. (1990) randomised 20 patients with burns with a range between 25% and 75% total body surface area. The control group received EN 57 hours after injury, and the study group received EN 4 hours after injury. There was an association between early EN and the reduction of the incidence of positive blood cultures and with a normalization of endocrine status, and there were no association between early EN and the length of ICU stay. There were no accurate data regarding morbidity and on total caloric intake in the days immediately after injury **(Chiarelli et al., 1990).**

Eyer et al. (1993) included 52 patients with blunt trauma in another study, the patients were divided into two groups, one

group received early feeding within 24 hours, and the other received late feeding after three days. Out of the 52 patients, 14 were excluded from the study because of death within 24 hours or because the target protein intake of 1.5 g/kg BW/day was not achieved. The conclusion was that early EN was not associated with a positive effect on ICU length of stay, ventilator days, organ system failure or mortality. In addition, there was an association between early EN and increased number of total (pneumonia, infections of the urinary tract) **(Eyer et al., 1993).**

The advocates of early EN criticized these results massively, they suggested that the EN in the study group was introduced too late (after 24 hours). They also suggested that significantly more patients with severe thoracic trauma and significantly reduced lung function (lower Horowitz quotient) had been entered in the study group and this can be a cause of higher infection rate (esp. pneumonia) in this group **(Kudsk et al., 1992; Moore et al., 1992).**

In a different study, Hasse et al. included 50 liver transplant patients to investigate the impact of early EN. The patients were randomized, they received either EN 12 hours after transplantation, or maintenance iv fluids until oral intake was initiated on day 2. In the group receiving early EN caloric intake was 3–4 times higher, and 80–110% of the actual energy

expenditure was met early. Early EN was associated with less viral infections, but no significant effect was found on length of time on ventilatory support, length of stay in ICU and hospital, number of readmissions, infections, or rejection during the first 21 post-transplant days **(Hasse et al., 1995).**

Another study 14 conducted by Singh et al. included 42 patients to compare the effect of postoperative early EN with spontaneous oral intake in patients with nontraumatic intestinal perforation and peritonitis. Early EN was introduced within 12 hours after surgery through an intra-operatively placed jejunostomy. In the group which received early EN, they received a higher intake (800 versus 400 kcal) on the first day, and by day 4 this had increased further to 42000 kcal. The other group had a very low oral intake. Early EN was associated with a significant reduction in infections, and no difference in mortality rates **(Singh et al., 1998).**

To summarize, the evidence in favour of early EN is not so much strong, but based on the clinical experience more than conclusive data we can conclude that early EN in an appropriate amount and with the aim of avoiding gut failure can be recommended **(Kreymanna et al., 2006).**