Clinical Nutrition ESPEN 17 (2017) 22–27

Contents lists available at ScienceDirect

Clinical Nutrition ESPEN

journal homepage: http://www.clinicalnutritionespen.com

Original article

The role of nutritional assessment and early enteral nutrition for combined pancreas and kidney transplant candidates

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ARTICLE INFO

Article history:
Received 20 April 2016
Accepted 4 December 2016

Keywords:
Early enteral nutrition
Combined pancreas kidney transplant
Naso-jejunal feeding

SUMMARY

Background: Early post-operative enteral nutrition is an important part of perioperative management and is strongly supported by ESPEN Guidelines. However, there is limited evidence into the use of Early Enteral Nutrition (EEN) after combined Pancreas and Kidney Transplantation (PKT). We know malnutrition in type-1 diabetics with end stage renal failure (ESRF) is a common problem and a significant risk factor. Therefore, we introduced EEN in our patients.

Method: We monitored and recorded nutritional data on 29 PKT recipients who underwent transplantation between Oct 2007 and Jan 2010 without a nutritional assessment or EEN [Monitored Group (MG)] and on 30 PKT recipients between Feb 2010 and Dec 2013 who received a nutritional assessment and EEN (Naso-jejunal feed or oral intake with supplementation, according to their nutritional status) [Fed Group (FG)].

The end-point was to assess patients' daily post-transplant nutritional intake. This was calculated as a percentage of estimated nutritional requirements using the Schofield equation with a 25% added stress factor and relevant activity factor. Following a literature search and realistic targets our aim was to reach >60% requirements: achievement of ≥60% energy requirements by day-7 (7d-60%) and at the time of discharge (total-60%) [13,14].

Results: There was no significant difference between MG and FG patients in cold ischemic time (CIT), recipient-age and donor-age, Length of Stay and donor-creatinine. In contrast, FG patients were less frequently in predialysis status 41.4% vs. 26.7%, p = 0.001; and had higher incidence of BMI <22.5 kg/m^2 63.3% vs. 48.3%, p = <0.005.

In outcomes, FG patients more frequently achieved a higher average % of nutritional requirements in the first week 39.69% vs. 22.37%, p = <0.005; as well as during whole in-patient stay 57.24% vs. 44.43%, p = <0.005 (Table 3, Figs. 1 and 2). The FG spent a greater proportion during the first week 66.7% vs. 31%, p = <0.005; and of whole their admission 93.3% vs. 75.9%, p = <0.005; meeting more than 60% of nutritional requirements. Most important, the need for parenteral nutrition within the FG was significantly lower, 7.1% vs. 20.7%, p < 0.005 (Table 3).

Conclusion: Our results show that these patients benefit from planned EEN and receive better nutritional support when compared to the patients managed with the historic, reactive approach to nutritional care. Nutritional intake in the first week as well as during the whole admission was superior in patients receiving active EEN despite a more difficult post-operative course due to higher incidence of re-operations compared to the control group. Also the need for parenteral nutrition was significantly lower in this group.

In addition, pre-transplant nutritional assessment is beneficial and accurately highlights those who may be at risk of malnutrition pre and post-operatively.

Abbreviations: BMI, Body Mass Index; CIT, cold ischemia time; COD, Cause of Death; CVA, Cerebro-vascular accident; DBD, donor after brain death; DCD, donor after circulatory death; EEN, Early Enteral Nutrition; ESPEN, the European Society of Parenteral and Enteral Nutrition; ESRF, end stage renal failure; FG, Fed Group; HD, haemodialysis; LOS, length of hospital stay; MG, Monitored Group; NJ, Naso-jejunal; Non-CVA, Non-cerebro vascular accident; NRQ, Nutritional requirements; PD, Peritoneal dialysis; PKT, Combined Pancreas and Kidney Transplantation; Pre, predialysis; RRT, renal replacement therapy.

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http://dx.doi.org/10.1016/j.clnesp.2016.12.002

1. Introduction

There is limited research into the role of nutrition within Combined Pancreas and Kidney Transplant (PKT) candidates pre and post-operatively.

Peri-operative nutritional management is well described in the European Society of Parenteral and Enteral Nutrition (ESPEN) guidelines [1]. These guidelines summarise evidence and describe the benefit and role of postoperative nutrition, including Early Enteral Nutrition (EEN) for different types of surgery. It is well identified in patients undergoing major upper and lower gastrointestinal surgery, that poor nutritional status contributes to an increased post-operative morbidity and mortality, lengthened hospital stay and impaired wound healing [2–4]. However, providing active nutritional management after surgery proved to have a positive impact on post-operative recovery, minimising the incidence of surgery related complications [5,6].

EEN is described as enteral feed initiated within 24 h of surgery; either oral nutritional supplements or enteral tube feeding (gastric, duodenal or jejunal). The ESPEN guidelines recommend tube feeding in those patients unable to eat for more than 7 days after surgery or for those who cannot maintain oral intake at more than 60% of requirements for a period of more than 10 days [1].

Unfortunately, there is little data regarding nutritional management in patients undergoing solid-organ transplantation, including PKT candidates. But, there is no reason why this group of patients with complex medical conditions related to ESRF (anaemia, fluid overload, etc.) and diabetes (diabetic gastroparesis, neuropathy, enteropathy, etc.), who frequently suffer from malnutrition, would not also benefit from EEN. As a consequence of these factors patients can develop malnutrition. Gastroparesis affects 5–12% [7] of patients in this group and typically present with nausea, vomiting, bloating, early satiety and abdominal pain [8].

Hypoalbuminaemia is fairly common, in patients with renal failure, mainly secondary to dialysis related stress and inflammation, metabolic acidosis, reduced insulin action, increased levels of angiotensin-II and oedema [9]. Therefore, heavy reliance on serum albumin as a nutritional assessment tool in chronic kidney disease is unwarranted [10]. Despite albumin often being used, there is no evidence that this is an accurate biochemical marker to assess nutritional status in PKT transplant recipients.

In addition, albumin usually drops post-operatively as a consequence of the trauma of surgery, inflammatory process and oedema development [11]. Generally, it resolves over time; however, persistent hypoalbuminaemia is associated with an increased risk of development of complications following organ transplantation [12].

A pre-operative nutritional assessment helps us to characterise nutritional status in these patients. It also helps us to identify the risk factors of malnutrition and to formulate a suitable pre and post-operative nutritional plan to reduce the risk of further malnutrition and the associated complications. The aim of this study was to review the benefit of EEN in patients undergoing PKT.

2. Materials and methods

All consecutive combined pancreas and kidney transplants at Cardiff Transplant Unit between Oct 2007 and Dec 2013 were enrolled in this study, with prospectively collected data and maintenance database. During the initial period between Oct 2007 and Jan 2010 candidates received no pre-transplant nutritional assessment and did not have an active planned post-transplant EEN plan. The dietitian assessed patients on a daily basis and nutritional management was recommended according to actual status *[Monitored Group (MG)]*. Subsequently, we introduced mandatory, pre-operative nutritional assessment prior to activation on the transplant list that also includes a plan for EEN (NJ feed or oral intake with supplementation, according to their nutritional status) *[Fed Group (FG)]*. Therefore, every patient since Feb 2010 comes into this category.

The pre-operative assessment included weight, Body Mass Index (BMI), weight history, nutritional intake vs. nutritional requirements, nutritional risk score, evidence of gastroparesis and biochemistry. If a patient had a BMI less than 20 kg/m^2, suffered from gastroparesis or a combination of unintentional weight loss and deficit between nutritional intake and actual requirements, we considered this patient as nutritionally high risk and early NJ feed was recommended. Otherwise, the patient was considered as low nutritional risk and for early oral nutrition in combination with supplements.

Those patients who were assigned to the NJ feeding group had a Medicina ef20 double lumen naso-jejunal tube placed and manipulated into the jejunum during theatre by the surgeons. Feeding commenced within 12 h of returning to the ward according to the protocol (1 kcal/ml feed at 10 ml/h rate for 6 h increasing by 10 ml/h every 6 h until 50 ml/h rate was achieved). A dietician then calculated an individual maintenance regime. This was based on the Schofield Equation and 25% stress factor and an individual activity factor. The maintenance regime aimed to achieve patient's individual energy requirements whilst remaining on the (1 kcal/ml feed for 24 h). Due to non-preventable interruption to feeding the regime was adjusted regularly to ensure at least 60% requirements were administered.

Organs were allocated to recipients according to national allocation policy; and implanted using standard technique: a pancreatic graft implanted intra-peritoneally, with pancreas venous drainage to systemic circulation (IVC) and drainage of the exocrine pancreas to jejunum. The immunosuppressive protocol was dual therapy of tacrolimus and mycophenolate mofetil. Lymphocyte depleting induction agent (Antithymocyte globuline) was administered prior to organ reperfusion. Patients received a therapeutic dose of Heparin via continuous i.v. infusion to prevent graft thrombosis.

Data was collected prospectively and analysed retrospectively; including donor characteristics (age, sex, Body Mass Index, creatinine, cause of death, history of hypertension and Cytomegalo virus), recipient characteristics (age, sex, Body Mass Index (BMI), history of dialysis), transplant related data (HLA mismatches, donor type, cold ischemia time, incident of post-transplant rejection, complications, reoperation, graft survival, patient survival, length of stay, routine blood results) and pre and post-transplant nutritional data (weight loss, gastroparesis, meeting nutritional requirements, history of parenteral nutrition, daily nutritional intake). Pancreas graft loss was recognised as the need to commence permanent insulin treatment and kidney graft loss as the need to dialyse for renal replacement therapy.

The end-point was to assess patients' daily post-transplant nutritional intake. This was calculated as a percentage of estimated nutritional requirements using the Schofield equation with a 25% added stress factor and relevant activity factor. Following a literature search and realistic targets our aim was to reach >60% requirements: achievement of ≥60% energy requirements by day-7 (7d-60%) and at the time of discharge (total-60%) [13,14].

All data analysed was carried out using IBM© SPSS® Statistics 20. Data was either expressed as median (and range) or mean (±SEM) and qualitative variables were described as percentage. Continuous data were compared by Student *t*-test and categorical data was analysed using the chi-square or Fisher exact test. Statistical significance was defined as a p value less than 0.05.